PROJECT OPERATIONS PLAN
REMEDIAL INVESTIGATION

Anchor Chemical Site
Hicksville, New York

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1.0 INTRODUCTION

The Anchor Chemical Site (Site) is located at 500 West John Street in Hicksville, Nassau County, New York, and is approximately 1.5 acres in size (Figures 1 and 2). The Site includes a building which housed a company (Anchor/Lith Kem-Ko) engaged in the production and mixing of cleaning solvents for the printing industry. A variety of chemicals, including organic solvents used in the manufacturing process, were stored in 17 underground storage tanks beneath the facility. The building on the Site is currently used as a furniture warehouse/showroom.

The Site is currently owned by K.B. Co., and managed by Spiegel Associates. It is included on the National Priorities List (NPL) because of known or threatened releases of hazardous substances. The Remedial Investigation (RI) is being conducted by Spiegel Associates with oversight by the U.S. Environmental Protection Agency (USEPA) Region II.

There have been several previous investigations at the Site. In 1977, the Nassau County Department of Health (NCDH) sampled liquid in one of the on-site drywells. In 1981, several underground tanks were found to be leaking and a ground-water monitoring program, utilizing on-site wells, was implemented. Six sets of ground-water samples were collected from the three wells between December 1982 to February 1985 by Lockwood, Kessler, and Bartlett, Inc.

Roux Associates, Inc. (Roux Associates) was first retained by Ruskin, Schlissel, Moscou, Evans, and Faltischek, P.C., then counsel to the Site Manager, in October 1987 to conduct further ground-water sampling at the Site. This sampling was performed to determine whether or not organic contaminants were still present. Roux Associates was subsequently retained by Spiegel Associates to carry out the RI.

The objectives of the RI are to characterize the Site with regard to the extent of soil and/or ground-water contamination which have resulted from past activities at the Site, and to provide the technical basis for choosing a preferred remedial alternative. A Remedial Investigation Work Plan has been prepared for this Site which describes the Site and its history, the tasks that will be accomplished, and the procedures to be followed.

This Project Operations Plan (POP) is intended to supplement the RI Work Plan and serve as a guide to field operations and Site management in the conduct of the RI. It is written to provide the type of information which will be useful to the Field Manager, health and safety personnel, and subcontractor personnel in the field.

The POP is composed of the following sections:

- Site Management Plan;
- Field Sampling and Analysis Plan;
- Health and Safety Plan; and
- Project Schedule.

2.0 SITE MANAGEMENT PLAN

2.1 Site Description

The Anchor Chemical Site is located at 500 West John Street on 1.5 acres of land (Figure 1). Land use in the area is predominantly commercial and recreational. The Site is bordered to the west by property owned by Jerry Spiegel, and leased to Stokvis Multiton Corp., a manufacturer of materials handling equipment, and to the south by West John Street. Located on West John Street, across from the Anchor Chemical Site, is Franklin Ribbon & Carbon Co., Inc., a typewriter supply shipping firm; Konig Seats, an automotive seat importing/exporting company; Reliance Utilities, an oil company; and Universal Shellac, a manufacturer of abrasive products.

Traversing west along the street are the Fishman Co., housewares; and General Instruments Corp., a large manufacturer of semi-conductors. To the north of the Site is land owned by K.B. Company and to the east, the Site is bordered by Cantiague Park. The park covers approximately 125 acres and contains various recreational facilities.

The building on the Site, which has been used as a manufacturing facility and as a warehouse, has included two solvent blending rooms, a product packaging room, several container and drum storage areas, two loading docks, a testing laboratory, and offices (Figure 2). There are 17 steel underground storage tanks, which range from 550 gallons (gal) to 4,000 gal in size, located beneath the concrete floor of the former mixing rooms (Figure 3).

At least five of these tanks have been decommissioned and filled with concrete. All piping to and from the tanks has been cut off and capped at wall and floor entry points. The status of the twelve remaining tanks (Nos. 1-4, 7, 9, 10, 12-14, 16 and 17) is unknown. These are to be inspected, and sampled if they contain liquids or sludges, as part of the RI. Inspection, sampling, emptying and decommissioning will be carried out in the solvent blending rooms. Each room has one personnel door leading outdoors, and one large door to the warehouse area. For each tank to be sampled it will be necessary to cut through the concrete floor, and to access a tank nozzle or manhole, or cut an opening in the tank.

These tanks have contained, and may still contain, some of the chemicals used by Anchor Chemical. The former contents of the tanks are described in Section 2.2. After the tanks have been determined to be empty or have been emptied, six soil borings will be drilled from inside the solvent rooms to sample soil below the underground storage tanks (Figure 3). These investigative tasks, which must be conducted from inside the building, represent the most difficult tasks of the RI. They are described further in the following sections of this POP.

The Site is completely fenced except for the front parking area and lawn, and access is restricted via gates at the front west and front east sides of the building. There is open access for drilling equipment to the boring and monitoring well locations in the front of the property. Care must be taken to avoid the overhead electrical lines at the front southeast corner of the Site, and the sewer and water lines under the front (south) of the Site as shown on Figure 4. Utility mark-outs will be made before drilling commences. Other below-grade utilities include drywells, PVC drain lines, and unused former cesspools.

Figure 4 also shows that access for drill rigs and emergency equipment to all other boring and monitoring locations west, north and east of the building is via gates and driveways on both sides of the building. Other drywells and PVC drain lines are shown west and north of the building.

Previous investigations have shown > 24,000 parts per billion (ppb) of chlorinated solvents in a liquid sample taken from a drywell north of the building in 1977. The exact location of the drywell is not known, but all drywells that existed during Anchor Chemical's occupation of the building are to be sampled during the RI.

Sampling of the three existing monitoring wells has shown approximately 30,000 ppb of volatiles in 1982, decreasing to 9 ppb in 1991. These wells and seven new wells will be sampled during the RI.

Based on the decline in levels of volatile organics there are no expected hot spots which would require unusual precautions for the outdoor investigative tasks.

Climatological data is provided for Nassau County as recorded at Mineola, New York. Average temperatures are 33° Fahrenheit (F) and 72°F for winter and summer, respectively. Total annual precipitation averages 42 inches, half of which falls between April and September. The average annual snowfall is 27 inches. The prevailing wind in Nassau County is from the west-northwest. During spring the windspeed is highest, averaging 14 miles per hour (Wulforst, 1987).

The soils in the area of the Site consist of loam to sandy loam soils which are generally well drained, and have slopes less than 3 percent. The entire surface of the Site, except a small front lawn area, is paved, so that all precipitation which occurs will drain as run-off. The run-off is collected in drywells on the Site. These drywells are not connected to a sewage system, but instead drain directly into the soils.

The average depth to water in this area is approximately 50 feet (ft) to 60 ft below land surface, (85 ft to 75 ft above mean sea level). County water-table maps (Koszalka, 1975) indicate that the general direction of ground-water flow in the area is from north-northeast to south-southwest. The presence of the ground-water recharge basin just east of the Site suggests the possibility that the ground-water flow direction in the Upper Glacial aquifer may be somewhat more to the west than the general county-wide trend. This will be determined in the course of the field investigation. In their 1985 report, Lockwood, Kessler, & Bartlett, Inc. (LKB) estimated the rate of horizontal ground-water flow at the Site, based on water levels measured in the three on-site wells, to be 0.45 ft per day (Lockwood, Kessler, & Bartlett, Inc., 1985).

There is no documented presence of wetlands in the area of the Site (Wulforst, 1987). The southern portions of Nassau County contain wetlands in the tidal flat areas, but these areas are not close to the Site.

2.2 Site History

This Section provides a brief history as it applies to the field investigation. A more detailed Site history is provided in the RI Work Plan.

The existing building was constructed in 1964 for the use of Anchor Chemical Company who occupied/leased the Site until 1978. Anchor Chemical Company (Anchor Chemical) operated a facility for the blending and packing of chemicals for the graphic arts industry (NCDH, 1983a). A list of the products made and raw materials used is provided in Table 1 (Anchor Chemical Co., 1977). Seventeen underground storage tanks were installed at the Site by the Franklin Company of Woodside, New York for Anchor Chemical in 1964. The 17 tanks were used to store the chemicals and solvents listed in Table 2 (Klein, 1981). A diagram of the tank layout under the solvent mixing rooms is shown on Figures 3 and 4 (Klein, 1981). Table 2 also gives the capacities, construction, and the products contained in each of the underground storage tanks at the Site, and all the available data on the testing and decommissioning of the tanks.

A 1977 industrial chemical survey indicated that the company purchased and used 50,000 gal of methylene chloride, 13,000 gal of 1,1,1-trichloroethane; 13,000 gal of ethylbenzene; 270 gal of petroleum tars; 40 gal of dyes and organic pigment; 50,000 gal of petroleum naphthas; 20,000 gal of ethylene glycol monoethylether; 2000 gal of glycerine glycols and 10,000 gal of nonionic ethoxylated linear alcohol per year (NCDH, 1977).

In 1977, NCDH determined that floor drains in the mixing rooms were connected to a storm-water drywell in the parking area north of the facility (The specific drywell is not known.) Water from washing of chemical spills in these rooms was discharged into the drywell (NCDH, 1983a). A sampling of the drywell by NCDH in 1977 revealed the presence of the following chemicals:

Chemical	Concentration (ppb)
1,1,1-trichloroethane	2,500
Trichloroethylene	>15,000
Tetrachloroethylene	>20,000

Subsequently, a spill prevention plan was submitted to NCDH and all lines leading from the building to the drywell were sealed (NCDH, 1983a and Jasser, 1977).

Of the 17 Tanks, 14 were leak tested in 1981 and three in 1982 or 1983. NCDH records indicate that 5 out of the initial 14 tanks tested in 1981 failed air-over-product tests. These five tanks were:

Tank No.	Contents
5	Naphthol spirits
6	Acetone
8	Mineral spirits*
11	Isopropyl alcohol
15	Textile spirits

*1,1,1-trichloroethane had been reported earlier (1965 and 1975)

These five tanks were taken out of service and decommissioned (Office of the Fire Marshall, 1981 a, b, c; NCDH, 1983b; and NCDH, 1983c). NCDH records also indicate that in 1983 these five tanks were abandoned in place and filled with concrete slurry in accordance with a county ordinance (Nassau County Fire Commissioner, 1984).

One of the three remaining tanks tested in 1982-83 (Tank No. 3 containing methylene chloride) was found to be leaking. The actions taken to decommission this tank are not known.

These six tanks which may have leaked, and the former floor drains which were connected to a drywell to the north of the building, are the only known sources of environmental contamination. Contaminant migration pathways would be to the ground water, and then south with the ground-water flow.

Three monitoring wells were installed by LKB in September of 1982. Soil samples collected by NCDH contained up to 490 ppb methylene chloride and 22 ppb 1,1,1-trichloroethane (1,1,1-TCA) (NCDH, 1982b). Ground-water samples collected by NCDH and LKB contained up to 24,000 ppb 1,1,1-TCA, 1,100 ppb tetrachloroethylene, 350 ppb dichloroethane, 41 ppb methylene chloride, and 55 ppb trichloroethylene. Chlorodibromomethane was detected in Well 3 at concentrations up to 170 ppb (Lockwood, Kessler & Bartlett, 1985 and NCDH, 1982b.).

NCDH records indicate that the decommissioning of the 12 remaining underground storage tanks by Barlo Equipment Corporation, was halted in August 1985 when Anchor/Lith Kem-Ko was evicted (NCDH, 1985). Tank decommission/abandonment documents for the 12 tanks were not available and the status of these tanks is unknown.

In 1987 Roux Associates was retained to resample the wells previously installed by LKB. Samples were collected on October 27, 1987 from Wells MW-1 and MW-2. Well MW-3 was not sampled due to the presence of a thick, paste-like clay lodged in the screen area which prevented proper purging. Additionally, 4 ft to 5 ft of silt were found at the bottom of wells MW-1 and MW-2 although this did not prevent the collection of water samples from these two wells. Well Number 3 was cleaned out so a sample could be collected, and a second round of sampling was conducted by Roux Associates in June 1989. Again, sediments were found in all the wells, although it was possible to obtain water samples. Wells MW-1 and MW-3 showed measurable quantities of 1,1,1-TCA (59 ppb and 8 ppb, respectively). Well MW-1 also had 4 ppb of 1,1-dichloroethane.

In October 1989, the Site was leased to the current occupant, J.D. Brauner, a furniture manufacturer. Several improvements/renovations were undertaken prior to their occupancy, including the installation of new windows, the gutting of offices, repaving the parking area and installation of new drywells for better drainage (McGill, 1990).

In February 1991, Roux Associates resampled the wells. Only 9 ppb of 1,1,1-TCA was detected in Well MW-3. All remaining wells contained no detectable levels of any volatile organic compounds.

2.3 Scope of the RI

The scope of the RI is based upon the past usage of the property, the chemicals stored and used, and results of sampling of drywells, soils and ground water.

2.3.1 Underground Tanks

There are 17 underground tanks beneath the concrete floor of two former solvent blending rooms at the rear of the building. As discussed above, six of these had failed leak tests of which five are known to have been decommissioned. The status of the remaining tanks is unknown and it is possible that they may still contain residuals of liquid and/or vapor phase materials listed in Table 2. Thus this area is a potential source of Site contamination, and also the major potential health and safety problem for this investigation.

Investigation of the status of these twelve tanks will be conducted by MPC Environmental Services (MPC), a hazardous site response contractor. MPC will access and, if the tanks are not empty, sample the contents of each tank. Portions of the concrete floor in the two solvent blending rooms will have to be removed, and tank contents sampled through tank nozzles, or through openings cut in the tanks with pneumatic tools. Subsequently the tanks will be emptied of any remaining chemicals and filled with concrete in place. Filling with concrete will not be done, however, until soil sampling beneath the tanks has been completed. Filling the tanks in place has been agreed to by EPA. Procedures to be followed and required health and safety precautions in the conduct of this work have been furnished by MPC, and are given in Appendix A.

During all work related to the underground tanks and until the tank investigation is complete, the Exclusion Zone will encompass the the room being investigated and the 70 square foot area outside the double doors into the warehouse. The Contaminant Reduction Zone and Support Zone (Clean Zone) will be outside the building, and along the eastern fence line (Figure 5). The Support Zone will be upwind of the Exclusion Zone.

After the investigation of the twelve tanks is completed, six vertical soil borings will be made in the area of the underground tanks (Figure 3) to investigate possible soil contamination from leaks and spills which may have occurred. Analyses of soil samples taken will be reviewed to determine if any contamination of the soil under the tanks needs to be remediated.

During these soil borings made inside the building, the Exclusion Zone will continue to encompass the room being investigated and the 70 square foot area outside the double doors into the warehouse (Figure 5).

2.3.2 Drywell Sampling

For several years the floor drains in the two solvent blending rooms drained to a drywell north of the building. Which drywell is not known for certain, although drywell DW-1 (Figure 4) is suspected. In 1977, NCDH water samples from that drywell contained >24,000 ppb of chlorinated volatile organics.

Therefore, in this RI, sediment and soil samples will be taken with a hand auger in all nine of the drywells on the Site that were in place during the period that Anchor Chemical occupied the Site (Figure 2). One of the nonoperational cesspools on Site will be sampled in the same manner.

2.3.3 Soil Borings and Monitoring Wells

The three existing monitoring wells have shown decreasing concentrations of volatile organics from 1982 to 1991, from approximately 30,000 ppb to 9 ppb. (It is not known if analyses have even been run for parameters other than volatile organics.) To fully evaluate ground-water conditions at the Site, seven new monitoring wells will be installed (Section 3.1). One new deep well will be logged continuously, while the remaining six wells will be logged at 5-foot intervals. Soil samples will be taken from the ground/water interface for each new well location and at the screen zone depth for all new wells. Two rounds of ground-water samples will be taken from all new and existing monitoring wells.

Development water and purge water from the new wells will be disposed in a new drywell which will not be sampled for soil or sediment and cannot overflow to an old drywell, or at an alternate location which will not impact any of the drywells before completion of drywell sampling. Two weeks after well development, the first round of ground-water samples will be collected.

6 x 2

Nine soil borings will be drilled and two soil samples selected from each boring for laboratory analyses (Section 3.3). During this phase of the investigation, the wells will be resampled for confirmation of ground-water analyses.

2.4 Organization and Staffing

The RI for the Anchor Chemical Site will be managed by Roux Associates, as the prime contractor. The overall project staffing and organization is shown in Figure 6. Resumes of Key Personnel are given in Appendix B. The duties of the Roux Associates personnel to be assigned to this project are as follows:

Project Principal - Paul Roux will have overall responsibility for the project. He will plan the project, review all data collected, and assist with interpretations and report preparation. Mr. Roux will work on remedial alternative screening and will be available for meetings as requested.

Project Manager - Joanne Yeary will have overall responsibility for all aspects of the RI portion of the project and will be the contact for USEPA on all RI project matters. Ms. Yeary will plan and direct the field investigation, be present on-site to observe major activities, review all data generated, write reports, and meet with USEPA and others as requested.

Field Manager - Harry Gregory will be responsible for the drilling and sampling program, including inspection of drilling equipment and supplies prior to start of job, inspection of existing wells, decisions regarding necessary changes in well construction to meet actual field conditions, supervision of all drilling, logging of all samples, inspection of well construction activities, preparation of detailed logs, measurement of water levels when no drilling is in progress, coordination of drilling and sampling activities with other Site activities, and implementation and enforcement of health and safety programs. A technician will be available to assist Mr. Gregory with the health and safety program as needed.

Quality Assurance Officer - Michael DeCillis will be the Quality Assurance Officer for this project. Mr. DeCillis will inspect each major phase of the field work to ensure that all protocols are followed, and will prepare QA reports to be submitted to the Project Manager. Mr. DeCillis will also serve as a senior technical advisor and review all documents prior to submission.

Principal Engineer - James Worrall will review chemical and hydrogeologic data and assist the Project and Task Managers in interpretations and report preparation, where appropriate, during the Remedial Investigation.

Health and Safety Officer - Linda Wilson will be the Health and Safety Officer for this project. Ms. Wilson will prepare the Health and Safety Plan which provides specific procedures to be implemented for personal protection. She will revise the Health and Safety Plan, if required, based on the findings of preliminary Site investigations.

Geologist/Technician - Roux Associates' geologists and technicians will assist where necessary with water-level measurements, photoionization measurements, sampling, pick-up and delivery of equipment and samples to facilitate field operations, and decontamination of core barrels and other equipment. Geologists and technicians will be under the direct field supervision of the Field Manager, Harry Gregory.

2.5 Site Security

Because the Site is fenced, the drilling rig will remain on the Site. Soil samples and supplies will be stored in the building on Site or in a suitable locked facility, such as a trailer brought to the Site.

All sampling equipment, sample bottles, field notes, and water-level measuring equipment will be the responsibility of the Field Manager (hydrogeologist) and will be locked in his field vehicle or other secure location. It is Roux Associates' policy to duplicate all field notes on a daily basis and keep the duplicate set in a secure place away from the Site.

Under the supervision of Roux Associates, the Anchor Chemical Site will have three regulated working zones (Figure 7). The three working zones are as follows:

- Support (Clean) Zone: This zone is free of contamination and is the location of the command post. Site workers will be permitted to park vehicles in this zone. This zone is upwind of the potentially contaminated areas.

- Contaminant Reduction Zone: This zoned area is where all decontamination procedures will take place.

- Exclusion Zone: This zone encompasses all the potentially contaminated areas.

Access of individual contractors, other than designated EPA or EPA Contractor observers, to the Support Zone, Contaminant Reduction Zone and the Exclusion Zone will be as follows:

MPC personnel and a Roux Associates observer will be the only persons permitted in the north end of the building, or the room being investigated (which will be the Exclusion Zone) and the Contaminant Reduction Zone during the underground tank sampling, emptying and decommissioning.

Roux Associates' geologist and technician, MPC's driller and helper will be the only personnel permitted in the Exclusion Zone and Contaminant Reduction Zone during the soil borings in the underground tank areas.

Roux Associates' geologist and technician and MPC's driller and helper will be the only personnel permitted in the individual Exclusion Zones and Contaminant Reduction Zones around each specific boring area and monitoring well area.

Roux Associates' geologist and technician will be the only personnel permitted in the individual Exclusion Zones and Contaminant Reduction Zones around each specific sampling area.

All Site workers and designated EPA or EPA Contractor observers will be permitted in the Support Zone during all tasks of the RI.

In addition, EPA may specify individuals who will have access to Exclusion Zones and Contaminant Reduction Zones to observe activities or collect duplicate samples.

2.6 Decontamination Procedures

Decontamination will be accomplished in the Contaminant Reduction Zone at the northeast end of the building (Figure 7). Wash water (and potable water) will be obtained from a city water supply, which will be made available at the north end of the building. Decontamination procedures for specific items are described below.

Sampling Devices

Pumps will be cleaned between uses with a steam cleaner and scrub brush, and rinsed with demonstrated analyte-free water. New tubing will be used at each well. Split-spoon core samplers and all other sampling equipment will be decontaminated following protocols in Appendix C.

Well Construction Materials

All materials such as well casings and screens will be decontaminated before well installation by steam cleaning and rinsing with demonstrated analyte-free deionized water.

Tools

Tools such as wrenches and shovels used during the drilling operations which come into contact, directly or indirectly with sediment and/or water from a boring will be decontaminated by steam cleaning and rinsing with demonstrated analyte-free water.

Heavy Equipment

Drilling rigs will be washed with water under high pressure. The rig will be decontaminated before entering the Site and before leaving the Site. However, those components in direct contact with contaminants, such as auger flights, will be decontaminated with a steam cleaner between holes to prevent cross contamination.

Decontamination Water

Liquids resulting from decontamination activities will be collected and retained until tested to determine the proper method of disposal. Retained liquids will be stored on Site according to RCRA requirements pending proper disposal.

2.7 Quality Assurance

All field work will be done by or under the direct supervision of the Field Manager, an experienced hydrogeologist from Roux Associates. A Quality Assurance (QA) Manager will also be assigned to this project. The QA Manager will be present for critical phases, will inspect Site activities, review procedures to ensure that all protocols are being followed, inspect field notes, check Chain-of-Custody forms, and observe sampling activities. The QA Manager will prepare Roux Associates Internal Quality Assurance Reports that will be submitted to the Project Manager.

The Field Manager will have direct responsibility for following all protocols, for ensuring that the Health and Safety Plan is followed, ensuring that all wells are constructed to specification and properly developed. The USEPA's satisfaction regarding well construction will be the ultimate criterion for acceptance.

In addition to the above, a Quality Assurance/Quality Control plan is presented in Appendix D.

2.8 Sample Handling

All samples (soil, sediment and water) will be collected according to the appropriate protocols (Appendix C).

For preservation of cyanide samples, if oxidizing agents or sulfide are present in the sample, the following procedures must be used.

- Test a drop of sample with potassium iodide-starch test paper (KI-starch paper); a blue color indicates the present of oxidizing agents and the need for treatment. Add ascorbic acid, a few crystals at a time, until a drop of sample procedures no color on the indicator paper. Then add an additional 0.6 g of ascorbic acid to each liter of sample volume.

- Test a drop of sample on lead acetate paper previously moistened with acetic acid buffer solution. Darkening of the paper indicates the presence of sulfide. If sulfide is present, powdered cadmium carbonate should be added until a drop of the treated solution does not darken the lead acetate test paper and filter solution before raising the pH for stabilization.

All samples will be placed in the appropriate precleaned jars or bottles provided by the laboratory from their Sample Bottle Repository (SBR) for the specific analyses to be performed. All jars and bottles will be prelabeled with the following:

- a unique code number (recorded in the field book);
- the boring or well number;
- the depth (if appropriate);
- the type of sample;
- date and time of collection;
- names of individuals collecting sample;
- type of analysis to be conducted; and
- sample preservation or none.

After the sample jars and/or sample bottles have been prelabeled with the above information, the labels will be covered with clear waterproof tape.

Bottles or jars will be sealed with the custody seal, placed in plastic bags and packed in ice at 4° Celsius (C). Ice chests will have been precleaned and kept closed until needed. When sampling is completed for the day, all ice chests will be drained of water and repacked with fresh ice. Copies of the Chain-of-Custody forms will be placed inside the chests. The chests will then be sealed with a Custody seal and taken directly to the laboratory, or to Federal Express, by the geologist.

The following day the laboratory will report the receipt of the chest, condition of the chest, and condition of the samples to Roux Associates. Any damaged samples will be retaken on the following day and reshipped to the laboratory.

2.9 Record Keeping

All information pertinent to field activities will be recorded in a bound, waterproof field book. Duplicates of all notes will be prepared each night and kept in a secure place away from the Site. Proper documentation will consist of all field personnel maintaining detailed records of all work accomplished including the following:

- date and time of work events;
- purpose of work;
- names and addresses of people relevant to project;
- a description of all methods;
- a description of all samples;
- number and size of samples;
- a description of sampling point;
- date and time of collection of sample;
- sample collector's names;
- reference to Site map;
- field observations;
- any field measurements with portable instruments;
- any problems encountered and how they were addressed;
- sample collection equipment used;
- field analytical equipment used; and
- any calibration data for equipment including calculations and results.

Photographs will be used to document the hydrogeologist's observations where appropriate. Items such as the date/time, location, and sequential number of the photograph and roll number will be recorded in the field book.

Each sample collected in the field will be labeled using waterproof ink. The label will include the following as a minimum:

- a unique code number (recorded in the field book);
- the boring or well number;
- the depth (if appropriate);
- the type of sample;
- the date and time of collection; and
- the name(s) of individuals collecting sample.

The hydrogeologist will transfer this information to the log book after filling out the

The number of persons involved in collecting and handling samples will be kept to a minimum. Roux Associates will use a team of two people (a hydrogeologist and technician) to purge wells and collect the samples.

Strict Chain-of-Custody procedures will be maintained for each sample (Appendix E). This Chain-of-Custody will comply with USEPA approved procedures.

2.10 Enforcement of Safety Procedures

It will be the responsibility of the Field Manager to enforce the established health and safety procedures. All Site workers, including all subcontractors, will be given verbal and written instructions regarding Site health and safety procedures. The Field Manager will, if necessary, stop ongoing work any time an unsafe condition occurs until the condition is corrected. Health and safety procedures are explained in the Health and Safety Plan (Section 4.0).

2.11 Coordination of Field Activities

The Field Manager will be responsible for coordination of all Site activities. These include: scheduling of subcontractors, implementation and enforcement of health and safety program, supervision of all field activities, inspection of well construction, preparing detailed logs, ensuring that all tasks are carried out in a timely and efficient manner, and keeping the Project Manager up to date on all activities and costs incurred to date.

2.12 Material Disposal

Development and purge water will be directed towards and disposed of into one of the new drywells on Site. If there is a possibility of overflow to one of the old drywells, water will instead be directed to a reinfiltration basin which will be dug at the north end of the property. The reinfiltration basin, if needed, will be installed adjacent to the Support Zone and away from MW-6. The new drywells, which were installed in 1989, are currently in use and receive stormwater runoff from the Site. The water will be returned to the Upper

Glacial aquifer from which it will be removed. Based upon past ground-water sampling, containment of development water is not indicated. Again, care will be taken to ensure that this water does not impact any drywell locations designated for sediment or soil sampling.

Drill cuttings will be stored in a covered dumpster on Site until all drilling and collection of soil borings is completed. At that time, the composited drill cuttings and soil material will be sampled and analyzed for Target Compound List (TCL) volatile organic compounds, semivolatile organic compounds and metals. This choice of analytical parameters is based on the knowledge of the materials which were contained in the tanks which were found to be leaking (Section 2.2), constituents found in ground water to date (Section 2.2), and for metals contained in products (see Table 1).

Decontamination liquids which may contain dilute HNO_3 and acetone will be drummed and disposed of as hazardous waste.

For purposes of possible classification of waste soil under RCRA, Toxicity Characteristics Leaching Procedures (TCLP) analyses will be run for the RCRA toxicity characteristics constituents (including chromium, carbon tetrachloride, tetrachloroethylene, trichloroethylene, 1,1-dichloroethylene), and reactivity, ignitability and corrosivity characteristics. All appropriate RCRA storage, transport and disposal regulations will be followed for waste soil and drummed decontamination liquids.

3.0 FIELD SAMPLING AND ANALYSIS PLAN

This field Sampling and Analysis Plan (SAP) incorporates Task 3 - Installation of Monitoring Wells, Task 4 - Characterization of Ground Water and Sediment Based on Target Compound Analyses, and Task 6 - Drilling of Soil Borings and Sampling of Soil and Ground Water. All tasks are described in the document titled "Work Plan for Remedial Investigation: Anchor Chemical Site" (Roux Associates, 1990). This field SAP includes the following:

- a description of sampling and analytical objectives;
- the number, type and location of samples to be collected during the field investigation;
- the Site-specific quality assurance requirements in accordance with the Quality Assurance Project Plan for Guidance for USEPA Region II; and
- the detailed procedures for field activities and data management elements.

3.1 Task 3 - Installation of Monitoring Wells

This task consists of the following subtasks:

- Subcontracting;
- Mobilization; and
- Monitoring-Well Installation.

3.1.1 Subcontractors

Subcontractors have been identified to perform the work on Site. Assignment of work is given in Table 3. Roux Associates may change subcontractors, if necessary to satisfactorily complete the project. Any changes in subcontractors must be approved by the EPA.

3.1.2 Mobilization

This subtask consists of field personnel orientation, equipment mobilization, and marking the sampling locations in the field.

Each field team member will attend an orientation meeting to become familiar with the history of the Site, health and safety requirements, and field procedures.

Equipment mobilization will entail the ordering, purchasing, and if necessary, the fabricating of all sampling equipment needed for the field investigation. A complete inventory of available equipment required will be secured.

Location for the soil borings and ground-water monitoring wells will be marked out at the start of the Site operations. The locations will be measured from existing landmarks and provisions will be made to accommodate Site activities currently in progress. A surveyor licensed in the State of New York will be retained by Roux Associates to survey sampling locations after all wells have been installed and soil borings completed.

3.1.3 Installation of Monitoring Wells

A total of seven ground-water monitoring wells will be installed at the Site (Figure 4). Four wells (MW-4, MW-5, MW-6, and MW-7) will be screened in the Upper Glacial aquifer at approximately 70 ft below land surface, and three wells (MW-1D, MW-5D, and MW-7D) screened in the Magothy aquifer at approximately 140 ft below land surface to form three shallow/deep monitoring well clusters at locations MW-1, MW-5, and MW-7.

The monitoring wells will be drilled using a truck-mounted hollow stem auger rig. Drill cuttings will be handled in accordance with procedures outlined in Section 2.13. Upon completion of the borehole, a 4-inch diameter schedule 10, threaded stainless steel casing (type 304) with a 10-foot long stainless steel screen with a .20 slot screen size will be installed through the auger. When the screen and casing are in place, a clean, Morie No. 2 graded silica sand will be used to pack the annular space around the screen. The sand pack will be installed through a tremie pipe to prevent bridging.

At the well clusters, the deep well will be installed first. Split-spoon samples will be taken every five feet. One deep well will be logged continuously. The split-spoon sampler will be decontaminated between sample intervals and sample locations according to procedures in Appendix C, page 1. A photoionization meter will be used to scan the split-spoon soil samples for each well. The screened interval for the shallow well will then be chosen to test the zone that shows the highest readings, or if all readings are the same, the top of the screen will be set at 10 feet below the water table.

5 x 2 - 10

Two soil samples from each well (or cluster) location will be selected for TCL analysis. One sample will be from the screen zone and one from the water table. If floating organics are suspected based on the results of analyses of soil samples from the water table, a discussion will be held with EPA to determine if wells bridging the water table will be installed at these locations during the soil boring program.

When the well screen has been properly sand packed, two feet of fine sand will be placed immediately over the sand pack and a five foot thick layer of clean, certified 100% bentonite high solids grout will be tremied onto the top of the fine sand to seal the annular space. Water will then be added to hydrate the bentonite for a one hour period before proceeding.

The remainder of the annular space will then be grouted using a tremie pipe with a cement/bentonite slurry to 2 ft below grade. Well MW-6 will be finished above grade as shown on Figure 8. Well Clusters MW-1, MW-5, and MW-7 will be finished flush with grade, have locking caps installed, and protective meter boxes cemented in place over each well. USEPA guidelines will be followed for all steps of well drilling and construction. Drill cuttings will be stored on Site and samples analyzed for RCRA disposal requirements. All RCRA regulations will be followed (e.g., closed dumpster).

Upon completion, each well will be developed by surging and pumping to remove any fine sediment from around the screen zone and to establish a good hydraulic connection between the aquifer and well. Development of the monitoring wells will be accomplished by the use of a stainless steel submersible pump, a stainless and teflon geoguard pulse pump, or by bailing the well with a stainless steel hand bailer. Development will continue until the water is less than 50 nephelometric turbidity units, as required by the NYSDEC. Development water will be disposed in accordance with Section 2.12, Material Disposal.

The monitoring well locations and elevations will be surveyed by a New York State licensed land surveyor to the nearest 0.01 ft with a closure of ± 0.05 ft for the Site. The measuring point elevation will be marked on each well casing and all water-level measurements will be referenced to this point. Water-level measurements will be collected using a steel tape which has been washed with soapy water, and rinsed with demonstrated analyte-free water. All elevations and depths, including well casings, will be referenced to mean sea level.

Information on the vertical hydraulic gradient will be provided from water levels measured in the three monitoring well clusters. The responsiveness of each well to water-level fluctuations in the aquifer will be tested by measuring recovery rates after pumping. To obtain further information regarding the hydraulic conditions underneath the Site, several specific capacity tests will be performed to estimate the hydraulic conductivity of the aquifer. The method is given in Appendix C. At a minimum, specific capacity tests will be run on MW-1D, MW-4, MW-7, MW-7D and MW-6. Depending on geologic conditions encountered, other wells may be tested. Specific capacity tests express the productivity of a well obtained by dividing the rate of discharge of water from the well by the drawdown of the water level in the well. Estimates of transmissivity can be obtained using a graphical method which relates the specific capacity of the well to the transmissivity, or by using a modified form of the nonleaky artesian formula (Walton, 1962) as follows:

$$Q/s = T/[264 \log (Tt/2693 r_w^2 S) - 65.5]$$

where:

Q/s	=	specific capacity, in gpm/ft
Q	=	discharge in gpm
s	=	drawdown, in ft
T	=	coefficient of transmissibility, in gpd/ft
S	=	coefficient of storage, fraction
r_w	=	nominal radius of well, in ft
t	=	time after pumping started, in min

The equation assumes that: 1) the well penetrates and is uncased through the total saturated thickness of the aquifer, 2) well loss is negligible, and 3) the effective radius of the well has not been affected by the drilling and development of the well and is equal to the nominal radius radius of the well.

An attempt will be made to redevelop the three existing wells (MW-1, MW-2, and MW-3). If these three wells can be redeveloped, they will be fitted with locking caps, and sampled during the first round of ground-water sampling. If MW-1 and MW-2 cannot be used, they will be replaced with new wells located within ten feet of their present position, and the new wells will be sampled during round one. If MW-3 cannot be used, it will not be replaced. Rather, MW-4 will be considered an acceptable substitute.

3.2 Task 4 - Characterization of Ground Water and Sediment Based on Target Compound Analysis

Two weeks after the monitoring wells have been installed and developed, ground water will be sampled and analyzed following USEPA approved protocols. The ground-water samples will be analyzed for the compounds on the TCL plus the 30 highest peaks of a forward library search. Analyses for Target Analyte List (TAL) parameters will be performed on unfiltered samples.

The initial characterization will also include the collection and analysis of sediment and sludges in nine original drywells DW-1 through DW-9 and one of the nonoperational cesspools (Figure 4). The samples will be collected using a stainless steel hand auger. The hand auger will be advanced to a depth of approximately two feet below the upper surface of sediments in the drywell or cesspool. This depth is deep enough that volatile organics will be present and shallow enough to be potentially the most contaminated with metals and semivolatiles, if any are present. These ten samples will also be analyzed for TCL compounds. This task will involve only personnel from Roux Associates. Protocols for this sampling are given in Appendix A. Table 5 gives the proposed sampling program for the field investigation.

A square drain is located just south of the southern loading dock (Figure 4). It is not known if this was existing at the time of Anchor Chemical's occupancy of the Site, or if it was added later. If the latter cannot be established, this drain's sediments will be sampled along with the nine original drywells.

3.3 Task 6 - Drilling of Soil Borings and Sampling of Soil and Ground Water

Nine soil borings will be drilled at possible contamination source areas and the locations will be surveyed by a licensed surveyor. This includes borings to the water table in three of the nine original earth bottom drywells (Figure 4); one in drywell DW-1 where a spill of organic liquid was suspected. Two other drywells which have the highest levels of VOCs in the sediment samples (Task 4) will also be selected for boring locations. Two samples will be selected for laboratory analyses from each boring, based on field photoionization meter readings.

The remaining six borings will be drilled adjacent to the underground tank areas (Figure 3). As shown in Figure 3, the tank area has been subdivided into three groups and a minimum of two borings will be drilled in each group. The exact location of each boring location will be determined in the field with EPA approval.

The borings will be straight down borings from inside the building near the tanks. The borings will be as deep as feasible with the drilling equipment available, but under any circumstances will extend at least ten feet below the bottom of the tanks. The maximum depth of the boring will be the water-table. Two samples will be selected for laboratory analyses from each boring, based upon field photoionization meter readings.

Drilling of the tank borings will be accomplished using a truck-mounted or skid-mounted auger rig. Split-spoon soil samples will be collected at five-foot intervals from land surface to the bottom of the boring. The samples will be logged and screened using a portable photoionization meter by a Roux Associates hydrogeologist. The samplers will be decontaminated according to procedures in Appendix C.

Upon completion, each boring will be grouted to land surface with a bentonite/cement grout. The drill cuttings removed from the boring during drilling will be stored on Site in a closed dumpster. The drill rig and all equipment which came in direct or indirect contact with the subsurface material will be decontaminated using high pressure steam before moving on to the next drilling location.

A total of 18 soil samples and 10 ground-water samples will be analyzed during round two. Data from the first round of ground-water and sediment sampling will be analyzed so that an appropriate analytical suite for the second round can be selected. The necessary time for analytical work and data validation is included in the project schedule. The selected suite of analytical parameters will be those compounds on the TCL that were detected above instrument detection limits by Roux Associates, or the USEPA, in the ground-water, soil, and sediment samples during Task 4.

3.4 Decontamination Procedures

Prior to any drilling activities on Site, all drilling and sampling equipment will be decontaminated. Decontamination of the drilling rig, tools and sampling equipment will be accomplished at the decontamination pad set up on Site. The pad will consist of a bermed area lined with 6 millimeter (mil) thick plastic sheeting. The decontamination area will be maintained so that all water generated during decontamination will be collected and retained. See Section 2.12 Material Disposal. The larger equipment such as the drilling rig, rods, and augers will be decontaminated with high pressure steam. Split-spoon samples and more delicate equipment will be cleaned using methods described in of Appendix C. Solvents and acid rinses will be containerized separately and properly disposed of following all RCRA regulations.

All sampling equipment will be decontaminated between samples and the drilling rig and other equipment will be cleaned between boreholes. At the end of the drilling program all equipment will be thoroughly decontaminated before leaving the Site.

During all decontamination procedures neoprene gloves will be worn to prevent phthalate contamination of the sampling equipment.

3.5 Field Quality Assurance/Quality Control Protocol

All downhole drilling equipment will be steam-cleaned upon arrival at the Site, and between boring locations. Development and purge pumps are to be cleaned between each use by steam cleaning the outside, and passing clean (potable) water through the pump.

Provision will be made for decontamination of all sampling equipment. All sampling equipment will be cleaned between each use following the procedure in Appendix C. Decontaminated sampling equipment will then be wrapped in new aluminum foil pending use for sample collection. Stainless steel single-stranded wire or polypropylene monofilament (i.e., fishing line) five-foot long leaders will be used to suspend the sampling bailer from the rope. Leaders, and gloves worn for sample handling, will be discarded between sample collections.

Samples for volatile organic analysis will be handled quickly and carefully to minimize vapor loss to the atmosphere. Ground-water samples for volatile organic analysis will be packaged in 40-milliliter (ml) vials with teflon septas. Ground-water samples for metals and volatiles will be properly preserved in the field according to USEPA Contract Laboratory Program (CLP) protocol prior to laboratory submittal.

Trip blanks and field (equipment) blanks will also be submitted for analysis along with the field samples. Trip blanks will consist of laboratory cleaned sample containers (two 40-ml VOA vials) filled with laboratory demonstrated analyte-free water. The criteria for analyte-free water is given in the last page of Appendix F. The water will be obtained from the analytical laboratory. Trip blanks will be provided at a frequency of one per cooler containing VOC samples per sampling day. They will be handled and transported in the same manner as the field samples acquired on that day, and submitted to the laboratory for volatile organic analysis. Trip blanks will not be opened in the field. A field blank will consist of laboratory cleaned sample containers which are transported empty into the field. Laboratory demonstrated analyte-free water is passed through or over the sampling equipment used on that particular day, and collected in the cleaned containers. Field blanks will be collected at a frequency of one per equipment type per day and analyzed for the same parameters as the field samples.

One in every 20 samples submitted for laboratory analysis will be submitted in duplicate. The duplicate sample will be labeled with a unique designation (a blind duplicate) as a QA/QC check on the laboratory. If less than 20 samples are collected for a particular medium, one sample is still to be collected in duplicate. The duplicate sample will be analyzed for the same analytical parameters as each field sample.

In addition, one matrix spike and matrix spike duplicate sample will be collected for each media sampled (e.g. ground water, soil/sediment).

Internal laboratory QA/QC procedures will be followed, the methodologies of which are standard under the USEPA Contract Laboratory Protocol Quality Control Program. These include gas chromatography/mass spectrometry (GC/MS) instrument tune and mass calibration, system performance check and initial calibration, continuing calibration check, method blank, internal standards, and matrix and surrogate spiking procedure.

All sample bottles will be prepared in accordance with CLP sample repository Statement of Work (SOW). The bottles will be provided by the analytical laboratory.

All field observations will be recorded in the field book. Entries will be dated and initialed by field sampling personnel on a daily basis. The log book will be paginated and all notes are to be entered in waterproof ink. Full Chain-of-Custody control will be maintained throughout the sampling program.

Samples will be packaged in laboratory-issued sample containers and stored on ice pending same day or overnight shipment to the laboratory. Soil samples for volatile organic analysis will be collected immediately upon opening the split-spoon sampler.

3.6 Analysis Validation Program

Trip blanks, field blanks, and duplicate samples will be used to verify the quality of the field sampling and laboratory results. The analytical laboratory will provide the demonstrated analyte-free deionized water and will keep the required records for auditing purposes. A brief description of each follows:

- Trip blank: a sample of demonstrated analyte-free deionized water will be put into a sample bottle by the laboratory prior to arriving at the Site and then handled in the same manner as the actual samples. This can be an indicator of sample contamination during the entire sampling process. A separate trip blank will be supplied for VOAs in an aqueous matrix.

- Field blank: at the beginning of the day prior to a sampling event, a sample of demonstrated analyte-free deionized water will be put into a decontaminated bailer, and then into a sample bottle while on Site. The same method will be used to collect field blanks for a decontaminated split spoon and a decontaminated mixing bowl. Field blanks are prepared as if they are water samples regardless of the matrix being sampled. The samples will then be handled in the same manner as the actual samples. This can be an indicator of sample contamination due to on-site activities or contaminated sampling equipment.

- Duplicate samples: Duplicate samples will be taken from a single volume of water in the bailer, or soil in the split-spoon sampler. These will be submitted to the selected laboratory "blind" for comparison of analytical results.

- Matrix Spike/Matrix Spike Duplicate: One matrix spike/matrix spike duplicate sample will be collected for each media sampled (e.g., ground water, soil/sediments). These samples will be collected in addition to the primary sample.

3.7 Data Management

All data generated during the remedial investigation will be accurately communicated and properly managed. The two components of data management essential to a properly performed remedial investigation are data processing and storage and quality assurance. Data processing and storage techniques to be implemented for this study are described in this section. Quality assurance is described in detail in Appendix D, Quality Assurance/Quality Control Plan for the Site.

3.7.1 Documenting Field Measurements and Observations

All field measurements and observations will be recorded in project log books, field data records, or similar types of record-keeping books. Field measurements will include pH, temperature, conductivity, turbidity, and any other parameters essential to the RI. All data will be recorded directly and legibly in field log books with all entries signed and dated. If entries must be changed, then the change will be made with a single stroke mark and not obscure the original entry. The reason for the change will be identified at the time the change is made, and initialed and dated. Field data records will be organized into standard formats whenever possible, and retained in permanent files. At the end of each day in the field, the field books will be photocopied by the Field Manager and kept in a locked file.

3.7.2 Sample Identification and Chain-of-Custody

All samples will be placed in the appropriate precleaned jars and/or bottles provided by the laboratory for the specific analysis to be preformed. All jars will be prelabled with the following (Appendix E):

- a unique code number (recorded in the field book);
- the boring or well number;
- the depth (if appropriate);
- the type of sample;
- date and time of collection;
- names of individuals collecting the sample;
- type of analysis to be conducted; and
- sample preservation or none.

Sample possession will be traceable from the time the sample is collected or developed until it and the derived data are introduced as evidence for legal proceedings. Chain-of-Custody procedures will be followed to document sample possession (Appendix E). A sample is considered under your custody under the following conditions:

- it is in your possession; or
- it is in your view; after being in your possession, or
- it is in your possession and you locked it up; or
- it is in a designated secure area.

If a cooler of samples is to be shipped to the analytical laboratory, a signed custody seal will be placed on the cooler (Appendix E).

4.0 HEALTH AND SAFETY PLAN

4.1 Introduction

This Site-specific Health and Safety Plan (HASP) has been prepared in accordance with 29 CFR 1910.120 and Roux Associates Standard Operating Procedures. It addresses all activities associated with the Anchor Chemical Site except the underground tank investigation, and will be implemented by the designated Site Health and Safety Officer (SHSO) during Site work. The Health and Safety Plan for the underground tank investigation is given in Appendix A.

Compliance with this HASP is required for all persons and third parties who enter this Site. Assistance in implementing this HASP can be obtained from the Roux Associates Health and Safety Manager. The content of this HASP may undergo revision based upon additional information made available. Any changes proposed must be reviewed and approved by the Roux Associates Health and Safety Manager or his designee.

Scope of Work:

The objectives of the Remedial Investigation are to characterize the Site with regard to the extent of soil and/or ground-water contamination which have resulted from past activities at the Site, and to provide the technical basis for choosing a preferred remedial alternative.

4.2 Key Personnel

Implementation of safe Site investigation procedures are described in this section.

- **Project Manager**

Ms. Joanne Yeary will be responsible for the overall implementation and monitoring of the health and safety program by:

a. providing the appropriate protective equipment and ensuring that is used in compliance with the HASP;
b. providing the proper training to ensure personnel health and safety;
c. ensure that all personnel are apprised of the potential hazards on the Site;
d. establish safe work practices to prevent possible injury and exposure to health hazards; and

e. communication with the Site Health and Safety Officer

- **Site Health and Safety Officer**

Mr. Harry Gregory will be the Site Health and Safety Officer and will also supervise the field program. Mr. Gregory will be responsible for the direct supervision of field personnel including:

a. health and safety program compliance (see Section 4.2);
b. maintaining a high level of health and safety awareness among the employees (including employees of the tenant) at the Site; and
c. reporting accidents and undertaking corrective actions.

The Site Health and Safety Officer (SHSO) will be present on Site during the conduct of all field operations, will be responsible for all health and safety activities and has the authority to make all health and safety related decisions. The determination of hazard levels will be made by the SHSO in consultation with the CHSM. The SHSO has stop-work authorization which he will execute upon determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation, such as detrimental weather conditions, or photoionization readings exceeding PEL or TLV values. Authorization to proceed with work will be issued by the OHSS (consultation with the SHSO) after such action. The SHSO will have primary responsibility to initiate and execute contact with emergency facilities and personnel when this action is appropriate. All Site workers will have knowledge of the appropriate emergency contacts and may initiate these contacts if necessary. Assistant SHSOs may be designated by the SHSO, if required, but must be pre-qualified and approved by the OHSS and CHSM.

- **Field Personnel**

All field personnel will have the appropriate training (Section 4.3) and will report directly to Mr. Gregory. They will be required to:

a. conform with the provisions of the HASP;
b. be aware of the potential hazards of the Site; and
c. report any accidents or hazardous conditions to Mr. Gregory.

- **Corporate Health and Safety Manager**

Stephen Smith, the Corporate Health and Safety Manager (CHSM) has overall responsibility for development and implementation of the HASP. He also shall approve any changes to the HASP due to modification of procedures or newly proposed Site activities.

Health and safety related duties and responsibilities will be assigned only to qualified individuals by the CHSM. Before personnel may work on Site, currentness of acceptable medical examination and acceptability of health and safety training must be approved by the CHSM.

- **Office Health and Safety Supervisor**

Linda Wilson, the Office Health and Safety Supervisor (OHSS) serves as the local area office designee of the CHSM and aids the CHSM in assuring that the policies and procedures of the HASP are implemented by the SHSO. The OHSS is responsible for providing the appropriate monitoring and safety equipment and other resources necessary in implementing the HASP. The OHSS ensures that all personnel designated to work on Site are qualified according to applicable EPA, OSHA and state requirements.

Responsibility	Name	Telephone Numbers
Roux Health and Safety Manager	**Stephen C. Smith**	**(404)270-5145**
Office Health and Safety Supervisor	Linda M. Wilson	(516)673-7200
Site Health and Safety Officer	Harry Gregory	(516)673-7200
Project Manager	Joanne Yeary	(516)673-7200
Field Manager	Harry Gregory	(516)673-7200

4.3 Training Requirements

4.3.1 Basic Training

All Site personnel who will perform work in areas where there exists the potential for toxic exposure will be health and safety trained prior to performing work on Site per OSHA (29 CFR 1910.120(e)). This training includes a 40-hour OSHA training course (minimum) and an annual refresher course (8 hours), as appropriate. Training records will be maintained by the SHSO on Site and as described in Section 4.3.4. Each individual will sign a daily log to ensure that proper protective equipment and training have been received.

4.3.2 Site Specific Training

Training will be provided by the SHSO that will specifically address the activities, procedures, monitoring and equipment for the activities, procedures, monitoring and equipment for the Site operations to all Site personnel and visitors. It will include Site and facility layout, hazards, emergency services at the Site and will detail all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity. Site-specific training will be documented and kept as part of the project records.

4.3.3 Safety Briefings

Project personnel will be given briefings by the SHSO on an as-needed basis to further assist them in conducting their activities safely. Safety briefings will be provided when new operations are to be conducted, changes in work practices must be implemented due to new information made available and before work is begun at each work site. Records of safety briefings will be kept as part of the project records.

4.3.4 Record Keeping Requirements

All record keeping requirements mandated by OSHA (29 CFR 1910.120) will be strictly followed. Specifically, all personnel training records, injury/incident reports, medical examination records and exposure monitoring records will be maintained by Roux Associates for a period of at least thirty years after the employment termination date of each employee. The SHSO shall maintain a daily written log of all health and safety monitoring activities and monitoring results shall become part of the project records.

4.4 Medical Surveillance Requirements

Medical surveillance specifies any special medical monitoring and examination requirements as well as stipulates that all Roux Associates personnel and subcontractors are required to pass the medical surveillance examination or equivalent for hazardous waste work required by 29 CFR 1910.120. As a minimum, the examination will include:

- Complete medical and work histories
- EKG
- Urinalysis
- Physical Exam
- Eye Exam
- Blood Chemistry
- Pulmonary Function Test
- Audiometry

The examination will be taken annually, at a minimum, and upon termination of employment with the company. Additional medical testing may be required by the CHSM or OHSS in consultation with the company physician and the SHSO if an overt exposure or accident occurs, or if other Site conditions warrant further medical surveillance.

4.5 Hazard Analysis

To evaluate potential hazards prior to Site entry, potential and suspected compounds that may pose a hazard have been identified in Table 5.

4.5.1 Hazard Assessment

Specific tasks which may result in hazards are drilling, sampling and movement around the Site during field activities. These are discussed in the following sections.

- **Underground Storage Tank Investigation**

  The possible flammable/explosive range of the unknown chemicals in the underground tanks beneath the building on Site will require the use of intrinsically safe and explosion proof equipment. The risk of fire or explosion will be of most concern during all intrusive activities near or within the underground tanks.

- **Chemical Hazards**

  1,1,1-trichloroethane, trichloroethylene, 1,1-dichloroethane, tetrachloroethylene, methylene chloride, benzene, toluene, xylenes, acetone, petroleum naphthas, chloroform, ethylacetate, ethylbenzene and isopropyl alcohol have been detected on the Site. The toxicological, physical and chemical properties of these compounds has been presented in Table 5. The potential for this hazard exists during all intrusive and sampling activities.

- **Ambient Air Hazards**

  Should the photoionization reading level exceed the PEL or TLV for the chemicals listed in Table 5 the SHSO or field manager will upgrade the protection level. The HASP and the RI work plan will be modified to reflect the hazards presented by the new conditions. The potential for an air hazard exists during all intrusive and sampling activities.

- **Heat/Cold Stress**

  Temperature extremes, precipitation, high winds and storms can affect personnel safety. In its early stages, heat stress can cause rashes, cramps, discomfort, and drowsiness resulting in impaired functional ability. Continued heat stress can lead to heat stroke and death. Work practices will be modified to monitor and minimize the effects of heat stress by avoiding overprotection, careful training and monitoring of personnel with protective clothing, scheduling rest periods, or adjusting the work schedule to early morning or late afternoons. The potential hazard of heat stress exists during all outdoor activities.

  Cold injury (frostbite and hypothermia) will be guarded against with the appropriate clothing and the availability of shelter, carefully scheduled work and rest periods, and monitoring of the worker's physical condition. This is especially necessary when the wind chill factor is low. The potential hazard of cold stress exists during all outdoor activities.

- **Noise**
  The hollow-stem auger method will be used for drilling. From previous experience, drilling using this method does not exceed the 85 dba TWA Standard. However, hearing conservation devices will be on Site for employees who experience discomfort. A potential for noise hazard exists for all drilling activities.

- **General Safety Hazards**
  During movement around the Site, Site personnel will be aware of potential safety hazards (holes, ditches, steep grades, etc.) and will immediately notify their supervisors of any new hazards so preventative measures may be taken. Care will be taken to avoid the overhead electrical lines and the sewer and water lines (shown on Figure 4) during drilling activities.

For all RI tasks which are conducted outside the building (hand augering, boring, well installation, sampling), only one task at one location will be conducted at any one time. Therefore, the Exclusion Zone for all outdoor tasks will encompass a 20 foot radius (approximately) area around each work location for the duration of that task (Figure 7). At the completion of the task, there will be no need for an Exclusion Zone at that location. The Contaminant Reduction Zone, which will be used for personnel and equipment decontamination, will be located outside at the northeast end of the building. Potable city water will be run to the north end of the building to be used for decontamination.

4.6 Site Control Measures

Roux Associates employs a three zone approach to Site operations to control the potential spread of contamination. The three zones are:

- The Exclusion Zone
- The Contamination Reduction Zone and
- The Support (Clean) Zone

4.6.1 Exclusion Zone

The area(s) which contain, or are suspected to contain, hazardous materials will be considered the Exclusion Zone. This includes a 20 foot radius (approximately) around borings, the installation of monitoring wells, and sampling locations (Figure 7). This area is further defined in Section 2.3.1. This zone is to be clearly delineated by a "Hotline". The "Hotline" is a length of colored flag tape completed surrounding the Exclusion Zone. During tank excavation, opening and sampling, no warehouse workers will be inside the defined Exclusion Zone or Contamination Reduction Zone. The SHSO may establish more than one restricted area within the Exclusion Zone when different levels of protection may be employed or different hazards exist. No personnel are allowed in the Exclusion Zone without:

- Buddy System
- The proper personal protective equipment
- Medical authorization and
- Training certification

4.6.2 Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) will be established between the Exclusion Zone and the Support Zone. The CRZ will contain the contamination reduction corridor (CRC) and will provide for full personnel and portable equipment decontamination. The CRZ is to be used for general Site entry and egress in addition to access for heavy equipment for investigation activities. This area is further defined in Section 3.4. The CRZ will also contain safety and emergency equipment (see section 4.11). No personnel are allowed in the Contamination Reduction Zone without:

- The proper personal protective equipment
- Medical authorization and
- Training certification

4.6.3 Support (Clean) Zone

The Support Zone is considered the uncontaminated area and will be separated from the CRZ by the "Contamination Control Line". The "Contamination Control Line" will be a different colored flag tape than the "Hotline". The Support Zone will contain the support facility which will provide for team communications and emergency response. At least one person shall remain in the Support Zone at all times during operations downrange to facilitate communications and emergency response. Appropriate safety and support equipment will be located in this zone, and the majority of Site operations will be controlled from this location. No potentially contaminated personnel or materials are allowed in this zone except appropriately packaged/decontaminated and labeled samples.

4.6.4 Authorizations

Personnel authorized to enter the Exclusion Zone while operations are being conducted must be approved by the Site Manager. Authorization will involve completion of appropriate training courses, medical examination requirements as specified by OSHA 29 CFR 1910.120, and review and sign-off of this HASP.

4.7 Personnel Monitoring Procedures

Personal breathing zone samples, eight-hour time-weighted-average (TWA) sampling, may be conducted if sustained operations in Level C or Level B are required. The personal breathing zone samples will be collected according to NIOSH analytical methods and analyzed by an AIHA-certified laboratory.

Photoionization readings (OVA, HNU, Tip II or OVM) will be taken continuously during all intrusive activities. Air sampling tubes will be used to periodically monitor benzene and chloroform in the breathing zone during all intrusive activities. Should a level exceed the PEL or TLV as listed in Table 5 the SHSO or field manager will upgrade the protection level. The HASP and the RI work plan will be modified to reflect the hazards presented by the new conditions. An air hazard exists during all intrusive and sampling activities.

4.8 Personnel Protective Equipment

4.8.1 General

The level of protection to be worn by field personnel will be defined and controlled by the SHSO with approval of the CHSM. Where more than one hazard area is indicated, further definition shall be provided by review of Site hazards, conditions, and operational requirements and by monitoring at the particular operation being conducted. Protection may be upgraded or downgraded by the SHSO on the basis of action levels. Based on background data from previous investigations at the Site, Level D will be worn for the outdoor investigation (installation of monitoring wells, ground water and sediment sampling, and soil borings and soil sampling). Photoionization readings will be made continuously and benzene and chloroform readings will be made periodically during all intrusive activities. If needed, Level C protection will be available at the Site.

Work which may require Level B will be subcontracted. This will include the investigation of the USTs and soil beneath the building foundation. Due to the ambiguity of the contents of the tanks, Level B may be used at the onset of the investigation. See Appendix A, UST Contractor's Investigation Plan.

4.8.2 Respiratory Protection and Clothing

Level D Protection

1. Personal protective equipment
   - Coveralls
   - Gloves
   - Boots/shoes, leather or chemical-resistant, steel toe and shank
   - Boots (outer), chemical-resistant (disposable*)
   - Safety glasses or chemical splash goggles
   - Hard hat**
   - Escape mask*

* Optional
** During Drilling

2. Criteria for selection

   Readings on the photoionization meter are less than 5 ppm (with the exception of benzene [1 ppm] and chloroform [2 ppm]) in the breathing zone. Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals. Note: Benzene and chloroform will be monitored with periodic sampling in the breathing zone using air sampling tubes.

Level C Protection

1. Personal protective equipment
   - Full-face, air-purifying, canister-equipped respirator (MSHA/NIOSH approved)
   - Chemical-resistant clothing (coverall; hooded, two- piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls)
   - Coveralls*
   - Gloves (outer), chemical-resistant
   - Gloves (inner), chemical-resistant
   - Boots (outer), chemical-resistant, steel toe and shank
     - Boots (outer), chemical-resistant (disposable*)
     - Hard hat (face shield*)
     - Escape mask*
   - 2-Way radio communications (intrinsically safe)*

*Optional

2. Criteria for selection
   - Total vapor readings register between 5 ppm and 25 ppm on photoionization instruments such as the Photovac Tip II and Century OVA System, or >1 ppm benzene or >2 ppm chloroform using contaminant specific measuring devices such as air sampling tubes.
   - Measured air concentrations of identified substances will be reduced by the respirator to at or below the substance's exposure limit, and the concentration is within the service limit of the canister.
     - Atmospheric contaminant concentrations do not exceed Immediately Dangerous to Life and Health (IDLH) levels.
     - Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.
   - Job functions have been determined not to require self-contained breathing apparatus.
   - Air will be monitored continuously for total vapor.

Level B Protection

1. Personal Protection Equipment
   - Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH approved)
   - Chemical-resistant clothing (overall and long-sleeved jacket; coveralls; hooded, one or two-piece chemical-splash suit; disposable chemical- resistant coveralls)
   - Coveralls
   - Gloves (outer), chemical-resistant
   - Gloves (inner), chemical-resistant
   - Boots (inner), chemical-resistant, steel toe and shank
   - Boots (outer), chemical-resistant, (disposable)
   - Hard hat (face shield)
   - 2-way radio communications (intrinsically safe)

2. Criteria for Selection

   Meeting any one of these criteria warrants use of Level B protection:
   - The type(s) and atmospheric concentration(s) of toxic substance(s) have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection. These would be atmospheres:
     -- with concentrations Immediately Dangerous to Life and Health (IDLH) or
     -- exceeding limits of protection afforded by a full-face, air-purifying mask or
     -- containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.
   - The atmosphere contains less than 19.5% oxygen.
   - Site operations make it highly unlikely that the small, unprotected arc of the head or neck will be contacted by splashes of extremely hazardous substances.
   - If work is performed in an enclosed space and the total atmospheric concentrations of unidentified vapors or gases range from 5 ppm to 500 ppm on instruments such as the Century OVA System or HNU Photoionization, and vapors are not suspected of containing high levels of chemicals toxic to skin.

4.9 Decontamination Procedures

A steam cleaner will be utilized to decontaminate the drilling equipment. Personnel should exercise caution when using a steam cleaner. The high pressure steam can cause severe burns. Protective gloves, face shields, hard hats, steel-toed boots, and Tyvek suits or rain gear will be worn when using steam cleaners.

4.9.1 Contamination Prevention

One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel

- Do not walk through areas of obvious or known contamination;
- Do not handle or touch contaminated materials directly;
- Make sure all personal protective equipment (PPE) has no cuts or tears prior to donning;
- Fasten all closures on suits, covering with tape, if necessary;
- Take particular care to protect any skin injuries;
- Stay upwind of airborne contaminants; and
- Do not carry cigarettes, gum, etc. into contaminated areas.

Sampling/Monitoring

- When required by the SHSO, cover instruments with clear plastic, leaving opening for sampling and exhaust ports; and
- Bag sample containers prior to the placement of sample material.

Heavy Equipment

- Care should be taken to limit the amount of contamination that comes in contact with heavy equipment;
- If contaminated tools are to be placed on non-contaminated equipment for transport to the decontamination pad, plastic should be used to keep the equipment clean; and
- Excavated soils should be contained and kept out of the way of workers.

4.9.2 Decontamination

All personnel and equipment exiting the Exclusion Zone shall be thoroughly decontaminated. Figures 9, 10 and 11 illustrate typical decontamination procedures for Levels D, C and B. Detailed decontamination procedures are in Appendix C. Safety briefings shall explain the decontamination procedures for personnel and portable equipment for the various levels of protection indicated in Section 4.8. Heavy equipment will be decontaminated with a steam cleaner.

4.9.3 Disposal Procedures

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on Site. All potentially contaminated materials (e.g., soil, clothing, gloves, etc.) will be bagged or drummed, as necessary, and segregated for disposal. All contaminated materials shall be disposed of in accordance with appropriate regulations. All non-contaminated materials shall be collected and bagged for appropriate disposal as normal domestic waste. All waste disposal operations conducted by Roux Associates will be monitored by the SHSO and carried out under the appropriate level of personal protection described in Section 4.8.

4.10 Standard Operating Procedures/Safe Work Practices

4.10.1 Communications

- Telephones -- A telephone will be located in the Site trailer or be available in the building for communication with emergency support services/facilities.

- Hand Signals -- To be employed by personnel required to have Level C protection. These signals are also very important when working with heavy equipment. They shall be known by the entire field team before operations commence and covered during Site-specific training (see Section 4.11.1).

4.10.2 General Safe Work Practices

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth contact and ingestion of material is prohibited on Site except in specified areas.

- Hands must be washed thoroughly upon leaving the Site or before eating, drinking, or any other activities. This will be done in the decontamination staging area.

- Contaminated protective equipment shall not be removed from the Site until it has been decontaminated or properly packaged and labeled.

- Portable or fixed emergency shower/eyewash stations shall be located in the decontamination staging area.

- No excessive facial hair, which interferes with a satisfactory fit of respiratory equipment, will be allowed on personnel that may be required to wear respiratory protective equipment.

- An emergency first aid kit and fire extinguisher shall be on Site at all times.

- All respiratory protection selected to be used on Site shall meet NIOSH/MSHA requirements for the existing contaminants.

- Any skin contact with surface and ground water shall be avoided (tyvek suits, rubber gloves, leather boots).

- No contact lenses may be worn on Site.

4.10.3 General

All field sampling will be performed under the level of personal protection described in Section 4.8. In this section, non-monitoring, safety-related procedures are described.

4.10.4 Sampling

Personnel must wear prescribed clothing, especially eye protection and chemical resistant gloves when sampling. Sample bottles may be bagged prior to sampling to ease decontamination procedures. The sampling team must be aware of emergency evacuation procedures described in this HASP and the location of all emergency equipment and emergency contacts prior to sampling. Contamination avoidance shall be practiced at all times. In some situations, additional monitoring by the SHSO may be needed to confirm or establish the proper level of protection before the sampling team can proceed.

4.10.5 Sample Handling

Personnel responsible for the handling of samples shall wear the prescribed level of protection described in Section 4.8. Samples shall be identified as to their hazard and packaged as to prevent spillage or breakage. Any unusual sample conditions should be noted. Lab personnel shall be advised of sample hazard level and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or inclusion of a written statement with the samples. It may be necessary for the SHSO to review safety procedures in handling Site samples to assist or assure that these practices are appropriate for the type of suspected contaminants in the sample.

4.10.6 Waste Disposal

All waste disposal operations shall be monitored by the SHSO and carried out under the appropriate level of personal protection described in Section 4.8. Personnel shall wear the prescribed clothing, especially eye protection and chemical resistant gloves, when handling or drumming waste materials. Contamination avoidance shall be practiced at all times.

4.10.7 Additional Safe Work Practices

Refer to the SHSO for specific concerns on each individual Site task. The safety rules listed below must be strictly followed:

- No confined space entry;
- Employ the buddy system for any Exclusion Zone Activities.
- Practice contamination avoidance, both on Site and off-Site;
- Plan activities ahead of time;
- Do not climb over/under obstacles;

- Be alert to your own physical condition;
- Report all accidents, no matter how minor, immediately to the SHSO; and
- KNOW YOUR HEALTH AND SAFETY PLAN

A work/rest regimen will be initiated when ambient temperatures and protective clothing cause a stressful situation. No work will be conducted without adequate light or without supervision. Task safety briefings may be held prior to the onset of each task.

4.11 Emergency Response

4.11.1 Safety Equipment

Basic emergency and first aid equipment will be available at the Support Zone and/or the CRZ, as appropriate. This shall include HASP-specified communications, first aid kit, emergency eyewash or emergency shower or drench system, fire extinguishers, and other safety-related equipment. Other safety equipment will be located at the site of specific operations, e.g., a drilling rig, as appropriate.

4.11.2 Communications

- Telephones -- A telephone will be located in the Site trailer or be available in the building for communication with emergency support services/facilities.

- Hand Signals -- To be employed by personnel required to have Level C protection. These signals are also very important when working with heavy equipment. They shall be known by the entire field team before operations commence and covered during Site-specific training.

  The following hand signals will be used, if needed:

Signal	Meaning
Hand gripping throat	Out of air, can't breath
Grip partner's wrist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	I'm alright, okay
Thumbs down	No, negative

4.11.3 Emergency Plan

As a result of possible hazards on Site and the conditions under which operations are conducted, the possibility of an emergency exists. An emergency plan is required by OSHA (29 CFR 1910.120) to be available for use and is included below. A copy of this plan shall be posted in the Support Zone at each work site.

4.11.4 Site Emergency Coordinator(s)

The Site Emergency Coordinator is the Site Health and Safety Officer. The Site Emergency Coordinator(s) shall make contact with the local fire, police and other emergency units prior to beginning work on Site. In these contacts, the Site Emergency Coordinator(s) will inform the emergency units about the nature and duration of work expected on the Site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants. Also at this time, the coordinators and the emergency response units shall make arrangements to handle any emergencies that might occur.

The Site Emergency Coordinator(s) shall implement this emergency plan whenever conditions at the Site warrant such action. The coordinator(s) will be responsible for assuring the evacuation, emergency treatment, emergency transport of Site personnel as necessary, and notification of emergency response units and the appropriate management staff.

4.11.5 Evacuation

In the event of an emergency situation, such as fire, explosion, significant release of particulates, etc., an air (and police) horn or other appropriate device will be sounded by the SHSO for approximately ten seconds indicating the initiation of evacuation procedures, and the fire and police departments notified by telephone of the emergency. All persons in both the restricted and non-restricted areas will evacuate and assemble near the Support (Clean) Zone or other safe area as identified by the Site Emergency Coordinator (Figure 12). The shortest, unobstructed route to the Support Zone should be taken. The Site Emergency Coordinator will have authority to initiate proper action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The SHSO must see that access for emergency equipment is provided and that all combustion apparatus has been shutdown once the alarm has been sounded. Once the safety of all personnel is established, other emergency response groups will be notified by telephone of the emergency. The hospital route (Figure 13) will be posted on Site. Any other required evacuation routes will be specified by the appropriate emergency personnel.

4.11.6 Potential or Actual Fire or Explosion

If the potential for a fire exists or if an actual fire or explosion occurs, the following procedure will be implemented:

- Immediately evacuate the Site as described above (Section 4.11.4) and shown in Figure 12 and
- Notify fire and security

  Fire Department 933-6444

  Police Department 365-0500

4.11.7 Environmental Incident (Release or Spread of Contamination)

If possible, the spread of contamination should be controlled or stopped. The Site Emergency Coordinator shall instruct a person on Site to immediately contact police and fire authorities to inform them of the possible or immediate need for nearby evacuation. If a significant release has occurred, the National Response Center and other appropriate groups should be contacted. Those groups will alert National or Regional Response Teams as necessary. Following these emergency calls, the remaining personnel listed below shall be notified:

Type	Name	Telephone #
Fire Department	Hicksville Fire Department	(516)933-6444
Emergency Response	Hazardous Material Team	566-5295 (91) 566-5274 (54)
Police Department	2nd Precinct	(516)365-0500
National Response Center (Release or Spill)		(800)424-8802
Site Health and Safety Officer	Harry Gregory	(516)673-7200
Health and Safety Manager	**Stephen Smith**	**(404)270-5145**
Project Manager	Joanne Yeary	(516)673-7200

Type	Name	Telephone #
Hospital (Figure 13)	Central General Emergency Room	(516)681-8900 (516)681-2335
Poison Control Center	Nassau County Medical Center	(516)542-2323
Ambulance	Hicksville Fire Department	(516)931-0026

4.11.8 Personal Injury

Emergency first aid shall be applied on Site as deemed necessary to stabilize the patient. The above emergency contacts will be notified as necessary.

The SHSO will supply medical data sheets on the patient to appropriate medical personnel and complete the Roux Associates Incident/Injury Report.

4.11.9 Overt Personnel Exposure

If an overt exposure to toxic materials should occur, the exposed person shall be treated on Site as follows:

Skin Contact: Wash/rinse affected area thoroughly with copious amounts of soap and water, then provide appropriate medical attention. An eyewash and/or emergency shower or drench system will be provided on Site at the CRZ and/or Support Zone as appropriate. Eyes should be rinsed for at least fifteen (15) minutes upon chemical contamination.

Inhalation: Move to fresh air and/or if necessary, decontaminate and transport to the hospital.

Ingestion: Decontaminate and transport to emergency medical facility.

Puncture Wound or Laceration: Decontaminate and transport to emergency medical facility. SHSO will provide medical data sheets to medical personnel as requested.

4.11.10 Adverse Weather Conditions

In the event of adverse weather conditions, the SHSO will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Heavy rainfall;
- Potential for heat stress;
- Potential for cold stress and cold-related injuries;
- Limited visibility;
- Potential for electrical storms;
- Potential for malfunction of H & S monitoring equipment or gear; and
- Potential for accidents.

4.12 Confined Space Entry

Confined space is defined as any space, depression or enclosure that has limited opening for entry and egress, may have limited ventilation, may contain or produce life-threatening atmospheres due to oxygen deficiency or the presence of toxic, flammable or corrosive contaminants, and which is not intended for continuous occupancy. No confined space entry will be undertaken by Roux Associates personnel for this project. Additional information regarding confined space entry is given in Appendix A.

5.0 PROJECT SCHEDULE

Task 1 of the RI Investigation of Site History has already been completed. The time planned for the completion of Tasks 2 through 6 and preparation of the RI report are given below and shown in Figure 14.

Task 1 - Investigation of Site History - completed

Task 2 - Underground Tank Inspection - 5 weeks

Task 3 - Installation of Monitoring Wells - 3 weeks (concurrent with Task 2)

Well Recovery Period - 2 weeks

Task 4 - Characterization of Ground Water and Sediment Based on Target Compound Analysis - 2 weeks

Laboratory Analysis and Data Validation - 10 weeks

Task 5 - Survey of Supply Wells - 2 weeks (concurrent with Task 4)

Task 6 - Drilling of Soil Borings and Sampling of Soil and Ground Water - 3 weeks

Laboratory Analysis and Data Validation - 10 weeks

Data Analysis and Report Preparation - 5 weeks

Example contingencies which may effect the schedule and how they will be handled are discussed in Appendix G.

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TABLES

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Table 1. List of Principal Products Made and Raw Materials Consumed by Anchor Chemical Company, Hicksville, New York, in 1977. (Source: NCDH Files).

PRINCIPAL PRODUCTS		RAW MATERIALS
Fountain Mix #18		Water; gum arabic 14° baume solution; chrome alum 50% zinc nitrate solution; ethyloxilated alcohol surfactant 6
Maxi Kleen		Water; citric acid; 62% solution chromium chloride; 70% solution hydroxyacetic acid; glycerine.
On the Press		Isopropyl alcohol; ethylene glycol; cuprous chloride; HCL.
PD Gum		Water; gum arabic 14% baume solution; phosphoric acid.
P.P.C. #1	100 Gal.	Water; monosodium phosphate; isopropyl alcohol; buty cellosolve; ethylene glycol; glycerine; phosphoric acid.
Velvee		Water; SL-62 (biodegradable surfactant); isopropyl alcohol; ionol concentrate.
TAME		Water; sodium citrate; citric acid; gum arabic 14° baume solution; ethylene glycol; butyl cellosolve; IPA Union Carbide emulsion L7001.

Textile Spirits
Napthol Spirits
Mineral Spirits
Methylene Chloride
Acetone
Solvatone
V.M. & P Naptha
1,1,1 Trichloroethane
Diethyl Glycol
Ethyl Acetate

Table 2. Underground Storage Tank Data, Anchor Chemical, Hicksville, New York.

Tank Number	Capacity (gallons)	Construction	Product(s)	Date Installed	Date Tested	Test Results	Abandoned/ Decommissioned
1	3,000	steel	Napthol Spirits (1)	1964	1981	passed	
2	3,000	steel	Mineral Spirits (2) Aromatic 100 (3)	1964	1981	passed	
3	3,000	steel	Methylene Chloride	1964	1982	failed	
4	3,000	steel	Textile Spirits (Hexane)	1964	1981	passed	
5	4,000	steel	Napthol Spirits	1964	1981	failed	1983
6	2,000	steel	Acetone Solvatone	1964	1981	failed	1983
7	2,000	steel	Cellosolve (2-Ethoxyethanol)	1964	1981	passed	
8	1,500	steel	1,1,1-Trichloroethane Mineral Spirits	1964	1981	failed	1983
9	1,500	steel	Diethyl Glycol	1964	1983	passed	
10	1,500	steel	Mineral Spirits 66 Cellosolve	1964	1981	passed	
11	1,500	steel	Isopropyl alcohol	1964	1981	failed	1983
12	1,500	steel	1,1,1-Trichloroethane	1964	1983	passed	
13	1,500	steel	Ethyl acetate Isopropanol	1964	1981	passed	
14	1,000	steel	Butyl cellosolve (2-Butoxyethanol)	1964	1981	passed	
15	4,000	steel	Textile Spirits	1964	1981	failed	1983
16	1,000	steel	VM&P Naptha (2)	1964	1981	passed	
17	550	steel	Acetone	1964	1981	passed	

(1) Hydrocarbon mixture; also called petroleum naphtha
(2) Mix of hydrocarbons of the methane series, also called VM&P Naptha
(3) Mix of aromatic hydrocarbons, C8-C10

Table 3 Contractors Involved in Remedial Investigation at Anchor Chemical Site, Hicksville, New York

Firm	Area of Responsibility	Contact Person
Roux Associates, Inc.	Overall planning and supervision	J. Yeary
Marine Pollution Control*	Driller	J. Emington
A. Tay	Surveyor	A. Tay
Environmental Standards, Inc.	Data Validation	R. Vitale
CompuChem Laboratories	Low level volatile organic analysis (if needed)	R. Camp
CEIMIC Corporation	Analytical Laboratory	P. Marples
MPC Environmental Services, Inc.*	Underground Tank Investigation	J. Emington

* A final decision on these subcontractors will be made on the basis of cost and availability at the start of the project.

Table 4. Summary of Sampling Program, Anchor Chemical Site, Hicksville, New York

Matrix	No. Samples	Analytes	Analytical Methods	Preservation	Holding Time (days)	Container
Round 1:						
Ground Water*	10 Samples**	Volatiles	CLP-SOW (2/88)	HCL (pH <2) at 4° store in dark	10	3x40-ml clear vial with teflon liner
	(plus 1 field blank, 1 trip blank for VOCs, 1 environmental duplicate, matrix spike, matrix spike duplicate)	Semivolatiles (BNA) extraction analysis	CLP-SOW (2/88)	4°C ± 2°C; store in dark	 7 40	2x32-oz amber glass boston round bottle with teflon lined lid.
		Pesticides/PCBs extraction analysis	CLP-SOW (2/88)	4°C ± 2°C; store in dark	 7 40	32-oz amber glass boston round bottle with teflon lined lid.
		Metals Mercury All Others	CLP-SOW (7/88)	Nitric Acid (pH<2) at 4°C	 28 180	1x1L plastic bottle with teflon lined lid.
		Cyanide***	CLP-SOW (7/88)	Sodium Hydroxide (pH>12) at 4°C	14	1x1L plastic bottle with teflon lined lid.
Soil/Sediment	10 soil (wells) 9 drywell samples 1 cesspool sample	Volatiles	CLP-SOW (2/88)	4°C ± 2°C; store in dark	10	1x40-ml clear vial with teflon liner
	(plus 1 field blank, 1 trip blank for VOCs, 1 environmental duplicate, matrix spike, matrix spike duplicate)	Semivolatiles (BNA) extraction analysis	CLP-SOW (2/88)	4°C ± 2°C; store in dark	 7 40	1x8-oz clear widemouth glass jar with teflon lined lid.

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Table 4. Summary of Sampling Program, Anchor Chemical Site, Hicksville, New York

Matrix	No. Samples	Analytes	Analytical Methods	Preservation	Holding Time (days)	Container
		Pesticides/PCBs extraction analysis	CLP-SOW (2/88)	4°C ± 2°C; store in dark	 7 40	1x8-oz clear widemouth jar with teflon lined lid.
		Metals Mercury All Others	CLP-SOW (7/88)	None	 28 180	1x8-oz. clear widemouth glass jar with teflon lined lid.
		Cyanide***	CLP-SOW (7/88)	4°C ± 2°C	12	Taken from above jar.
	4 (screen zones of shallow wells)	TOC	USEPA Region II (7/88)	4°C ± 2°C	14	1x8-oz. clear widemouth glass jar.
Round 2:						
Ground Water	10 Samples****	Parameters of concern as determined during Round 1. Wells with no detected VOCs in Round 1 will be analyzed for low level organics.	CLP-SOW (2/88) CLP-SOW (7/88) SOW-OLC 01.0 Draft (4/90)			
	(plus 1 field blank, 1 trip blank/day, 1 environmental duplicate, matrix spike, matrix spike duplicate)					

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Table 4. Summary of Sampling Program, Anchor Chemical Site, Hicksville, New York

Matrix	No. Samples	Analytes	Analytical Methods	Preservation	Holding Time (days)	Container
Soil/Sediment	18 samples (borings)	Parameters of concern as determined during Round 1				
	(plus 1 field blank, 1 trip blank/day, 1 environmental duplicate, matrix spike, matrix spike duplicate)					
Tank Contents	Unknown*****	RCRA toxicity characteristic constituents, ignitability, corrosivity and reactivity	TCLP 40 CFR 261 Appendix II and III	4°C ± 2°C; store in dark	14	3x40-ml clear vial with teflon liner (for VOCs) 3x8-oz. clear widemouth glass jar with teflon lined lid

* Field analyses performed for pH, conductivity, temperature & turbidity.
** Nine samples if MW-3 cannot be developed and sampled.
*** All cyanide samples will be preserved per USEPA Region II CERCLA Quality Assurance Manual, Appendix IV.
**** If water-table bridging wells are needed (Section 4.3) additional samples will be required.
***** All tanks that contain liquids or solid sludges will be sampled.

301205

Table 5. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at Anchor Chemical Company Site

Compound	CAS#	TLV* (mg/m^3)	IDLH* (ppm)	PEL* (mg/m^3)	Routes of Exposure	Toxic Properties	Target Organs	Physcial/ Chemical Properties
1,1,1 Trichloroethane	71-55-6	1900 350 ppm	1,000 ppm	1900 350 ppm	Dermal; ingestion; inhalation	Sensory irritant CNS depression Cardiac arryhthmia	skin CNS CVS eyes	Liquid; bp 74.1° fp -32.5°
1,1 Dichloroethane	75-34-3	810 200 ppm	4,000 ppm	400 100 ppm	Dermal; ingestion; inhalation	CNS depression Liver damage Sensory irritant	CNS liver eyes	Liquid; Chloroform odor bp 57.3°C flammable LEL 5.6% UEL 11.4%
Methylene chloride	75-09-2	350 100 ppm	NA	500 ppm	Dermal; inhalation; ingestion	CNS depression Liver and Kidney Damage Sensory irritant	skin CVS eyes CNS	Colorless liquid bp 39.8°C fp -96.7°C LEL 15.5.% UEL 66.4%
Tetrachloroethylene	127-18-4	335 50 ppm	0	170 25 ppm	Dermal; inhalation; ingestion	CNS depression Liver damage Sensory irritant	CNS liver skin eyes kidneys	Liquid ether-like odor bp-121.20°C
Trichloroethylene	79-01-6	270 50 ppm	0	270 50 ppm	Dermal; inhalation; ingestion	CNS depression Sensory irritant Kidney damage Liver damage Heart damage	CNS skin eyes kidney liver CVS	Liquid bp 86.7° flammable LEL 12.5% UEL 90%

301206

Table 5. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at Anchor Chemical Company Site

Compound	CAS#	TLV* (mg/m^3)	IDLH* (ppm)	PEL* (mg/m^3)	Routes of Exposure	Toxic Properties	Target Organs	Physcial/ Chemical Properties
Benzene	71-43-2	30 10 ppm	0	1 ppm	Dermal; inhalation ingestion	CNS depression Hematopoietic depression Dermatitis	CNS blood skin eyes resp system bone marrow	Liquid bp 80.093°C flammable LEL 1.4% UEL 8.0%
Toluene	108-88-3	375 100 ppm	2,000 ppm	375 100 ppm	Dermal; inhalation; ingestion	CNS depression Liver damage Kidney damage Defatting of skin	CNS liver kidney skin	Liquid benzene odor bp 11.04°C flammable LEL 1.2% UEL 7.1%
Xylene	1330-20-7	435 100 ppm	1,000 ppm	435 100 ppm	Dermal; inhalation; ingestion	Sensory irritant Blood dyscrasias Bronchitis CNS depression	CNS eyes skin GI tract blood liver kidneys	Liquid Aromatic odor bp 38.5 flammable LEL 1.1% UEL 7.0%
Acetone	67-64-1	1780 750 ppm	20,000 ppm	1800 750 ppm	Dermal; inhalation; ingestion	Sensory irritant Liver injury Kidney lesions Bronchitis Nausea, vomitting Headache	kidneys liver CVS CNS lungs eyes skin	Liquid Ether-like odor LEL 2.6% UEL 12.8%

Table 5. **Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at Anchor Chemical Company Site**

Compound	CAS#	TLV* (mg/m³)	IDLH* (ppm)	PEL* (mg/m³)	Routes of Exposure	Toxic Properties	Target Organs	Physcial/ Chemical Properties
Chloroform	67-66-3	50 10 ppm	0	9.78 2 ppm	Dermal; inhalation ingestion	CNS depression Liver and kidney damage Cardiac arrest Resp. depression Sensory irritant	CNS liver kidney heart eyes skin	Liquid Sweet, pleasant odor bp 61.26°C non-flammable
Ethylacetate	141-78-6	1400 400 ppm	10,000 ppm	1400 400 ppm	Dermal; inhalation; ingestion	Sensory irritant Respiratory irritant	eyes skin resp. system	Liquid Fruity odor bp 77.15°C LEL 1.2% UEL 11%
Ethylbenzene	100-41-4	435 100 ppm	2,000 ppm	435 100 ppm	Dermal; inhalation; ingestion	Sensory irritant Resp. irritant Liver damage CNS disorders	eyes skin resp. sys. liver CNS	Liquid Aromatic odor bp 136.2°C fp-94.9°C flammable LEL 1.2% UEL 6.8%
Petroleum naphthas	8002-05-9	1600 400 ppm	10,000 ppm	1600 400 ppm	Dermal; inhalation; ingestion	CNS depression Resp. tract irritant Sensory irritant	CNS skin eyes resp. system	Liquid Gasoline odor flammable
Isopropyl alcohol	67-63-0	980 400 ppm	12,000 ppm	980 400 ppm	Dermal; inhalation; ingestion	Resp. irritant CNS depression Sensory irritant	resp. sys. CNS skin eyes	Liquid Rubbing alcohol odor bp 82.5°C fp-89.5°C flammable LEL 2.5% UEL 12%

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Table 5. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at Anchor Chemical Company Site

Compound	CAS#	TLV* (mg/m³)	IDLH* (ppm)	PEL* (mg/m³)	Routes of Exposure	Toxic Properties	Target Organs	Physcial/ Chemical Properties
Hexane	110-54-3	180 50 ppm	5,000	180 50 ppm	Dermal Inhalation Ingestion	Polyneuropathy Visual disorders Facial numbness	skin eyes resp. sys. CNS	Liquid Gasoline odor Bp 156°F IP 10.18 ev UEL 7.5% LEL 1.1% flammable
2-Butoxyethanol	111-76-2	120 25 ppm	700	120 25 ppm	Dermal Inhalation Ingestion	CNS depression Sensory irritant Liver & kidney damage Blood abnormalities	CNS eyes liver kidney blood lymp-hatic	Liquid ether-like odor BP 339°F UEL 12.7% (275°F) LEL 1.1% (200°F) Moderate flammability
2-Ethoxyethanol	110-80-5	740 200 ppm	6,000	19. 5 ppm	Dermal Inhalation Ingestion	Eyes irritant Resp. tract irritant kidney liver damage	eyes lungs kidneys liver	Liquid ether-like odor BP 275°F UEL ? LEL 1.7%
Diethyl glycol	No toxicological information available.							
Solvatone	No toxicological information available.							
Textile Spirits	No toxicological information available.							
VM & P Naphtha	No toxicological information available specifically for VM & P naphtha. See Petroleum Naphthas above.							

* The most stringent of these guidelines will be implemented for each chemical.

301209

SA11603Y.2.3

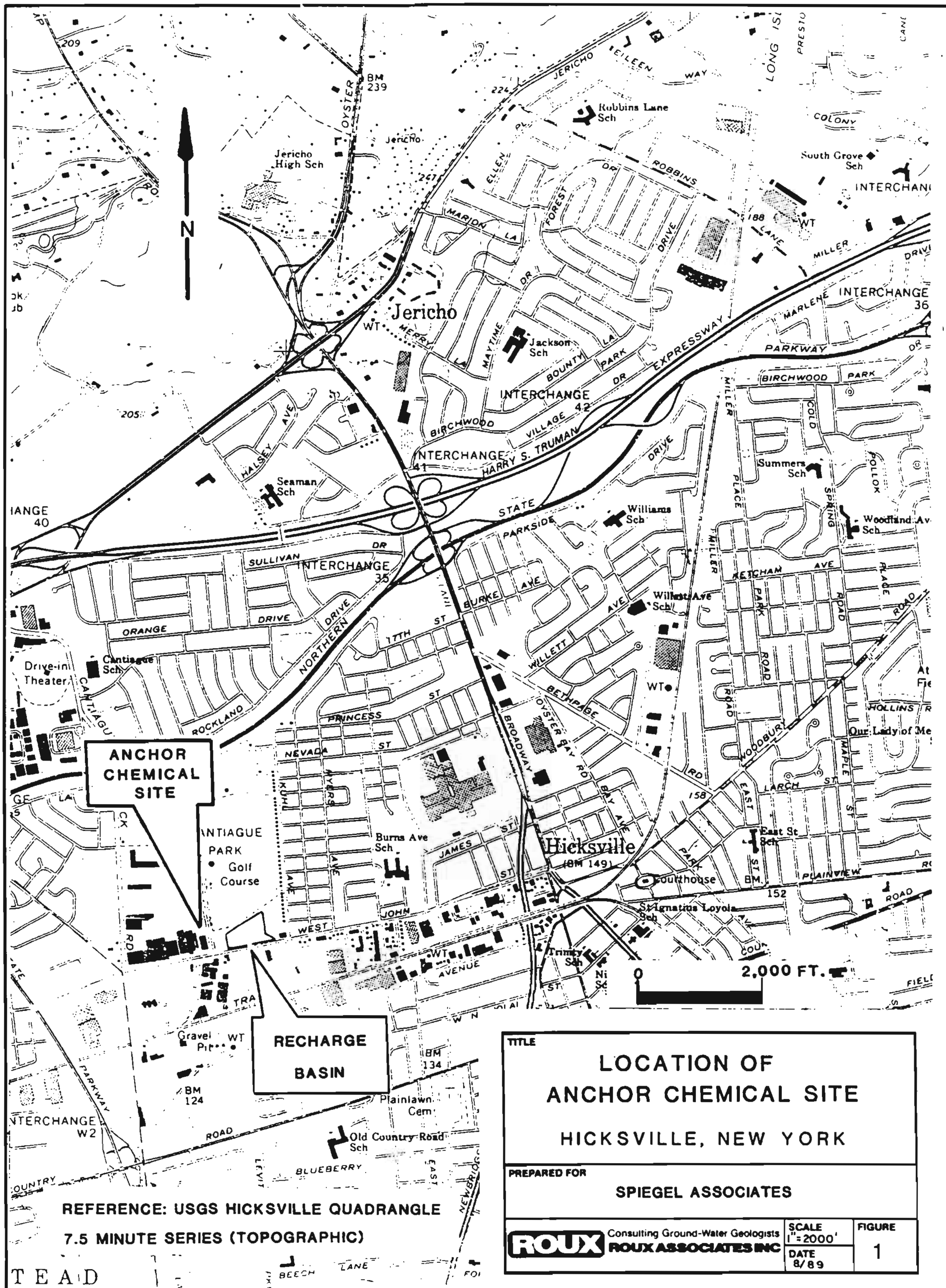
<u>References</u>

U.S. Department of Labor. 1990. OSHA Regulated Hazardous Substances, Industrial Exposure and Control Technologies Government Institutes, Inc.

Hawley's Condensed Chemical Dictionary, Sax, N. Van Nostrand and Reinhold Company, 11th Edition, 1987

FIGURES

301211



TITLE

LOCATION OF ANCHOR CHEMICAL SITE

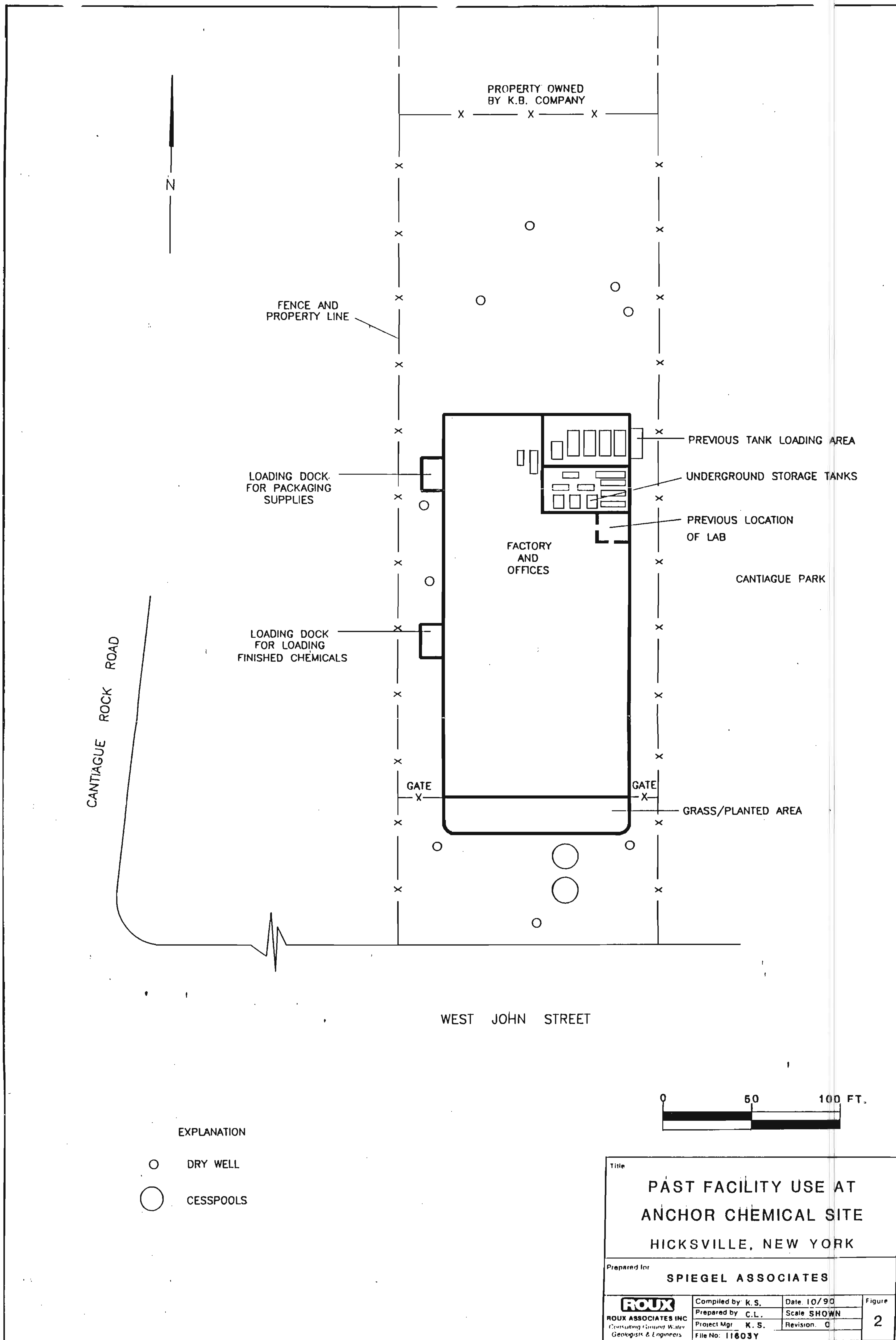
HICKSVILLE, NEW YORK

PREPARED FOR

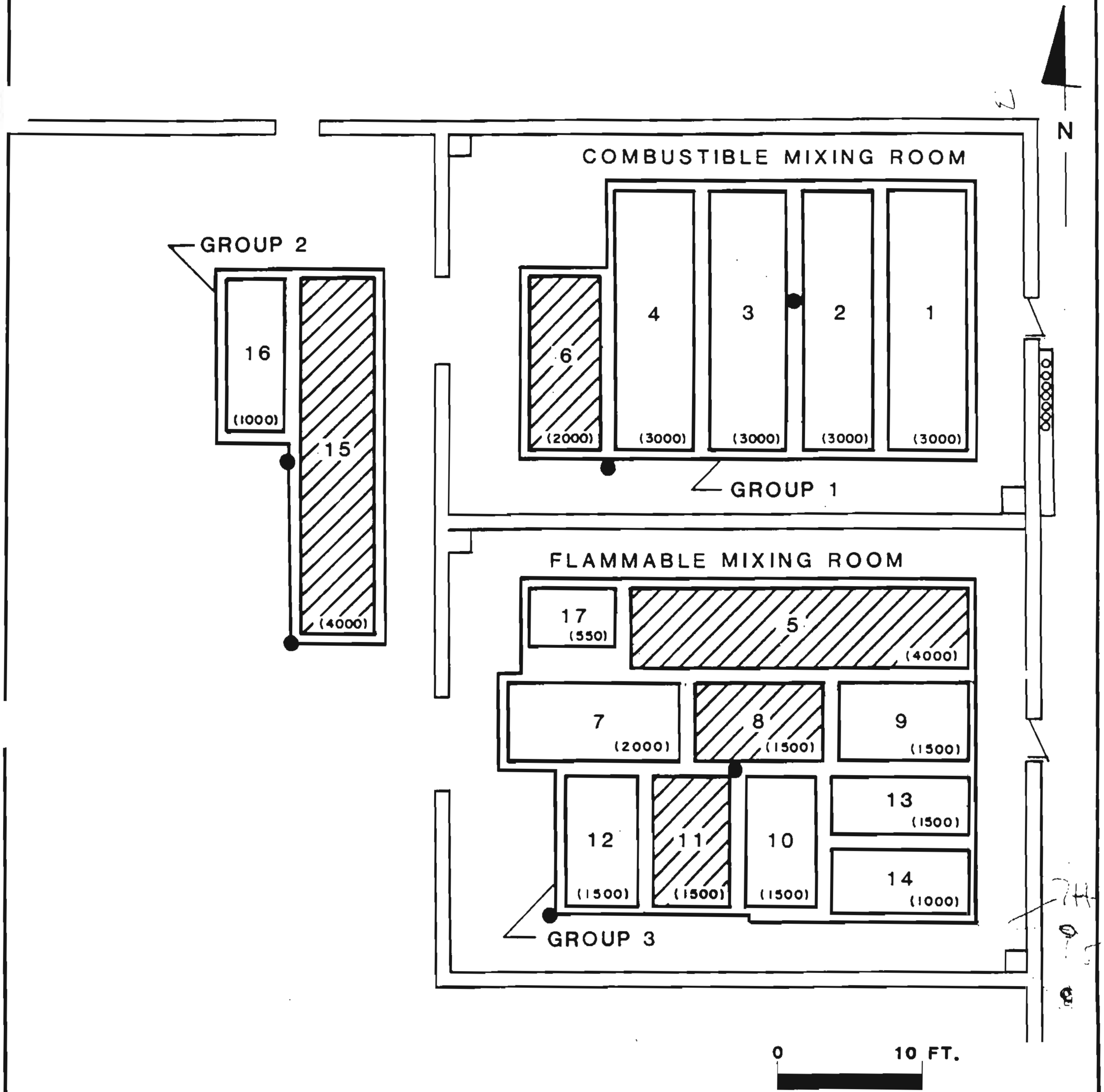
SPIEGEL ASSOCIATES

ROUX — Consulting Ground-Water Geologists — ROUX ASSOCIATES INC

SCALE	FIGURE
1"=2000'	1
DATE 8/89	


PROPERTY OWNED BY K.B. COMPANY
N
FENCE AND PROPERTY LINE
PREVIOUS TANK LOADING AREA
UNDERGROUND STORAGE TANKS
LOADING DOCK FOR PACKAGING SUPPLIES
PREVIOUS LOCATION OF LAB
FACTORY AND OFFICES
CANTIAGUE PARK
LOADING DOCK FOR LOADING FINISHED CHEMICALS
CANTIAGUE ROCK ROAD
GATE
GATE
GRASS/PLANTED AREA
WEST JOHN STREET
0
50
100 FT.
EXPLANATION
DRY WELL
CESSPOOLS
Title
PAST FACILITY USE AT
ANCHOR CHEMICAL SITE
HICKSVILLE, NEW YORK
Prepared for
SPIEGEL ASSOCIATES
ROUX
ROUX ASSOCIATES INC
Consulting Ground Water Geologists & Engineers
Compiled by K.S.
Prepared by C.L.
Project Mgr K. S.
File No: 11603Y
Date 10/90
Scale SHOWN
Revision 0
Figure
2

301213



EXPLANATION

● PROBABLE BORING LOCATION (MAY BE MOVED BASED ON ACCESS)

(2000) TANK FILLED WITH AN INERT SOLID MATERIAL

TANK CAPACITY IN GALLONS

Title:

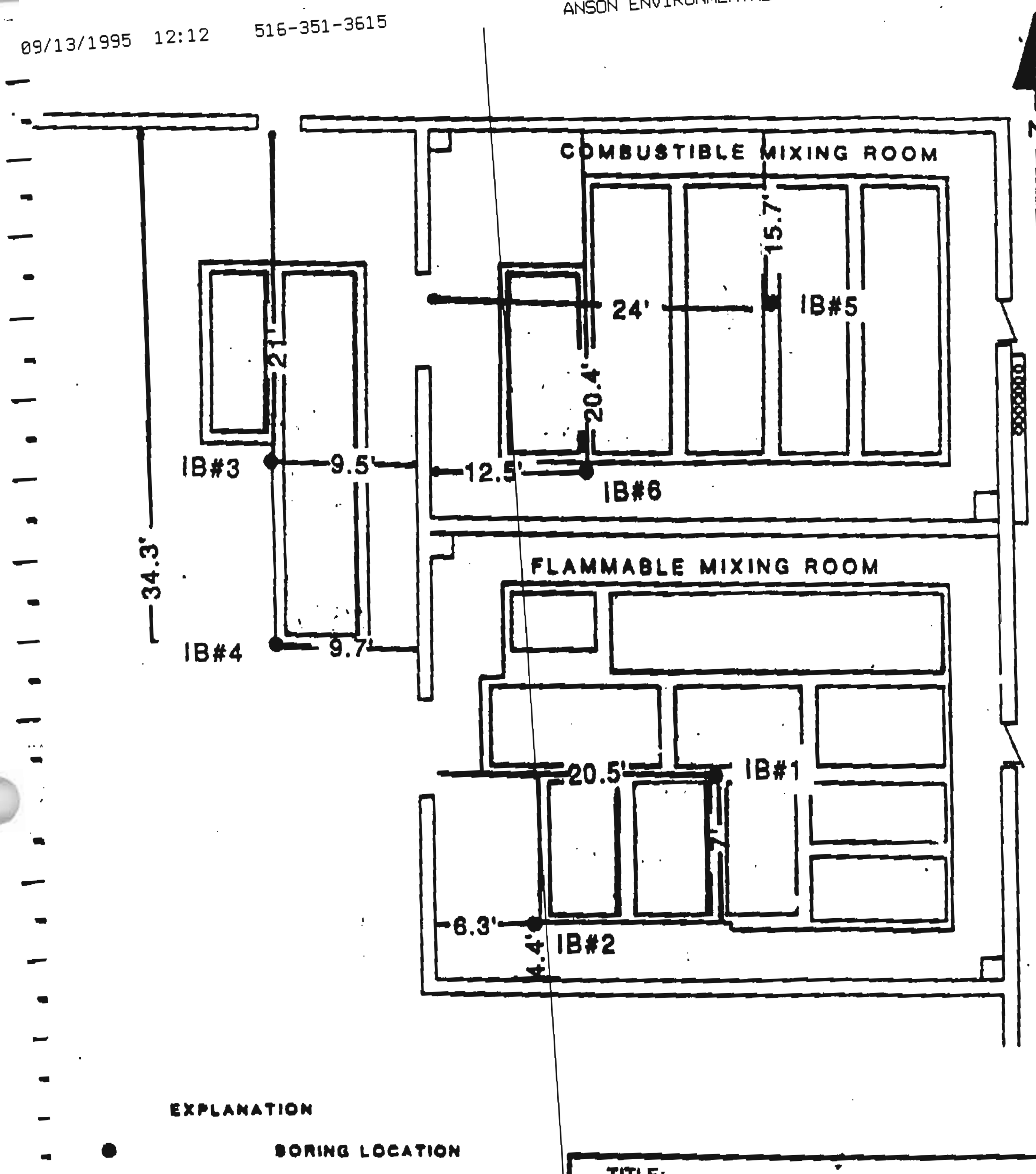
ARRANGEMENT OF UNDERGROUND STORAGE TANKS AT ANCHOR CHEMICAL SITE

HICKSVILLE, NEW YORK

Prepared for:

SPIEGEL ASSOCIATES

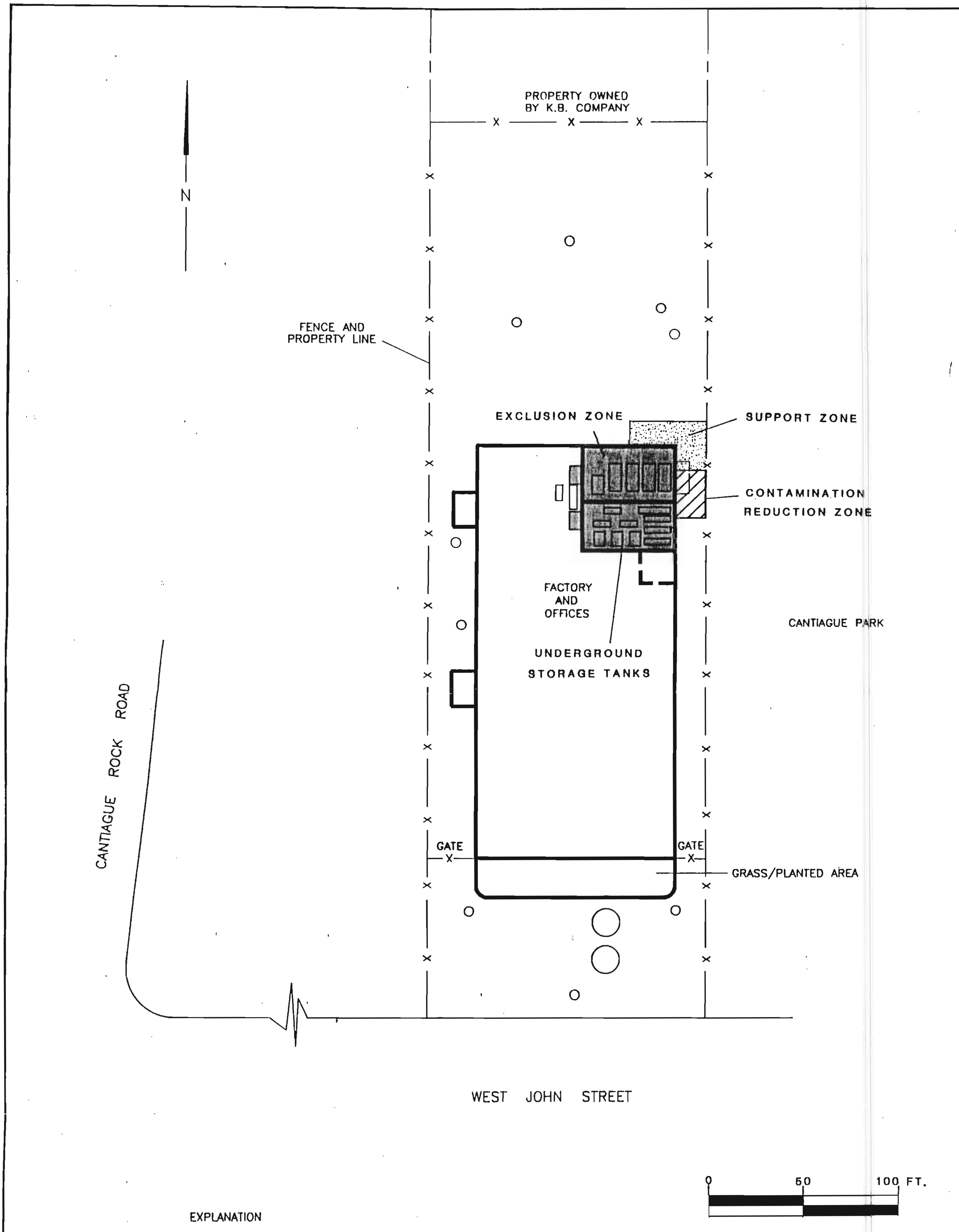
ROUX ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: E. B.	Date: 4/90	Figure 3
	Prepared by: V. M.	Scale: SHOWN	
	Project Mgr: K. S.	Revision: 0	
	File No 11603 Y		



FROM: Roux, 1991.

TITLE:	
LOCATION OF INDOOR BORINGS	
ANSON ENVIRONMENTAL LTD.	FIGURE NO. 4 - 1

301214 A



301215

Title:

LOCATIONS OF WORKING ZONES FOR THE TANK INVESTIGATION AT THE ANCHOR CHEMICAL SITE

HICKSVILLE, NEW YORK

Prepared for: SPIEGEL ASSOCIATES

ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: K.S.	Date: 10/90	Figure 5
	Prepared by: C.L.	Scale: SHOWN	
	Project Mgr: K.S.	Revision: 0	
	File No: 11603Y		

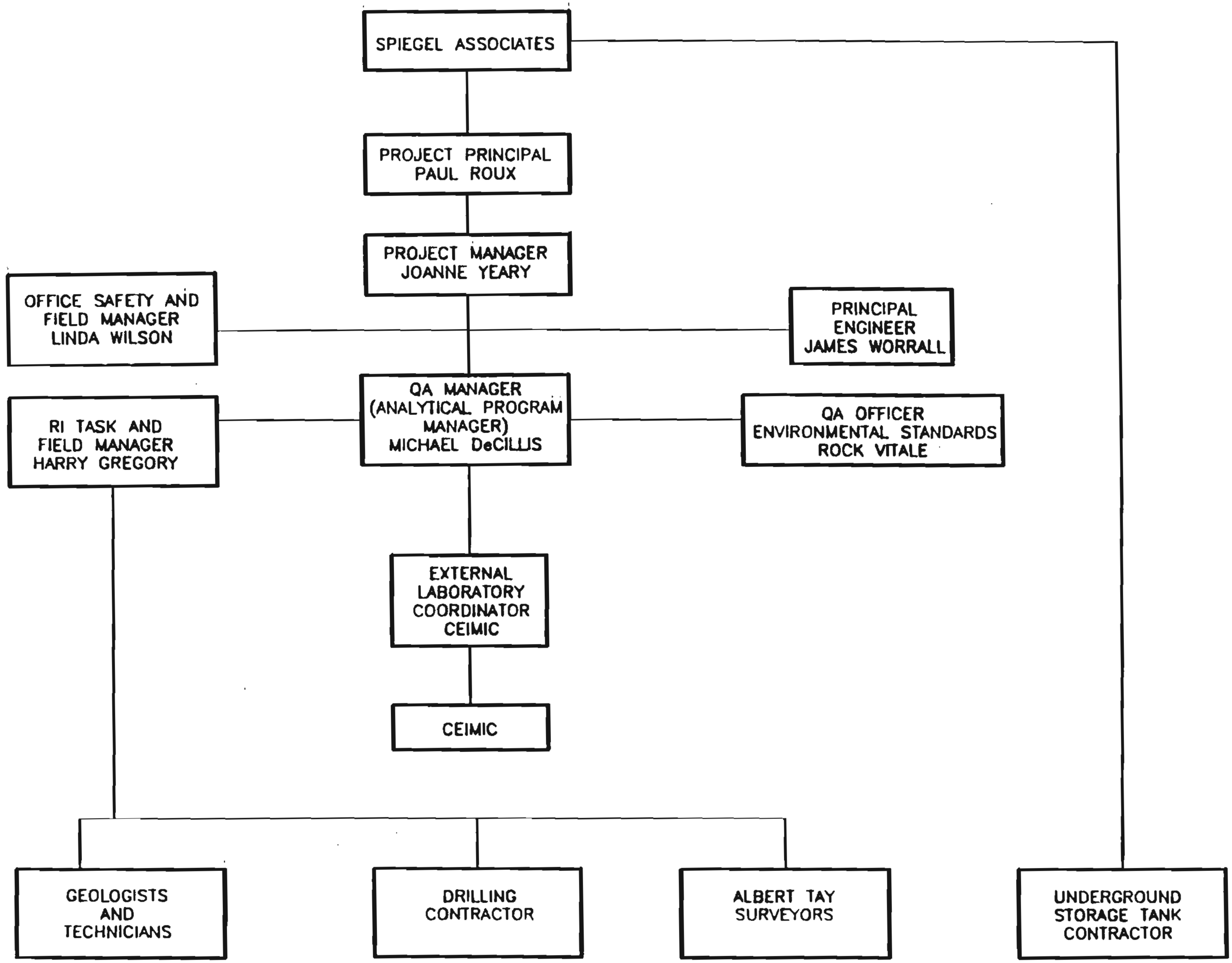
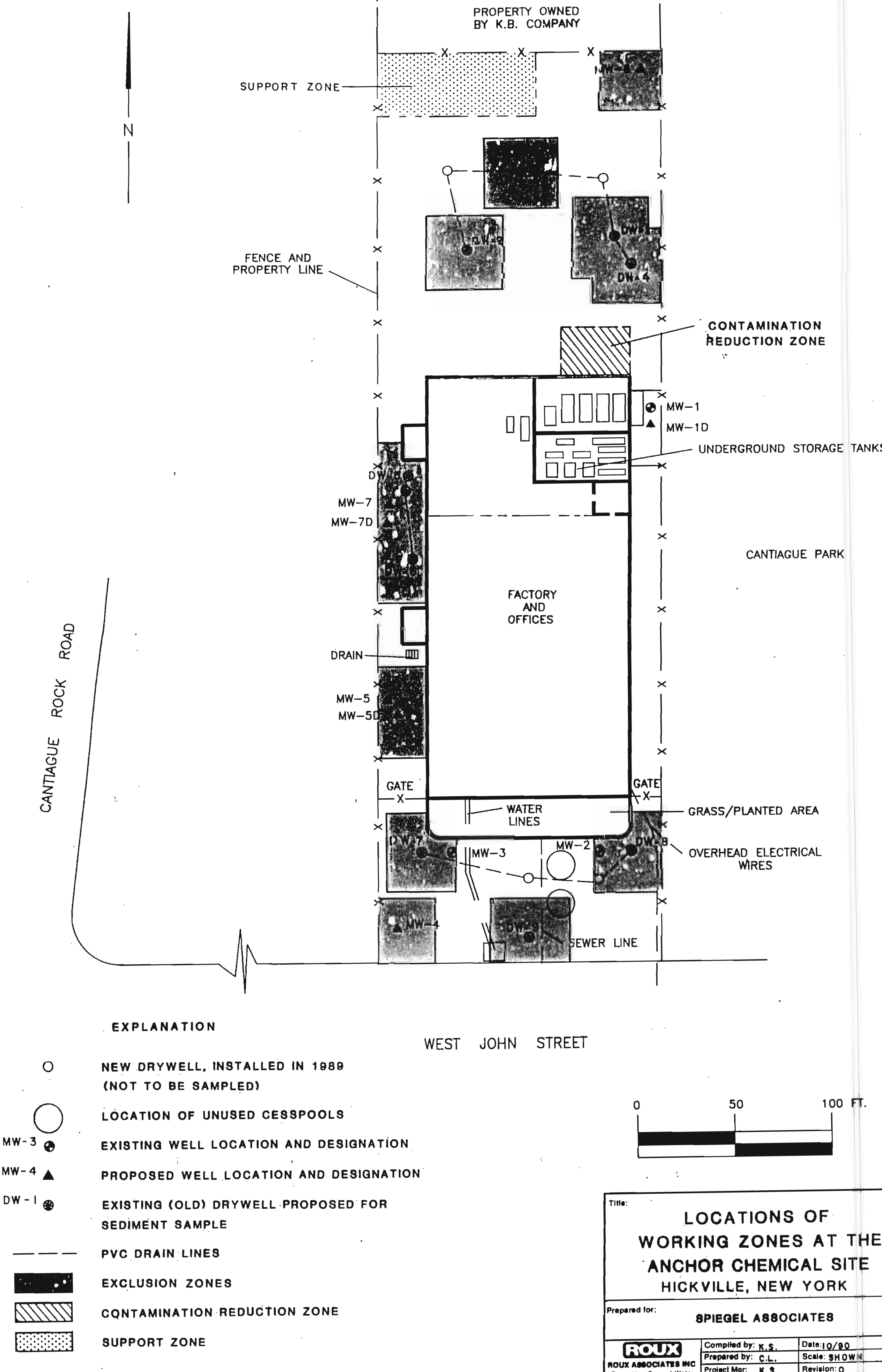


FIGURE 6

301216



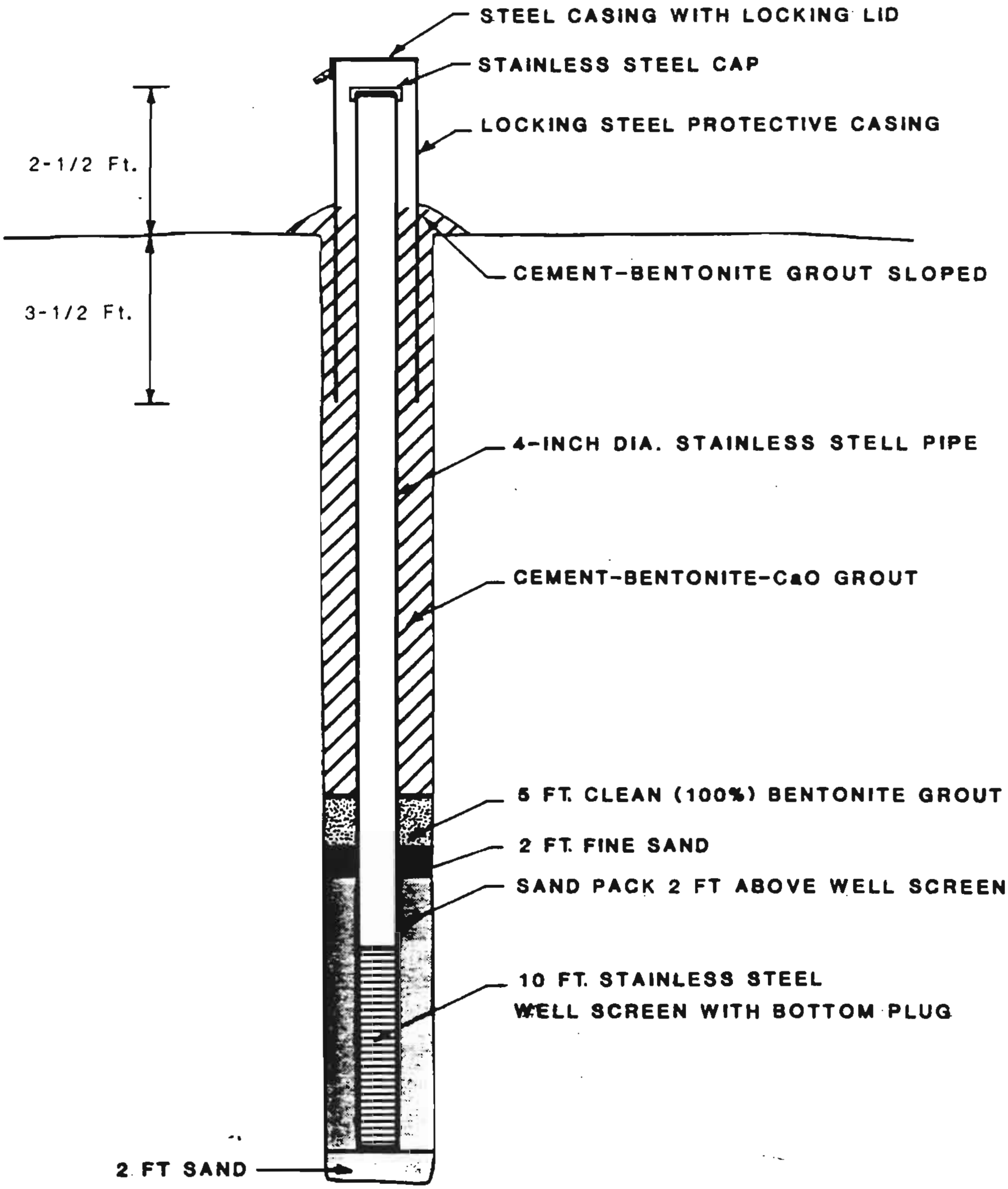
Title:
LOCATIONS OF WORKING ZONES AT THE ANCHOR CHEMICAL SITE
HICKVILLE, NEW YORK

Prepared for: SPIEGEL ASSOCIATES

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: K.S.	Date: 10/90	Figure 7
Prepared by: C.L.	Scale: SHOWN	
Project Mgr: K.S.	Revision: 0	
File No: 1160315		

301217



Title:

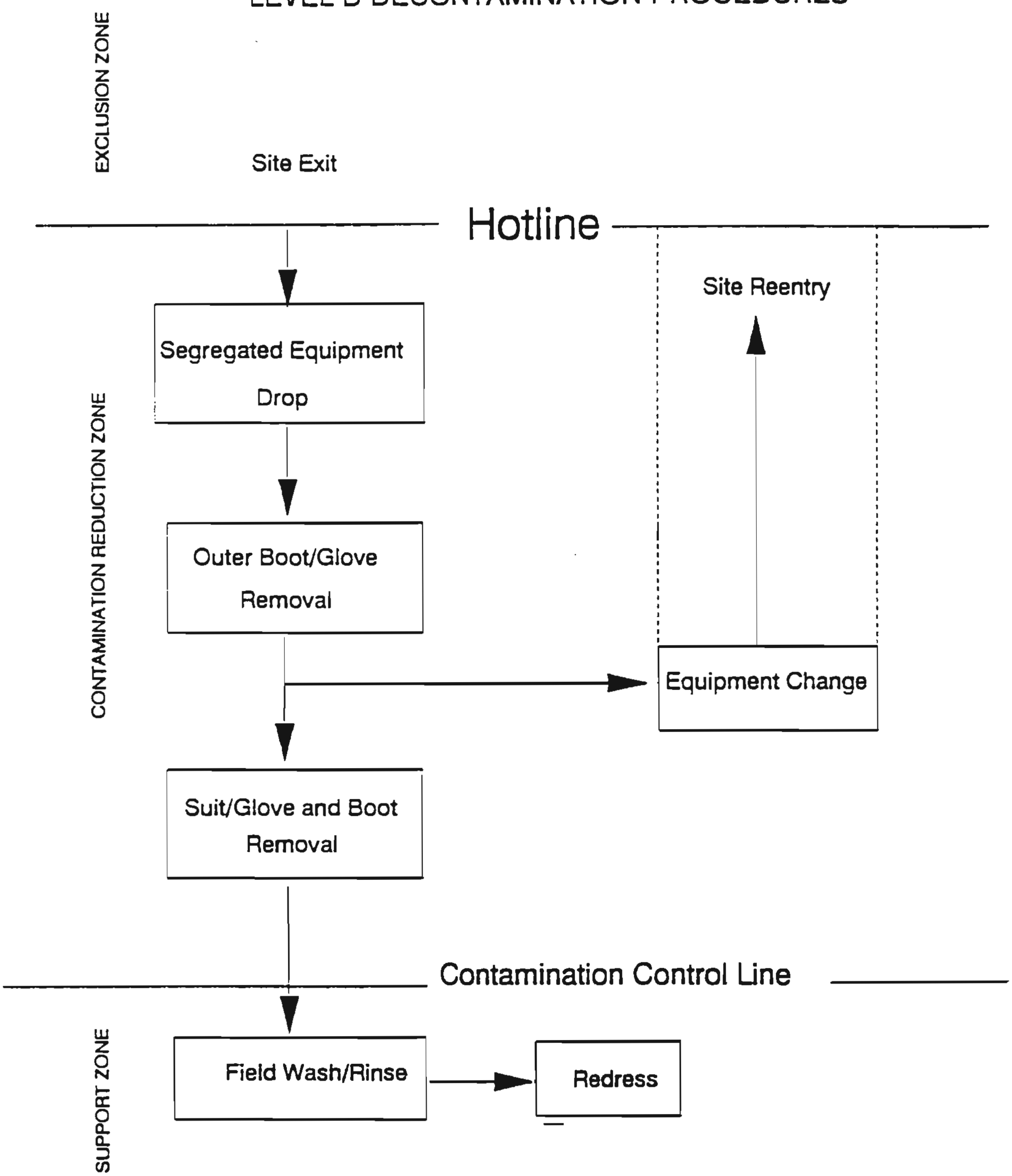
USEPA MONITORING WELL SPECIFICATIONS

Prepared for: SPIEGEL ASSOCIATES

ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: PR	Date: 10/90	Figure 8
	Prepared by: SW	Scale: NONE	
	Project Mgr: PR	Revision: 0	
	File No: 11603Y		

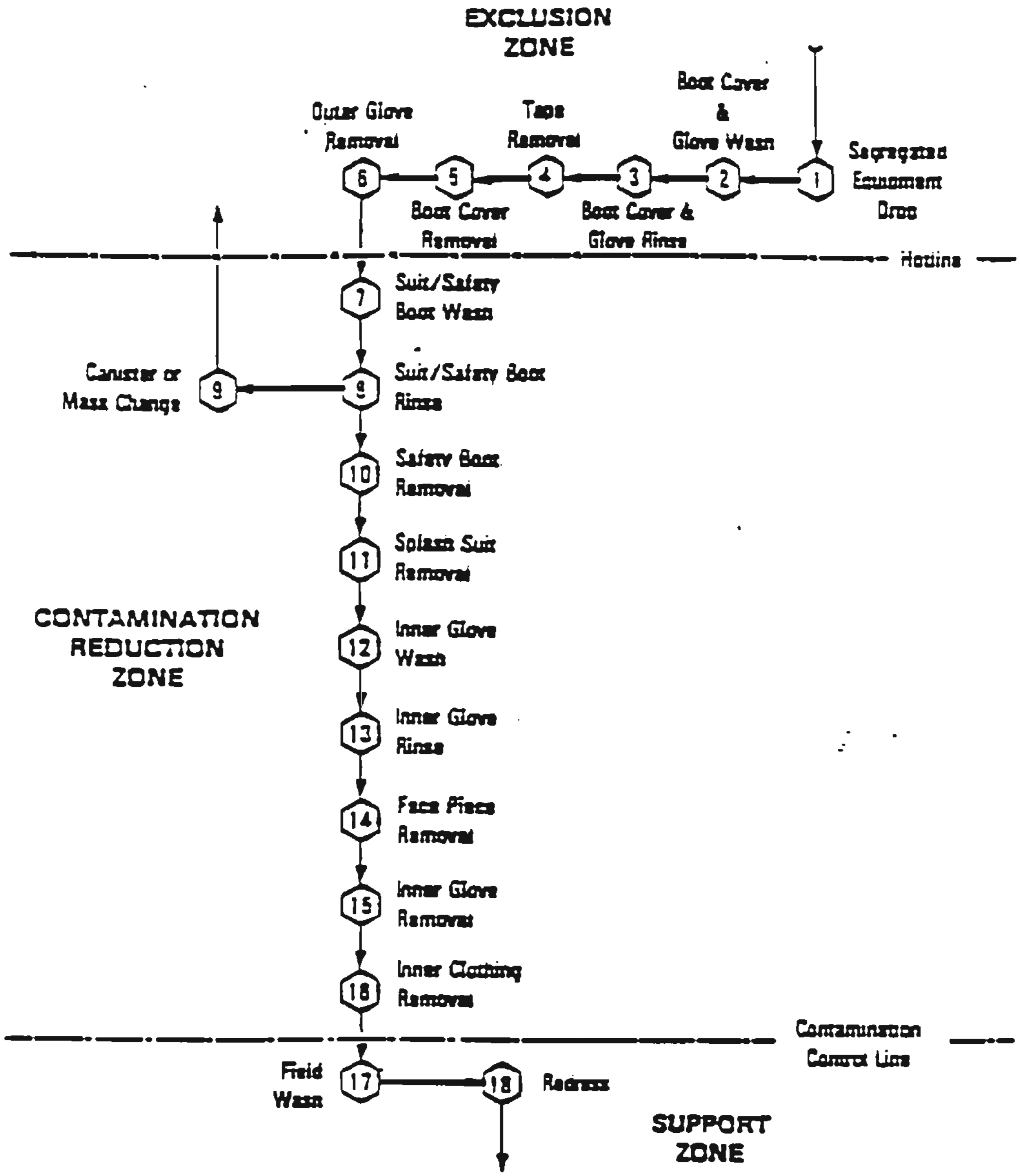
FIGURE 9

LEVEL D DECONTAMINATION PROCEDURES



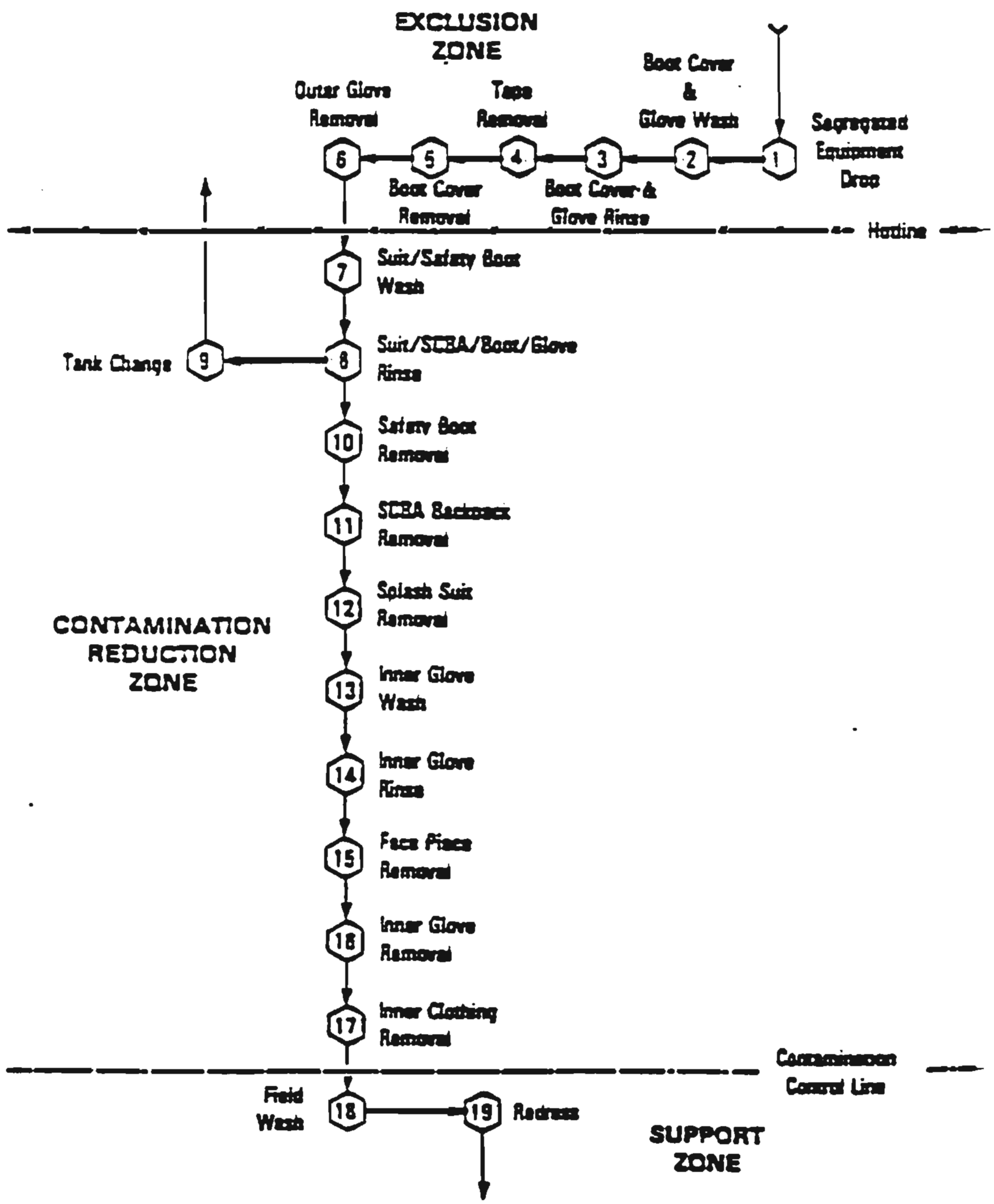
301219

FIGURE 10

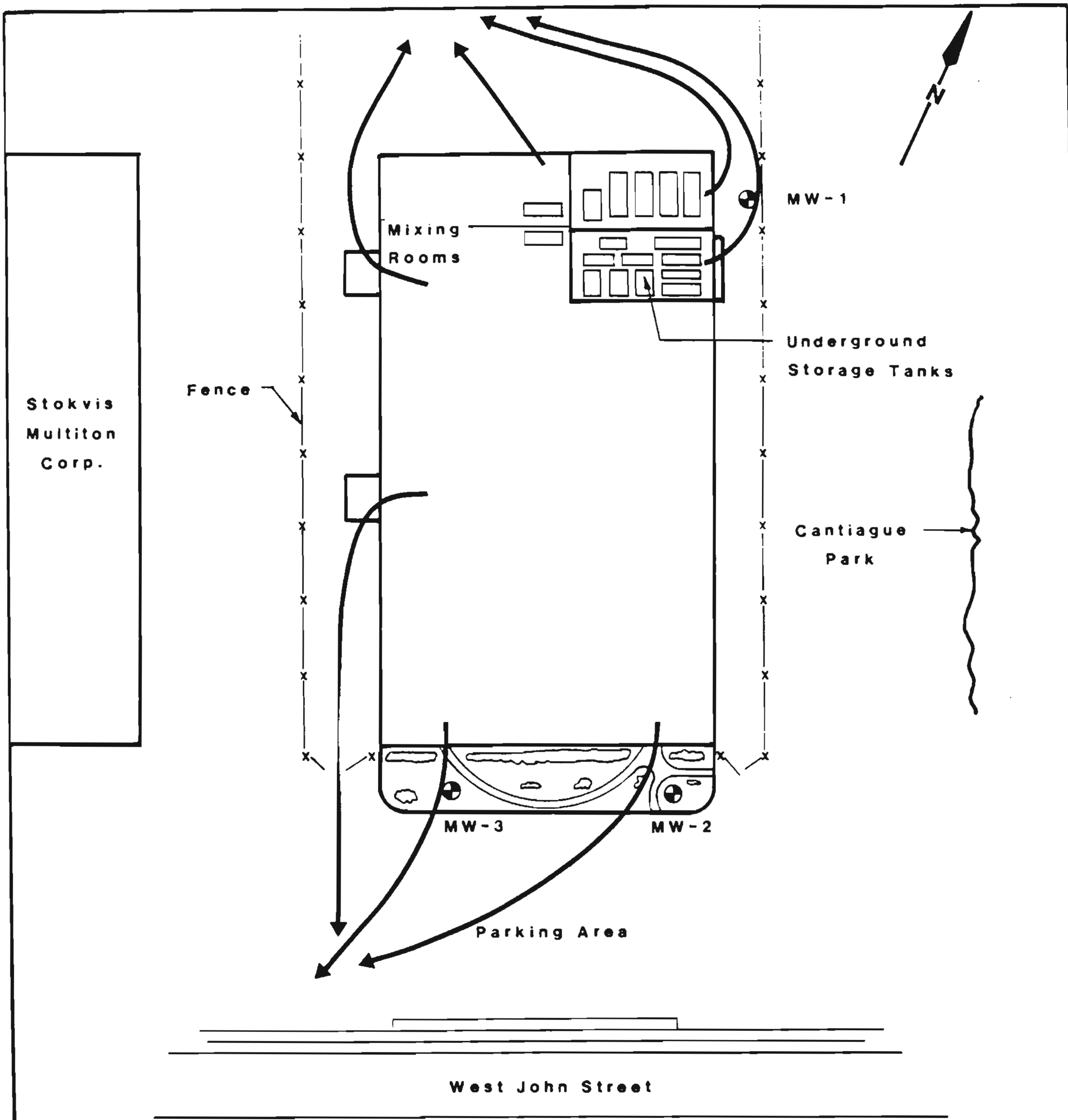


Decontamination Layout Level C Protection

FIGURE II



Decontamination Layout Level B Protection



NOTE: OCCUPANTS OF THE BUILDING WILL PROCEED TO THE CLOSEST EXIT AND EVACUATE THE BUILDING IN THE EVENT OF AN EMERGENCY.

Title:

EVACUATION ROUTE
ANCHOR CHEMICAL SITE
HICKSVILLE, NEW YORK

Prepared for:

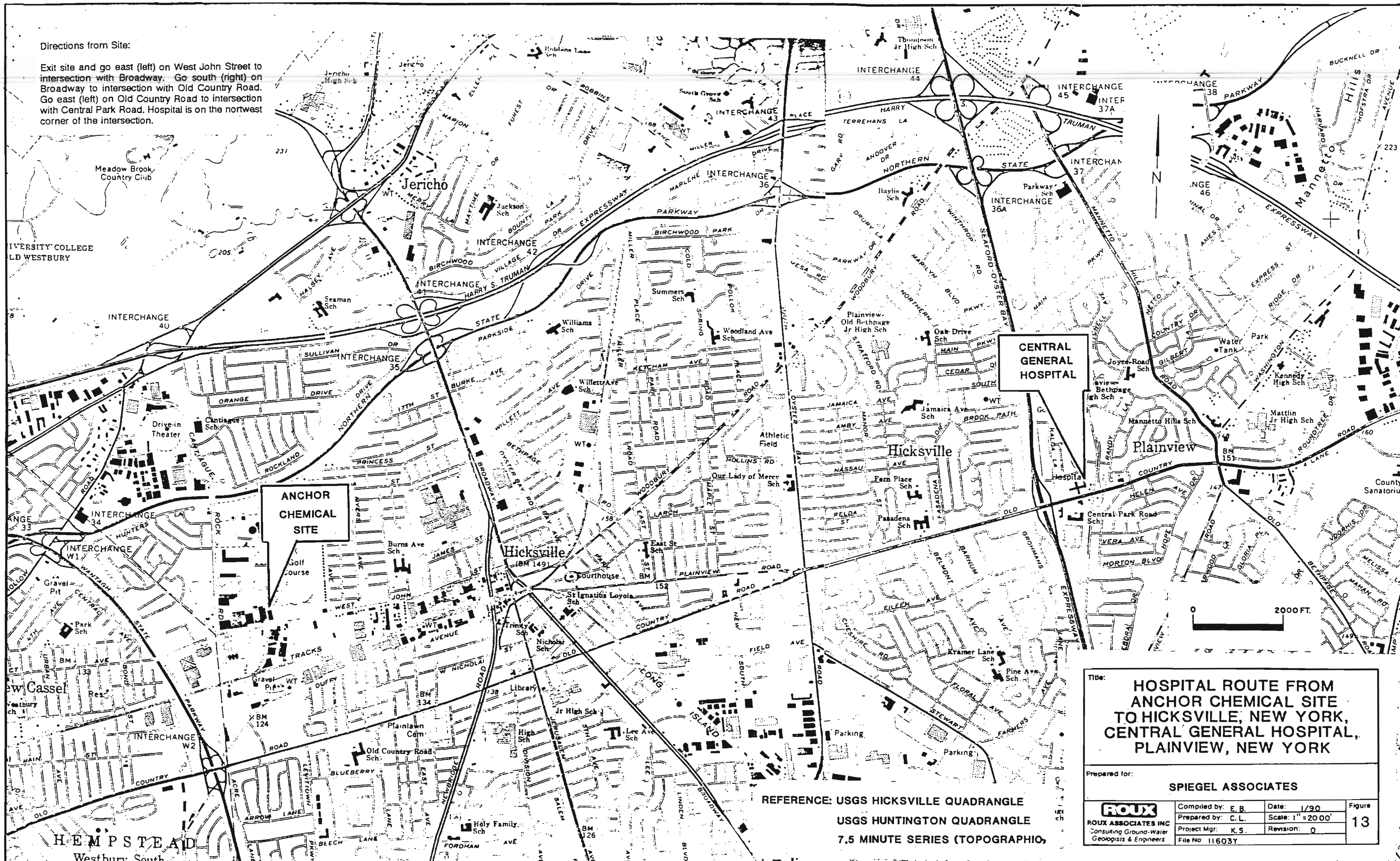
SPIEGEL ASSOCIATES

ROUX ASSOCIATES INC

Compiled by J.Y.	Date 4/91	Figure	
Prepared by C.R.	Scale NONE	12	
Project Mgr J.Y.	Revision 0		
File No 11603Y			

Directions from Site:

Exit site and go east (left) on West John Street to intersection with Broadway. Go south (right) on Broadway to intersection with Old Country Road. Go east (left) on Old Country Road to intersection with Central Park Road. Hospital is on the nortwest corner of the intersection.



REFERENCE: USGS HICKSVILLE QUADRANGLE
USGS HUNTINGTON QUADRANGLE
7.5 MINUTE SERIES (TOPOGRAPHIC)

Title:	HOSPITAL ROUTE FROM ANCHOR CHEMICAL SITE TO HICKSVILLE, NEW YORK, CENTRAL GENERAL HOSPITAL, PLAINVIEW, NEW YORK		
Prepared for:	SPIEGEL ASSOCIATES		
ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: E.B.	Date: 1/90	Figure 13
	Prepared by: C.L.	Scale: 1" = 2000'	
	Project Mgr: K.S.	Revision: 0	
	File No: 11603Y		

301223

FIGURE **14** – REMEDIAL INVESTIGATION SCHEDULE
ANCHOR CHEMICAL SITE
HICKSVILLE, NEW YORK

WEEKS AFTER START

		1	2	3	4	5	8	9	20	21	22	33	34	35	36	37
TASK 1	INVESTIGATION OF SITE HISTORY *															
TASK 2	UNDERGROUND TANK INSPECTION	●	●	●	●	●										
TASK 3	INSTALLATION OF MONITORING WELLS			●	●	●										
TASK 4	CHARACTERIZATION OF GROUND WATER & SEDIMENT BASED ON TARGET COMPOUND ANALYSES						●	●								
TASK 5	SURVEY OF SUPPLY WELLS						●	●								
TASK 6	DRILLING OF SOIL BORINGS AND SAMPLING OF SOIL AND GROUND WATER								●	●	●					
DATA ANALYSES AND REPORT												●	●	●	●	●

TWO-WEEK DELAY

TEN-WEEK DELAY

NOTE: (1) A SCHEDULE FOR THE FS WILL BE PREPARED AND SUBMITTED AS PART OF THE RI REPORT.

(2) THERE IS A TWO-WEEK DELAY INCLUDED AFTER TASK 3 TO ALLOW WELL RECOVERY AND A TEN-WEEK DELAY INCLUDED AFTER EACH OF TASKS 5 AND 6 TO ALLOW FOR SAMPLE ANALYSES AND DATA VALIDATION.

(3) THERE IS A TWO TO FOUR WEEK PERIOD REQUIRED TO CONTRACT AND MOBILIZE SUBCONTRACTORS

* TASK 1 IS COMPLETED

APPENDIX A

Underground Tank Investigation Plan

1.0 HEALTH AND SAFETY PLAN

1.1 Introduction

This Site-specific Health and Safety Plan (HASP) has been prepared in accordance with 29 CFR 1910.120 and M P C Environmental Services Standard Operating Procedures. It addresses the tank investigation at the Anchor Chemical Site and will be implemented by the designated Site Health and Safety Officer (SHSO) during Site work.

Compliance with this HASP is required for all persons and third parties who enter this Site. Assistance in implementing this HASP can be obtained from the MPC Environmental Service Health and Safety Manager. The content of this HASP may undergo revision based upon additional information made available. Any changes proposed must be reviewed and approved by the MPC Health and Safety Manager or his designee.

No employees at the Site will be allowed in the Contamination Reduction and Exclusion Zones during the soil boring drilling operations, tank sampling, and underground tank investigation.

Scope of Work:

The objectives of the Remedial Investigation are to characterize the Site with regard to the extent of soil and/or ground-water contamination which have resulted from past activities at the Site, and to provide the technical basis for choosing a preferred remedial alternative.

1.2 Key Personnel

Implementation of safe Site investigation procedures are described in this section.

Project Manager

Mr. John Emington will be responsible for the overall implementation and monitoring of the health and safety program by:

a. providing the appropriate protective equipment and ensuring that is used in compliance with the HASP;

b. providing the proper training to ensure personnel health and safety;

c. ensure that all personnel are apprised of the potential hazards on the Site;

d. establish safe work practices to prevent possible injury and exposure to health hazards; and

e. communication with the Site Health and Safety Officer.

Site Health and Safety Officer

Mr. Phil Dougherty will be the Site Health and Safety Officer and will also supervise the field program. Mr. Dougherty will be responsible for the direct supervision of field personnel including:

a. health and safety program compliance (see Section 1.2);

b. maintaining a high level of health and safety awareness among the employees at the Site; and

c. reporting accidents and undertaking corrective actions.

Field Personnel

All field personnel will have the appropriate training (Section 1.3) and will report directly to Mr. Dougherty. They will be required to:

a. conform with the provisions of the HASP;

b. be aware of the potential hazards of the Site; and

c. report any accidents or hazardous conditions to Mr. Dougherty.

Responsibility	Name	Telephone #
MPC Health & Safety Manager	Joseph Pampinella	(516) 369-4900
Office Health & Safety Supervisor	Robert Governale	(516) 369-4900
Site Health & Safety Officer	Phil Dougherty	(516) 369-4900
Project Manager	John Emington	(516) 369-4900
Field Manager	Phil Dougherty	(516) 369-4900

1.2.1 Health and Safety Personnel Designations

Corporate Health and Safety Manager

The Corporate Health and Safety Manager (CHSM) has overall responsibility for development and implementation of the HASP. He also shall approve any changes to the HASP due to modification of procedures or newly proposed Site activities.

Health and safety related duties and responsibilities will be assigned only to qualified individuals by the CHSM. Before personnel may work on Site, currentness of acceptable medical examination and acceptability of health and safety training must be approved by the CHSM.

Office Health and Safety Supervisor

The Office Health and Safety Supervisor (OHSS) serves as the local area office designee of the CHSM and aids the CHSM in assuring that the policies and procedures of the HASP are implemented by the SHSO. The OHSS is responsible for providing the appropriate monitoring and safety equipment and other resources necessary in implementing the HASP. The OHSS ensures that all personnel designated to work on Site are qualified according to applicable EPA, OSHA and state requirements.

Site Health and Safety Officer

The Site Health and Safety Officer (SHSO) will be present on Site during the conduct of all field operations, will be responsible for all health and safety activities and has the authority to make all health and safety related decisions. The determination of hazard levels will be made by the SHSO in consultation with the CHSM. The SHSO has stop-work authorization which he will execute upon determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation, such as detrimental weather conditions, or photoionization readings exceeding PEL or TLV values. Authorization to proceed with work will be issued by the OHSS (consultation with the SHSO) after such action. The SHSO will initiate and execute contact with emergency facilities and personnel when this action is appropriate, although all Site workers will have knowledge of the appropriate emergency contacts. Assistant SHSOs may be designated by the SHSO if required but must be pre-qualified and approved by the OHSS and CHSM.

1.3 Training Requirements

1.3.1 Basic Training

All Site personnel who will perform work in areas where there exists the potential for toxic exposure will be health and safety trained prior to performing work on Site per OSHA (29 CFR 1910.120(e)). This training includes a 40-hour OSHA training course (minimum) and an annual refresher course (8 hours), as appropriate. Training records will be maintained by the SHSO on Site and as described in Section 1.3.4. Each individual will sign a daily log to ensure that proper protective equipment and training have been received.

1.3.2 Site Specific Training

Training will be provided by the SHSO that will specifically address the activities, procedures, monitoring and equipment for the activities, procedures, monitoring and equipment for the Site operations to all Site personnel and visitors. It will include Site and facility layout, hazards, emergency services at the Site and will detail all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity. Site-specific training will be documented and kept as part of the project records.

1.3.3 Safety Briefings

Project personnel will be given briefings by the SHSO on an as-needed basis to further assist them in conducting their activities safely. Safety briefings will be provided when new operations are to be conducted, changes in work practices must be implemented due to new information made available and before work is begun at each work site. Records of safety briefings will be kept as part of the project records.

1.3.4 Record Keeping Requirements

All record keeping requirements mandated by OSHA (29CFR 1910.120) will be strictly followed. Specifically, all personnel training records, injury/incident reports, medical examination records and exposure monitoring records will be maintained by MPC for a period of at least thirty years after the employment termination date of each employee.

The SHSO shall maintain a daily written log of all health and safety monitoring activities and monitoring results shall become part of the project records.

1.4 Medical Surveillance Requirements

Medical surveillance specifies any special medical monitoring and examination requirements as well as stipulates that all MPC personnel and subcontractors are required to pass the medical surveillance examination or equivalent for hazardous waste work required by 29 CFR 1910.120. As a minimum, the examination will include:

* Complete medical and work histories
* EKG
* Urinalysis
* Physical Exam

* Eye Exam

* Blood Chemistry

* Pulmonary Function Test

* Audiometry

The examination will be taken annually, at a minimum, and upon termination of employment with the company. Additional medical testing may be required by the CHSM or OHSS in consultation with the company physician and the SHSO if an overt exposure or accident occurs, or if other Site conditions warrant further medical surveillance.

1.5 Hazard Analysis

To evaluate potential hazards prior to Site entry, potential and suspected compounds that may pose a hazard may have been identified in Table 5.

1.5.1 Hazard Assessment

* **Underground Storage Tank Investigation**
  The possible flammable/explosive range of the unknown chemicals in the underground tanks beneath the building on Site will require the use of intrinsically safe and explosion proof equipment. The risk of fire or explosion will be of most concern during all intrusive activities near or within the underground tanks.

* **Chemical Hazards**
  1,1,1-trichloroethane, trichloroethylene, 1,1-dichlorethane, tetrachloroethylene, methylene chloride, benzene, toluene, xylenes, acetone, petroleum naphthas, chloroform, ethylacetate, ethylbenzene and isopropyl alcohol have been detected on the Site. The toxicological, physical and chemical properties of these compounds has been presented in Table 5. This hazard exists during the intrusive and sampling activities.

* **Ambient Air Hazards**
  Should the photoionization reading level exceed the PEL or TLV for the chemicals listed in Table 5 the SHSO or field manager will upgrade the protection level. The HASP and the RI work plan will be modified to reflect the hazards presented by the new conditions An air hazard exists during all intrusive and sampling activities.

* **Heat/Cold Stress**
  Temperature extremes, precipitation, high winds and storms can affect personnel safety. In its early stages, heat stress can cause rashes, cramps, discomfort, and drowsiness resulting in impaired functional ability. Continued heat stress can lead to heat strokes and death. Work practices will be modified to monitor and minimize the effects of heat stress by avoiding over-protection, careful training and monitoring of personnel with protective clothing, scheduling rest periods, or adjusting the work schedule to early morning or late afternoons. The hazard of heat stress exists during all outdoor activities.

  Cold injury (frostbite and hypothermia) will be guarded against with the appropriate clothing and the availability of shelter, carefully scheduled work and rest periods, and monitoring the worker's physical condition. This is especially necessary when the wind chill factor is low. The hazard of cold stress exists during all outdoor activities.

* **Noise**
  The hollow-stem auger method will be used for drilling. From previous experience, drilling using this method does not exceed the 85 dba TWA Standard. However, hearing conservation devices will be on Site for employees who experience discomfort. A noise hazard exists for all drilling activities.

* **General Safety Hazards**
  Site personnel will be aware of potential safety hazards (holes, ditches, steep grades, etc.) and will immediately notify their supervisors of any new hazards so preventative measures may be taken. Care will be taken to avoid the overhead electrical lines and the sewer and water lines (shown on Figure 4) during drilling activities.

1.6 Site Control **Measures**

MPC employees a three zone approach to site operations to control the potential spread of contamination. The three zones are:

* The Exclusion Zone

* The Contamination Reduction Zone and

* The Support (Clean) Zone

1.6.1 Exclusion Zone

The area(s) which contain, or are suspected to contain, hazardous materials will be considered the Exclusion Zone. For the underground tank investigation, the room being investigated and the 70 sq. ft. area outside the double doors into the warehouse, will be the Exclusion Zone (Figure 5). This zone is to be clearly delineated by a "Hotline". The "Hotline" is a length of colored flag tape completed surrounding the Exclusion Zone. The SHSO may establish more than one restricted area within the Exclusion Zone when different levels of protection may be employed or different hazards exist. No personnel are allowed in the Exclusion Zone without:

* Buddy System
* The proper personal protective equipment
* Medical authorization and
* Training certification

1.6.2 Contamination Reduction Zone

A contamination Reduction Zone (CRZ) will be established between the Exclusion Zone and the Support Zone. The CRZ will contain the contamination reduction corridor (CRC) and will provide for full personnel and portable equipment decontamination. The CRZ is to be used for general Site entry and egress in addition to access for heavy equipment for investigation activities. This area is further defined in Section 3.4. The CRZ will also contain safety and emergency equipment (see section 1.11). No personnel are allowed in the Contamination Reduction Zone without:

* The proper personal protective equipment
* Medical authorization and
* Training certification

1.6.3 Support (Clean) Zone

The support Zone is considered the uncontaminated area and will be separated from the CRZ by the "Contamination Control Line". The "Contamination Control Line" will be a different colored flag tape than the "Hotline". The Support Zone will contain the support facility which will provide for team communications and emergency response. At least one person shall remain in the Support Zone at all times during operations downrange to facilitate communications and emergency response. Appropriate safety and support equipment will be located in this zone, and the majority of Site operations will be controlled from this location. No potentially contaminated personnel or materials are allowed in this zone except appropriately packaged/decontaminated and labeled samples.

1.6.4 Authorizations

Personnel authorized to enter the Exclusion Zone while operations are being conducted must be approved by the Site Manager. Authorization will involve completion of appropriate training courses, medical examination requirements as specified by OSHA 29 CFR 1910.120, and review and sign-off of this HASP.

1.7 Personnel Monitoring Procedures

Personal breathing zone samples, eight-hour time-weighted-average (TWA) sampling, may be conducted if sustained operations in Level C or Level B are required. The personal breathing zone samples will be collected according to NIOSH analytical methods and analyzed by an AIHA-certified laboratory.

Ambient atmosphere and tanks will be monitored for LEL using the MSA 261 meter. If readings exceed safe work concentrations (25%) the building will be evacuated until precautionary measures are taken. Readings will be continuous under the supervision of the SHSO.

Photoionization readings (OVA, HNU, Tip II or OVM) will be taken continuously during all intrusive activities, air sampling tubs will be used to monitor benzene and chloroform in the breathing zone during all intrusive activities. Should a level exceed the PEL or TLV as listed in Table 5, the SHSO or field manager will upgrade the protection level. The HASP and the RI work plan will be modified to reflect the hazards presented by the new conditions. An air hazard exists during all intrusive and sampling activities.

1.8 Personnel Protective Equipment

1.8.1 General

The level of protection to be worn by field personnel will be defined and controlled by the SHSO with approval of the CHSM. Where more than one hazard area is indicated, further definition shall be provided by review of Site hazards, conditions, and operational requirements and by monitoring at the particular operation being conducted. Protection may be upgraded or downgraded by the SHSO on the basis of action levels. Based on background data from previous investigations at the Site, Level D will be worn for the outdoor investigation (installation of monitoring wells, ground water and sediment sampling, and soil borings and soil sampling). Photoionization readings will be made continuously during all intrusive activities. If needed, Level C protection will be available at the Site.

Work which may require at Level B include the investigation and sampling of the USTs and soil beneath the building foundation. Due to the ambiguity of the contents of the tanks, Level B may be used at the onset of the investigation.

1.8.2 Respiratory Protection and Clothing

Level D Protection

1. Personal protective equipment

   - Coveralls

   - Gloves

   - Boots/shoes, leather or chemical-resistant, steel toe and shank

   - Boots (outer), chemical-resistant (disposable*)

   - Hard Hat**

   - Escape Mask*

*Option
**During Drilling

2. Criteria for selection

   Readings on the photoionization meter are less than 5 pmm (with the exception of benzene (1 ppm) and chloroform (2 ppm) in the breathing zone. Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals. Note: Benzene and chloroform will be monitored with periodic sampling in the breathing zone using air sampling tubes.

Level C Protection

1. Personal protective equipment

   - Full-face, air-purifying, canister-equipped respirator (MSHA/NIOSH approved)

   - Chemical-resistant clothing (coverall;hooded, two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls)

   - Coveralls*

   - Gloves (outer), chemical-resistant

- Gloves (inner), chemical-resistant
- Boots (outer), chemical-resistant, steel toe and shank
  - Boots (outer), chemical-resistant (disposable*)
  - Hard Hat (face shield*)
  - Escape Mask*
  - 2-Way radio communications (intrisically safe)*

*Optional

2. Criteria for Selection

- Total vapor readings register between 5 ppm and 25 ppm on photoionization instruments such as the Photovac Tip II and Century OVA System.
- Measured air concentrations of identified substances will be reduced by the respirator to at or below the substance's exposure limit, and the concentration is within the service limit of the canister.
  - Atmospheric contaminant concentrations do not exceed Immediately Dangerous to Life and Health (IDLH) levels.
  - Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.
- Job functions have been determined not to require self-contained breathing apparatus.
- Air will be monitored continuously.

<u>Level B Protection</u>

1. Personal Protection Equipment

- Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH approved)
- Chemical-resistant clothing (overall and long-sleeved jacket; coveralls; hooded, one or two-piece chemical-splash suit; disposable chemical-resistant coveralls)
- Coveralls
- Gloves (outer), chemical-resistant

- Gloves (inner), chemical-resistant

- Boots (inner), chemical resistant, steel toe and shank

- Boots (outer), chemical-resistant, (disposable)

- Hard hat (face shield)

- 2 way radio communications (intrinsically safe)

2. Criteria for Selection

Meeting any one of these criteria warrants use of Level B protection:

- The type(s) and atmospheric concentration(s) of toxic substance(s) have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection. These would be atmospheres:

  - with concentrations Immediately Dangerous to Life and Health (IDLH)

    or

  - exceeding limits of protection afforded by a full-face, air-purifying mask

    or

  - containing substances requiring air-supplied equipment but substances and/or concentrations do not represent a serious skin hazard.

- The atmosphere contains less than 19.5% oxygen.

- Site operations make it highly unlikely that the small, unprotected arc of the head or neck will be contacted by splashes of extremely hazardous substances.

- If work is performed in an enclosed space and the total atmospheric concentrations of unidentified vapors or gases range from 5 ppm to 500 ppm on instruments such as the Century OVA Systems or HNU Photoionization, and vapors are not suspected of containing high levels of chemicals toxic to skin.

1.9 Decontamination Procedures

A steam cleaner will be utilized to decontaminate the drilling equipment. Personnel should exercise caution when using a steam cleaner. The high pressure steam can cause severe burns. Protective gloves, face shields, hard hats, steel-toed boots, and Tyvek suits or rain gear will be worn when using steam cleaners.

1.9.1 Contamination Prevention

One of the most important aspects of decontamination is the prevention of contamination. Good contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel

* Do not walk through areas of obvious or known contamination;

* Do not handle or touch contaminated materials directly;

* Make sure all personal protective equipment (PPE) has no cuts or tears prior to donning;

* Fasten all closures on suits, covering with tape, if necessary;

* Take particular care to protect any skin injuries;

* Stay upwind of airborne contaminants; and

* Do not carry cigarettes, gum, etc. into contaminated areas.

Sampling/Monitoring

* When required by the SHSO, cover instruments with clear plastic, leaving opening for sampling and exhaust ports; and

* Bag sample containers prior to the placement of sample material.

Heavy Equipment

* Care should be taken to limit the amount of contamination that comes in contact with heavy equipment;

* If contaminated tools are to be placed on non-contaminated equipment for transport to the decontamination pad, plastic should be used to keep the equipment clean; and

* Excavated soils should be contained and kept out of the way of workers.

1.9.2 Decontamination

All personnel and equipment exciting the Exclusion Zone shall be thoroughly decontaminated. Figures 9, 10, and 11 illustrate typical decontamination procedures for Levels D, C and B. Detailed decontamination procedures are in Appendix C. Safety briefings shall explain the decontamination procedures for personnel and portable equipment for the various levels of protection indicated in Section 1.8. Heavy equipment will be decontaminated with a steam cleaner.

1.9.3 Disposal Procedures

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on Site. All potentially contaminated materials (e.g. soil, clothing, gloves, etc.) will be bagged or drummed, as necessary, and segregated for disposal. All contaminated materials shall be disposed of in accordance with appropriate regulations. All non-contaminated materials shall be collected and bagged for appropriate disposal as normal domestic waste. All waste disposal operations conducted by MPC will be monitored by the SHSO and carried out under the appropriate level of personal protection described in Section 1.8. RCRA regulations for handling, storage, transport and disposal will fully complied with.

1.10 Standard Operating Procedures/Safe Work Practices

1.10.1 Communications

* Telephones - A telephone will be located in the Roux Site trailer or be available in the building for communication with emergency support services/facilities.

* Hand Signals - To be employed by personnel required to have Level C protection. These signals are also very important when working with heavy equipment. They shall be known by the entire field team before operations commence and covered during Site-specific training (see Section 1.11.1).

1.10.2 General Safe Work Practices

* Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand to mouth contact and ingestion of material is prohibited on Site except in specified areas.

* Hands must be washed thoroughly upon leaving the Site or before eating, drinking, or any other activities. This will be done in the decontamination staging area.

* Contaminated protective equipment shall not be removed from the Site until it has been decontaminated or properly packaged and labeled.

* Portable or fixed emergency shower/eyewash stations shall be located in the decontamination staging area.

* No excessive facial hair, which interferes with a satisfactory fit of respiratory equipment, will be allowed on personnel that may be required to wear respiratory protective equipment.

* An emergency first aid kit and fire extinguisher shall be on Site at all times.

* All respiratory protection selected to be used on Site shall meet NIOSH/MSHA requirements for the existing contaminants.

* Any skin contact with surface and ground water shall be avoided (tyvek suits, rubber gloves, leather boots).

* No contact lenses may be worn on Site.

1.10.3 General

All field sampling will be performed under the level of personal protection described in Section 1.8. In this section, non-monitoring, safety-related procedures are described.

1.10.4 Sampling

Personnel must wear prescribed clothing, especially eye protection and chemical resistant gloves when sampling. Sample bottles may be bagged prior to sampling to ease decontamination procedures. The sampling team must be aware of emergency evacuation procedures described in this HASP and the location of all emergency equipment and emergency contacts prior to sampling. Contamination avoidance shall be practiced at all times. In some situations, additional monitoring by the SHSO may be needed to confirm or establish the proper level of protection before the sampling team can proceed. Samples will be taken using an engineering control, ie: bailor, to avoid entry to the tank. Equipment as per SOP 3.1.

1.10.5 Sample Handling

Personnel responsible for the handling of samples shall wear the prescribed level of protection described in Section 1.8. Samples shall be identified as to their hazard and packaged as to prevent spillage or breakage. Any unusual sample conditions should be noted. Lab personnel shall be advised of sample hazard level and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or inclusion of a written statement with the samples. It may be necessary for the SHSO to review safety procedures in handling Site samples to assist or assure that these practices are appropriate for the type of suspected contaminants in the sample.

1.10.6 Waste Disposal

All waste disposal operations shall be monitored by the SHSO and carried out under the appropriate level of personal protection described in Section 1.8. Personnel shall wear the prescribed clothing, especially eye protection and chemical resistant gloves, when handling or drumming waste materials. Contamination avoidance shall be practiced at all times.

1.10.7 Additional Safe Work Practices

Refer to the SHSO for specific concern on each individual Site task. The safety rules listed below must be strictly followed:

* Employ the buddy system for any confined space work, and Exclusion Zone Activities.

* Practice contamination avoidance, both on Site and off-Site;

* Plan activities ahead of time;

* Do not climb over/under obstacles;

* Be alert to your own physical condition;

* Report all accidents, no matter how minor, immediately to the SHSO; and

* KNOW YOUR HEALTH AND SAFETY PLAN

A work/rest regimen will be initiated when ambient temperatures and protective clothing cause a stressful situation. No work will be conducted without adequate light or without supervision. Task safety briefings may be held prior to the onset of each task.

1.11 Emergency Response

Safety Equipment

Basic emergency and first aid equipment will be available at the Support Zone and/or the CRZ, as appropriate. This shall include HASP-specified communications, first aid kit, emergency eyewash or emergency shower or drench system, fire extinguishers, and other safety-related equipment. Other safety equipment will be located at the site of specific operations, e.g., a drilling rig, as appropriate.

1.11.1 Communications

* Telephones - A telephone will be located in the Site trailer or be available in the building for communication with emergency support services/facilities.

* Hand Signals - To be employed by personnel required to have Level C protection. These signals are also very important when working with heavy equipment. They shall be known by the entire field team before operations commence and covered during Site-specific training.

  The following hand signals will be used, if needed:

Signal	Meaning
Hand gripping throat	Out of air, can't breath
Grip partner's wrist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	I'm alright, okay
Thumbs down	No, negative

1.11.2 Emergency Plan

As a result of possible hazards on Site and the conditions under which are conducted, the possibility of an emergency exists. An emergency plan is required by OSHA (29 CFT 1910.120) to be available for use and is included below. A copy of this plan shall be posted in the Support Zone at each work site.

1.11.3 Site Emergency Coordinator(s)

The Site Emergency Coordinator is the Site Health and Safety Officer. The Site Emergency Coordinator(s) shall make contact with the local fire, police and other emergency units prior to beginning work on Site. In these contacts, the Site Emergency Coordinator(s) will inform the emergency units about the nature and duration of work expected on the Site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants. Also at this time, the coordinators and the emergency response units shall make arrangements to handle any emergencies that might occur.

1.11.4 Evacuation

In the event of an emergency situation, sucn as fire, explosion, significant release of particulates, etc., an air (and police) horn or other appropriate device will be sounded by the SHSO for approximately ten seconds indicating the initiation of evacuation procedures, and the fire and police departments notified by telephone of the emergency. All persons in both the restricted and non-restricted areas will evacuate and assemble near the Support (Clean) Zone or other safe area as identified by the Site Emergency Coordinator (Figure 12). The Site Emergency Coordinator will have authority to initiate proper action if outside services are required.

Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The SHSO must see that access for emergency equipment is provided and that all combustion apparatus has been shutdown once the alarm has been sounded. Once the safety of all personnel is established, other emergency response groups will be notified by telephone of the emergency. The hospital route (Figure 13) will be posted on Site.

1.11.5 Potential or Actual Fire or Explosion

If the potential for a fire exists or if an actual fire or explosion occurs, the following procedure will be implemented:

* Immediately evacuate the Site as described above (Figure 13) and

* Notify fire and security

  Fire Department 933-6444
  Police Department 365-0500

1.11.6 Environmental Incident (Release or Spread of Contamination)

If possible, the spread of contamination should be controlled or stopped. The Site Emergency Coordinator shall instruct a person on Site to immediately contact police and fire authorities to inform them of the possible or immediate need for nearby evacuation.

If a significant release has occurred, the National Response Center and other appropriate groups should be contacted. Those groups will alert National or Regional Response Teams as necessary. Following these emergency calls, the remaining personnel listed below shall be notified:

TYPE	NAME	TELEPHONE #
Fire Department	Hicksville Fire Dept.	(516) 933-6444
Emergency Response	Hazardous Material Team	566-5295(91) 566-5274(54)
Police Department	2nd Precinct	(516) 365-0500
National Response Center (Release or Spill)		800 424-8802

Site Health and Safety Officer	Phil Dougherty	(516) 369-4900
Health and Safety Manager	Joseph Pampinella	(516) 369-4900
Project Manager	John Emington	(516) 369-4900
Hospital (Figure 13)	Central General Emergency Room	(516) 681-8900 681-2335
Poison Control Center	Nassau County Medical Center	(516) 542-2323
Ambulance	Hicksville Fire Department	(516) 931-0026

1.11.7 Personal Injury

Emergency first aid shall be applied on Site as deemed necessary to stabilize the patient. The above emergency contacts will be notified as necessary.

The SHSO will supply medical data sheets on the patient to appropriate medical personnel and complete the MPC Incident/Injury Report.

1.11.8 Overt Personnel Exposure

If an overt exposure to toxic material should occur, the exposed person shall be treated on Site as follows:

Skin Contact: Wash/rinse affected area thoroughly with copious amounts of soap and water, then provide appropriate medical attention. An eyewash and/or emergency shower or drench system will be provided on Site at the CRZ and/or support zone as appropriate. Eyes should be rinsed for at least fifteen (15) minutes upon chemical contamination.

Inhalation: Move to fresh air and/or if necessary, decontaminate and transport to the hospital.

Ingestion: Decontaminate and transport to emergency medical facility.

Puncture Wound or Laceration: Decontaminate and transport to emergency medical facility. SHSO will provide medical data sheets to medical personnel as requested.

1.11.9 Adverse Weather Conditions

In the event of adverse weather conditions, the SHSO will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

* Heavy rainfall;
* Potential for heat stress;
* Potential for cold stress and cold-related injuries;
* Limited visibility;
* Potential for electrical storms;
* Potential for malfunction of H & S monitoring equipment or gear; and
* Potential for accidents.

1.12 Confined Space Entry

Confined space is defined as any space, depression or enclosure that has limited opening for entry and egress, may have limited ventilation, may contain or produce life-threatening atmospheres due to oxygen deficiency or the presence of toxic, flammable or corrosive contaminants, and which is not intended for continuous occupancy.

Prior to entry into a confined space, the MPC will complete a MPC safe work permit (attached) and perform the following:

* Comply with proposed rule 29CFR1910.146 confine space entry, 1|1 ratio, oxygen deficiency 19.5, safe work permit, hazard identification, and buddy system;
* Require procedures and practices for control of permit space hazards-ensure that PEL, LEL are not exceeded;
* Post signs to notify employees of hazards;
* Prevent unauthorized Site entry;
* Provide employee training and proper use of equipment; and
* Provide equipment and procedures for rescue.

The observer of the work will remain outside the confined space and stay in continuous visual or radio contact with the tank investigator. The observer will seek additional help when needed.

The inspection and sampling task for the 12 tanks will be performed in the solvent blending rooms. For each tank to be sampled, we will access the tank through a vent pipe, manway or other openings. MPC will provide health and safety precautions to address: 1) the potential for fire and explosion; 2) coordination with local emergency officials; 3) possible evacuation of the Site; 4) personnel protective equipment; and 5) decontamination procedures.

After the investigation of 12 tanks is completed, six soil borings will be taken from the area of the underground tanks to investigate possible soil contamination from leaks and spills which may have occurred. This sampling will be performed in accordance with Section 1.10.4.

MPC Environmental Services

SAFE WORK PERMIT

Type Of Permit Vessel Entry ☐ Hot Work ☐ Other ☐ Permit #

Good on This Date Only: From: AM ☐ PM ☐ To: AM ☐ PM ☐

Client/Site Address:

Workers Authorized Entry:	Work Monitors:	Fire Watch: (Hot Work Only)

Description of Job or Special Procedures: ______

EMPLOYEE TRAINING AND PRE-ENTRY BRIEFING:

1. Safe Entry and Rescue Training Conducted on: ______ (DATE)
2. Mandatory Pre-Entry Briefing Conducted on: ______ (DATE)
3. Does This Job Require Special Training? ______ YES ☐ NO ☐

CONTRACTOR NOTIFICATION

Contractor Notified of: Permit Conditions ☐ Potential Hazards ☐ N.A ☐

LIGHTING REQUIREMENTS	SPECIAL TOOLS/EQUIPMENT	COMMUNICATION DEVICES

1. Are All Electrical Devices Intrinsically Safe? YES ☐ N.A. ☐
2. Have All Power Cords and Tools Been Visually Inspected? YES ☐ N.A. ☐

VESSEL PREPARATION

1. Work Area Isolated with Signs/Barriers? YES ☐ N.A. ☐
2. All Energy Sources Locked/Tagged Out? YES ☐ N.A. ☐
3. All Input Lines Capped/Blinded? YES ☐ N.A. ☐
4. Vessel Contents Drained/Flushed/Neutralized? YES ☐ N.A. ☐
5. Vessel Cleaned/Purged? YES ☐ N.A. ☐
6. Ventilation Provided 30 Minutes Before Entry? YES ☐ N.A. ☐

PRE-ENTRY ATMOSPHERIC TESTING	Reading	Time	Initials
1. Test for Oxygen Content	____ % O_2	____	____
2. Test for Flammable Concentration:	____ % LEL	____	____
3. Test for Toxic Concentration:	____ PPM of ______ (TLV - ___)	____	____
4. Test for Heat Stress Hazard:	____ °F ☐ °C ☐ WBGT	____	____

EMERGENCY/RESCUE PROCEDURES

1. Location of Written Emergency/Rescue Plan: ______
2. Type of Emergency/Rescue Team Required: ON-SITE ☐ OFF-SITE ☐ PHONE # ______

SAFETY EQUIPMENT

Personal Protective Equipment Required:	Area Safety Equipment Required:

1. Self-Contained Breathing Apparatus Required? YES ☐ NO ☐ TYPE: ______
2. Portable Atmospheric Monitor Required? YES ☐ NO ☐ TYPE: ______

PERMIT AUTHORIZATION:

I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Permit Authorized by (signature): ______

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STANDARD OPERATING PROCEDURES FOR UST'S SAMPLING

2.1 SCOPE OF WORK:
Twelve (12) tanks of varied capacity must be sampled to verify contents and volume. The tanks in question have been covered by a concrete flooring of unknown thickness. A trench will be constructed to ascertain the manway, bung or other opening in each tank. The risk of explosion and respiratory hazards will be avoided with the use of non sparking tools and adequate ventilation. Engineering controls will be employed as to avoid any release of vapors from empty tanks which might facilitate respiratory upgrade during sampling and cleaning.

2.2 CHAIN OF COMMAND:
The supervisor on site will be responsible for all determinations as to scope and implementation health and safety plan. He shall also be required to follow the set SOP and to make modifications when either engineering controls can be implemented or general safety precautions can be employed.

2.3 MONITORING EQUIPMENT:
The equipment shall be used as outlined in the site safety plan 1.7. All equipment must be calibrated prior to operation and follow manufactures guidelines for operation. If air monitoring indicates a PEL or TLV which is not recommended as per the MSDS, then a higher level of protection will be required.

2.4 TRENCHING METHODS:
A review of facility drawings indicate access to tanks for sampling purposes by trenching. Trench depth will be determined on site by sample borings in a unaffected area of the site.
A depth analysis will be conducted by the supervisor to further determine exact trenching procedures and depths.

2.5 TRENCH CUTTING:
The access to tanks shall be provided by a trench opening of 24 inches in width and a length determined by the supervisor. The length shall include access to all tanks within that row. Each trench shall be of 24 inches in width and length to be determined by the supervisor.

2.6 CUTTING TOOLS:
The floor opening will be created by a concrete saw which will be monitored to avoid contact with tanks or any appendages of tanks.

2.7 TRENCH DIGGING TOOLS:
Non sparking tools will be used to gain access to tank opening by either hand digging or hammers and shovels.

2.8 TRENCH MATERIAL STORAGE: All contaminated material removed from trench shall be stockpiled outdoors in a secured roll-off with a cover. All other trenching debris will be disposed of accordingly.

2.9 TANK ACCESS EQUIPMENT:
Non sparking tools will be used to disconnect fill pipe or open manway on tank to provide sample access.

3.0 SAMPLING EQUIPMENT:
A volumetric sample or wipe sample will be taken once an opening has been provided as per SOP 2.9.

3.1 SAMPLE PERSONNEL:
An employee adequately trained in sampling techniques will conduct the sampling and complete the appropriate chain of custody.

3.2 SAMPLE COLLECTION:
Samples will be collected as per section 1.10.4.

3.3 SAMPLE TESTING/ANALYSIS:
The samples will be tested for the following;
RCRA toxicity charactiristic for;
Ignitibility, Corrosivity, and Reactivity method as follows;

TCLP 1311

volitales	8240
semi volitales	8270
pesticidies	8080
herbicidies	8150
metal	6010
corrosivity	9045
ignitability	1010
reactivity, solid waste manual par 7.3	

3.4 MATERIAL DISPOSAL:
Material will be dispossed of based on sample characteristics to either a non-hazardous or hazardous landfill or treatment facility. Transportation will comply with DOT regulations for transport of hazardous and non-hazardous materials.

4.0 TANK CLOSURE:
The tank will be resealed after sampling if required, or vented to facilitate vacuming operation for cleanup. Vent pipe will have a 12"X12" lock box opening, flush with concrete flooring.

4.1 TRENCH CLOSURE:
The trench will maintain limited access and have clear markings to avoid accidental falling into. Closure will be made to meet the clients specifications.

APPENDIX B

Resumes of Key Personnel

Paul Roux
President

Technical Specialties:
Ground-water/soil contamination investigation and remediation. Environmental site assessment. Water resources management.

Experience Summary:
18 years of experience: President of Roux Associates, Senior Hydrogeologist at Stauffer Chemical Co., and various hydrogeological positions at Geraghty & Miller. Directed and participated in RI/FS studies, environmental impact statements, water quality and contaminant mobility studies, ground-water assessments, technical support for legal counsel, expert witness, regulatory agency negotiations.

Credentials:
M.A. Geology, Queens College, City University of New York, 1978.
B.S. Engineering Science, C.W. Post College, Long Island University, 1968.

Certified Professional Hydrogeologist, A.I.H.
Certified Professional Geologist, A.I.P.G.
Certified Professional Geologist, Indiana, North Carolina, Florida, Delaware, Arkansas, and Tennessee.

Professional Affiliations:
National Water Well Association
American Institute of Professional Geologists (Northeast Executive Committee, '80-82)
American Institute of Hydrology

Publications:
14 papers for GSA, Ground Water, US EPA, Pollution Equipment News, Various Seminars (Columbia University, National Water Well Association, Hazpro Conference). Topics include ground-water contamination and monitoring, leachate migration, aquifer decontamination, waste disposal impacts on ground-water, resistivity and conductivity surveys, procedures manuals, site assessments, in-situ remediation, sensitivity analysis for pesticides.

Key Projects:
- Principal-in-charge of remedial investigation feasibility studies for several hazardous waste sites listed on the National Priorities List, and for several state Superfund sites.
- Principal-in-charge of several studies to define areas vulnerable to ground water contamination from pesticide application. Planned and supervised a major herbicide leaching study in eight states, and testified on the results to the EPA Science Advisory Panel.
- Principal-in-charge of a large-scale well sampling program to determine the potential for pesticide leaching under various soil and hydrogeologic conditions.
- Evaluated ground-water conditions at over 100 industrial plant sites throughout the U.S. to determine existing and potential problems.
- Developed ground-water contamination abatement systems and monitoring programs at numerous industrial sites.
- Advised client management on corporate responses to ground-water portions of RCRA, SDWA (UIC), and CERCLA.
- Negotiated ground-water and hazardous waste matters with EPA and state regulatory personnel in ten states.
- Served on Chemical Manufacturers Association's Ground-water Management and Superfund Task Groups.
- Determined the effectiveness of an emergency cleanup of a 7,000 gal. PCB spill near a NJ public supply well field.
- For US EPA, evaluated impact of waste disposal facilities on ground-water resources of Gloucester and Camden counties, New Jersey. Conducted a similar project for Westchester County, New York.
- Implemented numerous water supply development projects. Clients included Shell Oil, Union Carbide, Puerto Rico Water Resources Authority, East Orange and Fairlawn townships in New Jersey, and Middletown and Weston townships in Connecticut.
- Designed ground-water removal and re-injection system for in-situ bioreclamation programs at several locations.

Joanne Yeary

Project Hydrogeologist

Technical Specialties:

Ground-water/surface-water investigation of hazardous materials and agricultural chemical residues in the environment. Oversee Quality Assurance for compliance with Good Laboratory Practices.

Experience Summary

3 years of experience: Project Hydrogeologist and Geologist with Roux Associates. Participated in several ground-water, soil and surface-water sampling programs. Quality Assurance Officer for several pesticide projects.

Credentials:

B.S. Geology, State University of New York at Stony Brook, 1986.

Professional Affiliations:

National Water Well Association

Key Projects:

- Supervised well installations, ground-water sampling, soil sampling and surface-water sampling at a CERCLA hazardous waste site in Massachusetts which is ranked #5 on the NPL.
- Participated in a ground-water sampling program for pesticides in domestic ground-water sources.
- Participated in a surface-water sampling program for pesticides in rivers and streams.
- Participated in a research program to evaluate the findings of state monitoring programs for pesticides in ground water.
- Supervised soil borings and well installations at several sites in New York and New Jersey.
- Purged and sampled monitoring wells at sites in New York, Massachusetts and Wisconsin.
- Logged soil borings and assisted in supervision of well installation at a site in Massachusetts. Developed, purged and sampled wells for organic compounds.
- Assisted in vapor probe installation at a hazardous waste site in New York.
- Conducted pumping test at hazardous waste site in Massachusetts as part of a program to evaluate an in site remedial program.
- Quality Assurance Officer for several pesticide projects. Assure that data, reports and archives adhere to EPA Good Laboratory Practice standards.
- Edited pesticide surface-water and ground-water sampling final reports following EPA Good Laboratory Practice standards and report format.
- Evaluated several hazardous waste sites for potential impact to the environment, calculated HRS scores and prepared Phase I reports for NYSDEC.
- Participated in slug tests at a hazardous waste site as part of a Phase II investigation for the NYSDEC.
- Assisted in writing summary report of environmental studies at a hazardous waste site in Massachusetts.
- Supervised soil borings at a site in Massachusetts and defined extent of buried hazardous waste.
- Installed piezometers and defined extent of a free product plume at a site in New York.
- Participated in follow-up investigations of farms with pesticide detections in on-site wells.
- Installed and sampled lysimeters at a site in Wisconsin as part of a pesticide follow-up study.
- Sampled 26 irrigation wells in Wisconsin as part of a pesticide follow-up study.

Michael A. DeCillis

Corporate Director of Ground-Water Modeling/Principal Hydrogeologist

Technical Specialties:

Quantitative analyses of hydrogeologic systems. Modeling of hydrogeologic environments. Investigation and remediation of ground-water and soil contamination. Management of water resources.

Experience Summary

14 years of experience: Corporate Director, Ground-Water Modeling Group of Roux Associates; previously Corporate QA/QC Officer of Roux Associates; Associate/Principal Hydrogeologist with Geraghty & Miller; Hydrogeologist with Environmental Associates. Modeling of ground-water flow and solute transport in unconsolidated and consolidated flow systems. Participated in resource development and soil/ground-water projects. Provided technical support for legal counsel. Involved in negotiations with regulatory agencies.

Credentials:

M.S. Hydrogeology and Earth Science,
Adelphi University, 1980
B.S. Earth Science and Biology,
Adelphi University, 1976

Certified Professional Geologist: A.I.P.G.
Certified Professional Geologist: TN, AK

Prepared and presented modeling section at Geraghty & Miller's Ground-Water Contamination seminars.
Assisted in preparation of Dr. Robert Cleary's IBM PC Applications in Ground Water Pollution and Hydrology course.

Professional Affiliations:

American Geophysical Union
Assoc. of Ground Water Scientists and Engineers
American Assoc. for the Advancement of Science
The New York Academy of Sciences

Publications:

EOS and Master Thesis on ground-water flow and solute transport models.

Key Projects:

- Principal Modeler, ground-water flow and solute transport modeling at Superfund, industrial, muncipal, and federal sites in numerous states and Puerto Rico for litigation and compliance issues (e.g., development of remediation programs, formulation of monitoring programs, support and representation of PRPs concerning COs, development of RI/FS Work Plans). Modeling also used for directing field investigations, and resource management and development.
- Quality Assurance/Quality Control (QA/QC) officer, providing technical oversight and guidance in hydrogeologic investigations involving resource development, hazardous waste contamination, pesticides, modeling, proposal and work plan preparation.
- Project Manager, hydrogeologic field investigations of landfills in New York to develop flow-system and water-quality data in support of NYS Part 360 permit application for site closure. Models were also used to evaluate potential migration pathways for contaminants and capture zones for hypothetical remedial wells.
- Project Manager, ground-water flow modeling of a coastal plain aquifer at a NJ RCRA investigation site. Modeling helped to identify the most effective remedial alternative to control off-site migration of contaminated ground water following closure of a series of waste-water lagoons and provide direction to additional field investigations.
- Designed, implemented, and analyzed aquifer tests for numerous sites throughout the United States and Puerto Rico.
- Principal Developer and Modeler, ground-water solute transport modeling for "generic" and area-specific hydrogeologic environments as in-house guidance tools to evaluate potential migration and plume configurations for organic and inorganic compounds in various hydrogeologic systems. Most often, modeling was undertaken to evaluate impacts on potential downgradient receptors.
- Principal Modeler, ground-water flow model of a fractured bedrock aquifer at a NJ industrial site. The model was part of a consent decree with state regulatory agencies to establish a buffer zone to exclude additional pumpage around the site and surrounding area to maintain a hydraulic barrier to the flow of contaminated ground water.
- Principal Modeler, ground-water flow and solute transport modeling at numerous industrial sites impacted by organics, hydrocarbons, PCBs, and metals. Strategies were developed to contain and/or clean-up aquifers, protect water supply wells, and prohibit impact on surface-water bodies.
- Principal Modeler, ground-water flow modeling for resource development in several states. Projects prompted by site contamination, expansion of water supply needs, nearby well field impacts, aquifer yield, artificial recharge and recovery.

James V. Worrall
Manager of Danbury Office/Principal Engineer

Technical Specialties:
Hazardous materials management. Waste treatment and disposal. In-situ remediation. Underground storage tank management. Plant closures and decontamination. Regulatory compliance strategies.

Experience Summary:
35 years in the chemical industry, 12 years exclusively in environmental work: Environmental and technical management positions at Roux Associates, Stauffer Chemical Company and Allied Corporation. Managed and participated in RI/FS and remediation projects, corporate disposal and UST programs, regulatory agency negotiations and technical support for legal counsel.

Credentials:
B.S. Chemical Engineering, Purdue University

Certified Hazardous Materials Manager - Master Level, No. 984, IHMM.
OSHA - 40 Hour Health & Safety Operations at Hazardous Materials Sites.

Professional Affiliations:
American Assoc. of Ground-Water Scientists and Engineers
American Institute of Chemical Engineers

Presentations:
New Jersey Environmental Exposition, 1986: "Underground Storage Tank Management Program for Industry".
Water and Wastewater Operations Center, Westford, MA: "Management of Underground Tanks".

Key Projects:

- Managed several remedial investigations, feasibility studies, and remediation projects for hazardous waste sites on the National Priorities List and state Superfund sites.
- Managed in-situ chemical and biological remediation of a coal tar impoundment site. Responsible for design, procurement, construction, operation and training.
- Managed or directed projects for plant closures, decontamination, waste disposal, PCB-transformer disposal, dismantlement and demolition at five chemical plants.
- Directed RI/FS, remedial design, installation, and start-up of a project to protect a metropolitan drinking water supply from ground-water contamination. Remediation included the installation of a 2,000 ft. wide interception barrier, precipitation and clarification of silica compounds, air stripping, and downgradient re-infiltration. System was designed to treat 180 gpm.
- Designed and established a program for the management of risks, costs and RCRA compliance associated with underground storage tanks (UST) for a major chemical company.
- Managed several environmental site assessments and remediation projects for property transfers under state Superlien laws.
- Negotiated environmental investigations, remedial measures and waste disposal alternatives with state and federal agencies in CA, CT, DE, MA, NV, NJ, NY, PA and VA.
- Established and directed a hazardous waste treatment and disposal program for a chemical company with 70-plants. Audited all major commercial facilities nationwide and negotiated contracts to ensure compliance with RCRA and DOT regulations.
- Chaired technical committee and coordinated consultants for industry-sponsored remedial investigations/feasibility studies at NPL Superfund-listed site and related state-listed abandoned waste site: Proposed multi-level ground-water intercept, air stripping column and reinfiltration/soil flushing system.
- Conducted a plant decontamination survey for a major chemical company in preparation for possible sale of buildings and facilities. The survey covered six plants across the country, and required inspections of all buildings and facilities to provide company management with decontamination methods and costs of decontamination and hazardous waste disposal.
- Directed PCB-waste impoundment removal and closure in compliance with RCRA and TSCA. Researched PCB treatment options.

Harrison Gregory
Staff Geologist

Technical Specialties:

Collection of environmental samples including: ground-water, surface water, soil pore water and soil. Preparation for field investigation.

Experience Summary

1 year practical experience in preparation for the collection of environmental samples at field studies in Georgia, Illinois, Iowa, Wisconsin, and New York.

Credentials:

A.A.S. in Animal Science, SUNY Farmingdale, 1965.
B.S. in Geology expected in August 1990.

Water Resources and Contamination Evaluation Workshop, Ohio University, June 1990.,

Professional Affiliations:

National Water Well Association

Key Projects:

- Field technician on small-scale prospective ground-water study for newly formulated insecticide. Collected, preserved, and shipped ground water, soil pore water, and soil samples.
- Maintain automated data logging equipment for climetological and hydrological data.
- Maintain and calibrate field meters for measurement of pH, conductivity, and temperature.
- Tabulate and enter data into computerized data base system.

Linda M. Wilson
Project Scientist

Technical Specialties:

Audits for compliance with Good Laboratory Practices; quality assurance; industrial hygiene & asbestos abatement programs.

Experience Summary:

4 years of experience: Project Scientist with Roux Associates; Senior Environmental Scientist with TRC Environmental Consultants; Operations Manager with Hygienetics.

Credentials:

M.S. Toxicology, St. John's University, 1984.
B.S. Environmental Science, Cornell University, 1978.

Certifications:

NYC Department of Environmental Protection Asbestos Investigator
NIOSH 582 Airborne Asbestos Sampling and Evaluation Techniques

Key Projects:

Quality Assurance

- Conducted audits for compliance with Good Laboratory Practice (GLP) standards for USEPA, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and Toxic Substance Control Act (TOSCA).
- Project manager responsible for quality assurance for asbestos investigations within 800 NYC Transit Authority facilities.
- Conducted in-house training seminars on NYC Local Law 76/85 and NYS Industrial Code 56.

Project Management

- Managed industrial hygiene and asbestos abatement projects from contract administration through design, technical specifications, field work, and final reports.
- Performed research to update Material Safety Data Sheets to ensure compliance with OSHA regulations for an industrial client.
- Conducted tenant awareness meetings sponsored by real estate management agents. Meetings answered tenant's questions and concerns regarding asbestos removal in their building.
- Implemented operations and maintenance programs for high-rise buildings in NYC, in response to Public Law 76/85.

APPENDIX C

Field Standard Operating Procedures

SAMPLING EQUIPMENT DECONTAMINATION PROCEDURE

(1) wash and scrub with a low phosphate detergent;

(2) tap water rinse;

(3) *rinse with 10% HNO_3, ultrapure grade (metal samples only);

(4) tap water rinse;

(5) acetone only rinse, or methanol followed by hexane (all solvents to be pesticide grade or better);

(6) deionized water rinse (demonstrated analyte-free);

(7) air dry;

(8) wrap in aluminum foil.

* If using carbon steel split spoons, a 1% HNO_3 rinse may be used instead of 10% to reduce the possibility of leaching metals from the spoon itself.

SEDIMENT SAMPLING OF DRYWELLS

(1) Take all necessary precautions to ensure personnel safety. Carefully inspect the area to identify safe sampling locations. Always wear a lifeline and appropriate personal protective equipment.

(2) Record sample locations and numbers in field notebook.

(3) Make sure all sampling equipment has been thoroughly precleaned and establish a clean area for decontamination.

(4) Use appropriate sampling bottles provided by the laboratory, as required for each sampling (labels, chain-of-custody, place on ice, etc.).

(5) Use a hand auger with extension rod or pipe to collect sediment samples. Auger or drive pipe to desired depth. If pipe is used, seal open end before withdrawal to avoid loss of sample. Remove sample onto new polyethylene sheeting using disposable vinyl gloves and stainless steel spoons or rod, as appropriate.

(6) Segregate representative portion of the sample. Log the sample in detail and record sediment characteristics (color, odor, consistency, texture, density, layering, and mineralogy).

(7) VOA samples must be collected before the homogenization of soil samples.

(8) For non-volatiles only, the homogenization of soil/sediment samples is performed in the following manner:

a. Remove rocks, twigs, leaves, and other debris;
b. Soil/sediment is removed from the sampling device and placed in a stainless steel pan, then thoroughly mixed using a stainless steel spoon;
c. Scrape sides, corners, and bottom of pan, roll to middle of pan and initially mix;
d. The sample is then quartered and moved to the four corners of the pan. Each quarter of the sample is mixed individually, and then rolled to the center of the pan and mixed again.

(9) Collect samples into bottles and seal with custody seal. Label each bottle with:

- a unique code number (recorded in the field book);
- the boring or well number;
- depth (if appropriate);
- type of sample;
- date and time of collection; and
- name of person collecting sample.

Record all information in field notebook. Place each bottle in separate plastic bag, seal the bag, and place on ice immediately if required.

(10) Maintain the samples in a secure area at 4°C and deliver to the laboratory within twenty-four hours along with chain-of-custody form.

(11) Discard all rags, gloves, polyethylene sheeting, etc. in an appropriate manner. Clean all sampling equipment in decontamination area prior to reuse.

GROUND WATER SAMPLING PROCEDURE - VOLATILE ORGANICS AND OTHER CONSTITUENTS

(1) Identify the well and enter presampling information in the field notebook and on the sampling form. Fill out other items on sampling form.

(2) Inspect protective casing and note any items of concern such as missing lock or bent casing.

(3) Cut a slit in one corner of a dedicated polyethylene sheet and slip it over and around the well or place near the well, creating a clean surface onto which the sampling equipment can be positioned. Do not kick, transfer, drop or in any way let soil or other material fall onto this sheet unless it comes from inside the well. Do not place any meters, tools, equipment, etc., on the sheet unless they have been cleaned with a clean rag to remove any sediments.

(4) Clean the top of the well off with a clean rag and remove the cap or plug, placing it on a clean surface.

(5) Clean the steel tape with soapy water followed by a demonstrated analyte-free water rinse, and measure the depth to water. Record this and compute the volume of water in the well.

(6) Existing wells will be purged by the hydrogeologist on site. All monitoring wells will be pumped or bailed before sampling and a minimum three casing volumes will be removed if the recharge rate is adequate to accomplish this within a reasonable amount of time. For wells with low recharge, the wells will be evacuated to near dryness once, and allowed to recover sufficiently for samples to be taken.

Hand bailers, submersible pumps, etc. will be clean and sediment-free prior to use. Decontamination will follow procedures on page C-1 of Appendix C.

If a pump is used, the tubing which comes in contact with water should be made of polyethylene or teflon and must be dedicated to individual wells. The intake should be placed just below the water level and lowered as the water level lowers while pumping to ensure that all the water within the well is exchanged with fresh water.

(7) Record the physical appearance of the water on the field data form (color, odor, turbidity, etc.) as it is pumped or bailed. Turbidity should be less than 50 NTUs before sample is taken. Temperature, pH and conductivity values should also be taken, and should not vary by more than 10% to demonstrate stabilization of formation water in the monitoring well.

(8) Prepare the bottles for receiving their samples (labels, place on ice, etc.).

(9) Samples must be taken within three hours of evacuation.

(10) After the well has been purged and developed, a teflon or stainless steel bailer with a 10 foot leader of stainless steel wire or polypropylene monofilament cord will be used to collect the ground-water sample. All sampling equipment must have been thoroughly decontaminated per procedure on page C-1, except if a bailer has been used to evacuate the well, it may also be used to sample the well with no additional cleaning.

(11) Lower the bailer into the well gently, making certain to only submerge it far enough to fill it completely.

(12) Before the first sample is collected, measure and record the temperature, conductivity, pH, and the physical appearance of the water.

(13) Standard 40 ml, precleaned, volatile organic sample bottles with teflon caps are required. Fill the bottles to the top creating a convex surface with no air bubbles. Acidify samples with HCL to pH <2 by adding 1:1 HCL drop by drop. The correct number of drops should be determined on a third portion of sample water of equal volume. Place the cap on tightly. Gently turn the bottle over and tap lightly on the soft surface to insure that no air bubbles are present.

(14) Fill the other containers provided by the laboratory according to directions.

(15) Label the bottle with location number, date and other pertinent information. Record all information on the sampling data form (following this page). Cool the sample immediately on ice. Maintain the samples in a secure area and deliver to the laboratory within 24 hours.

(16) Replace the well cap and cover the well, locking the protective cap.

(17) Decontaminate the bailer and/or pump in accordance with procedures on page C-1, Appendix C.

(18) Discard the cord, rags, gloves, etc. in an appropriate manner.

(19) Complete sampling data form. See next page.

CONTINUOUS SEDIMENT SAMPLING PROTOCOLS

(1) Split-spoon core samplers are used to collect continuous sediment samples. A hollow stem auger rig is generally used. The split-spoon samples are driven 1.5 or 2 feet at a time into undisturbed sediments by a standard 140-lb. weight. The geologist records the number of blows per six inches of penetration.

(2) The geologist opens the spoon on a polyethylene sheet, measures the recovery, logs the core in detail, separates the wash from the true sample and removes the sample from the split-spoon using disposable vinyl gloves and stainless steel spoons.

(3) For non-volatiles only, the sediment is homogenized using the following method:

a. Remove rocks, twigs, leaves, and other debris;
b. Soil/sediment is removed from the sampling device and placed in a stainless steel pan, then thoroughly mixed using a stainless steel spoon;
c. Scrape sides, corners, and bottom of pan, roll to middle of pan and initially mix;
d. The sample is then quartered and moved to the four corners of the pan. Each quarter of the sample is mixed individually, and then rolled to the center of the pan and mixed again.

(4) The sample jar is labelled with all pertinent information. In addition, the geologist will ensure that:

* samples are taken at appropriate depths;
* unrepresentative portions of the sample are discarded properly;
* that the sampler is decontaminated properly between use; and
* the driller used proper methods during sample collection and does not use oil or grease on tools entering the borehole.

(5) The sample is placed in a precleaned laboratory supplied USEPA-approved jar or vial (whichever is appropriate for compounds being analyzed) and placed on ice.

(6) Cross contamination is avoided by using as many split-spoon samplers as possible and by thoroughly decontaminating each between samples. Cross contamination is also minimized as samples are collected ahead of the drilled hole.

PERSONNEL DECONTAMINATION PROCEDURES

Figure 9

When exiting a Level D Exclusion Zone, all workers will proceed directly to the Contamination Reduction Zone (CRZ). Within the CRZ all drilling equipment will be steam cleaned. This includes split-spoon samplers, augers and the drill rig itself. Sampling equipment will additionally be decontaminated as described on page C-1.

If outer boots and gloves were worn as part of Level D, these will be removed and placed in a container for proper disposal. Next, tyveks and inner gloves are removed and containerized. If work boots were exposed to any contamination (i.e., outer boots were not needed), boots will be scrubbed with soapy water. All workers must wash their hands with soap and water when leaving the CRZ and entering the Support Zone.

Decontamination equipment may include the following:

1. Containers of various sizes
2. Plastic sheeting
3. Detergent
4. Potable water source
5. Scrub brushes
6. Steam cleaner

Figure 10

When exiting a Level C Exclusion Zone, all workers must have their outer layer of boots and gloves washed, rinsed and removed before proceeding to the CRZ. Within the CRZ, equipment will be decontaminated as previously described. Decontamination of personnel will follow the procedure outlined below.

1. Tyvek and boot wash and rinse;
2. tyvek and boot removal;
3. inner glove wash and rinse;
4. removal of face piece/respirator, and
5. inner glove removal.

All workers will wash their hands with soap and water when leaving the CRZ and entering the Support Zone.

Figure 11

When exiting a Level B Exclusion Zone, procedures will follow those outlined for Level C decontamination, with the following addition; after the boot rinse within the CRZ, the SCBA backpack will be removed.

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Specific Capacity Test Procedure

1. Enter all pertinent data concerning the pumping well and piezometers to be measured on the data sheets provided.

2. Check to make sure that all equipment is available and functioning: electric probes, data sheets, pencils, rain gauges (if necessary), stop watches, pump, generator, water quality meters (if necessary).

3. Record water level in pumping well and piezometers before pump is inserted in pumping well.

4. Insert pump in well, allow five minutes for water level to equilibrate, record new water level in pumping well and piezometers.

5. Start the pump and run a short term (15-30 minute) drawdown-recovery test pumping at a constant rate. The pumping rate selected should be based on estimates of well yield from soil samples collected during drilling.

6. Record water levels on a predetermined time schedule.

7. If one of the first closely-spaced readings is missed, just catch the next one (do not attempt to alter data).

8. Throughout note any changes pertinent to the test such as: changes in water color or turbidity; time and nature of any discharge fluctuations; time and length of any temporary pump shutdown; effects of any nearby pumping wells; and precipitation events.

9. If there is a shutdown (even if it's brief) measure water levels in at least the pumping well.

10. At the end of the drawdown test, recovery levels should be measured until water levels return as close as possible to pre-test levels. The drawdown schedule for water level measurements should be followed during recovery.

WELL SAMPLING DATA FORM

CLIENT ______________________
PROJECT NO. ______________________
LOCATION ______________________

WELL NUMBER ______________________ TYPE OF WELL ______________________
DATE ______________________ STORAGE TANK ______________________
WEATHER ______________________ TIME OF START ______________________
SAMPLED BY ______________________ TIME OF FINISH ______________________

DEPTH TO BOTTOM OF WELL ______________________ FT.
DEPTH TO WATER ______________________ FT.
WATER COLUMN ______________________ FT.
VOLUME OF WATER IN WELL ______________________ GAL.
VOLUME OF WATER TO REMOVE ______________________ GAL.
VOLUME REMOVED ______________________ GAL.

RATE OF PURGE ______________________
METHOD OF PURGE ______________________

PHYSICAL APPEARANCE/COMMENTS

FIELD MEASUREMENTS

TIME	pH	COND	TEMP	TURB	Eh	O^2

TYPES OF SAMPLES COLLECTED

LABORATORY NAME AND LOCATION

APPENDIX D

Quality Assurance/Quality Control Plan

QUALITY ASSURANCE/ QUALITY CONTROL PLAN

ANCHOR CHEMICAL SITE
Hicksville, New York

November 13, 1990

Prepared for:

Spiegel Associates
Jericho, New York

Prepared by:

ROUX ASSOCIATES, INC.
775 Park Avenue
Huntington, New York 11743

	Approval:	Date:
Roux Associates, Inc. Project Manager	____________	__________
Roux Associates, Inc. Quality Assurance Control Officer	____________	__________
Arthur D. Sanders, President Jerry Spiegel Associates	____________	__________

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TABLES

D-1 Data Quality Requirements and Assessments

DISTRIBUTION LIST

Each QA/QC plan will be assigned a unique number beginning with number 1 and will be documented on the Distribution Sheet. Whenever this document is amended (additions, deletions, etc.), the most current document will be distributed to the individuals listed below.

1) Dorothy Allen, Project Officer
   Emergency and Remedial Response Division

2) James Doyle, Esq.
   Office of Regional Counsel, USEPA

3) Marsden Chen
   Division of Hazardous Waste Management, NYSDEC

4) Arthur D. Sanders, President
   Jerry Spiegel Associates

5) Richard G. Leland, Esq.
   Rosenman and Colin

6) James F. O'Brien, Esq.
   Boqut, Chetkof, and O'Brien

1.0 INTRODUCTION

The objectives of the Remedial Investigation (RI) are to characterize the Anchor Chemical Site (Site) with regard to the extent of soil and/or ground-water contamination which have resulted from past activities at the Site, to evaluate alternatives for remediation, and to provide the technical basis for choosing a preferred remedial alternative.

This Quality Assurance/Quality Control Plan outlines the measures that will be taken to ensure that the data generated by the RI is of quality sufficient to meet the data quality objectives of precision, accuracy, and completeness (Section 3.0).

2.0 QA PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organization is presented in Section 2.4 (Figure 5). The responsibilities for QA/QC are delegated to the following parties.

Site Coordinator (Project Manager) - Paul Roux will review all data collected and assist with interpretation and report preparation.

Analytical Program Manager (QA Manager) - Michael DeCillis will have overall responsibility for selecting and reviewing sampling and analytical protocols for monitoring. In addition, he will review the QA/QC results with Environmental Standards (QA Officer) and direct the external analytical laboratory activities.

Analytical Quality Assurance Officer (QA Officer) - Rock Vitale of Environmental Standards will be responsible for making QC evaluations, evaluating sample custody procedures and reviewing all QA/QC activities.

Enteral Laboratory Coordinator - will be responsible for training qualified personnel in specific QC and analytical laboratory procedures. He will maintain records of all samples sent to the analytical laboratory. He will ensure that field analytical QC procedures are followed according to the required protocols.

3.0 QUALITY ASSURANCE OBJECTIVES

The general quality assurance objective is to ensure that environmental monitoring data of known and acceptable quality are provided. Data of acceptable quality are precise, accurate, representative, and consistent. Environmental data collection efforts will adhere to the Quality Assurance/Quality Control (QA/QC) procedures developed by Roux Associates for the collection and preservation of environmental samples and by the laboratory for their analyses. A detailed description of these procedures is provided in Appendices A and F.

3.1 Data Quality Requirements and Assessments

Accuracy and precision requirements will be addressed for all the data generated. Accuracy, the ability to obtain a true value, is monitored through the use of field and method blanks, spikes and standards and compared to federal and state regulations and guidelines. This will reflect the impact of matrix interferences. Precision, the ability to replicate a value, is monitored through duplicate (replicate) samples. It is assessed for each matrix and reported with a method reference number. Corrective actions and documentation for substandard recoveries or substandard precision must be performed by the laboratory. These parameters will be based on Contract Laboratory Program (CLP) criteria as shown in Table D-1.

Data representativeness, comparability and completeness must also be considered when discussing data quality requirements.

- Representativeness is a quality characteristic. It refers to the extent to which a sample is representative of the media and actual conditions at the sampling location. Sampling protocols have been developed to ensure that the samples collected are representative of the respective media (ground water, soil and sediment). The second round of sampling will further define this parameter.
- Comparability addresses the internal consistency of measurements, i.e., the use of standard methodology, consistent units for similar matrices; and consistent calibration ranges in the proper instrumentation. The data generated must be comparable to similar data generated by other organizations.
- Completeness is the percentage of measurements which are considered valid. This is evaluated by comparing project objectives with the proposed data acquisition.

4.0 SAMPLING PROCEDURES

All field sampling procedures for this field investigation will be done strictly in accordance with Roux Associates' Standard Operating Procedures (SOPs). These SOPs are included in the Appendix A.

A summary of the sampling program is presented in Table 5. Sample preservation, storage and holding times are addressed in USEPA-CLP SOW of Organic Analyses (2/88) and for Inorganic Analysis (7/87).

The preservation for volatile organics in water is to adjust the pH to less than 2 and cool to 4°C. Metals in water are preserved with nitric acid to a pH less than 2 and cooled to 4°C. All other analytes in soil and water are maintained at 4°C. All samples will be shipped to the lab within 24 hours from the time of collection.

5.0 SAMPLE CUSTODY

Sample custody procedures are designed to comply with USEPA requirements for sample control. Stringent chain-of-custody procedures will be followed to maintain and document sample possession. An example of the Chain-of-Custody Form which will be used during this investigation is shown in Appendix B.

5.1 Field Custody

Field custody of samples includes the following:

1. The field hydrogeologist is personally responsible for the care and custody of the samples collected until they are personally delivered to the contract and analytical laboratory or entrusted to a carrier;

2. Samples developed by overnight carrier will be in a cooler sealed with packing and evidence tape;

3. Log books and other records will always be signed and dated on each page; and

4. Chain-of-Custody forms will be completed prior to sample shipment. They will include the following information: sample number; time collected; data collected; source of sample; type of sample; preservative (if any); and name of sampler. These forms will be filled out in a legible manner using water-proof ink. Similar information will be provided on the sample label which is securely attached to the sample bottle.

5.2 Transfer of Custody and Shipment

The following procedures will be used when transferring custody of samples:

1. Samples will always be accompanied by a Chain-of-Custody form. When transferring samples, the individuals relinquishing and receiving them will sign, date and note the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the laboratory;

2. Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis with a separate custody record accompanying each shipment. Shipping containers will be sealed with a Custody Seal (Appendix B) for shipment to the laboratory. The method of shipment, courier name, and other pertinent information will be entered in the remarks section of the custody record;

3. All shipments will be accompanied by the Chain-of-Custody form identifying its contents. The white and pink copies will accompany the shipment and the yellow copy will be retained by the field sampler; and

4. Proper documentation will be maintained for shipments by common carrier.

5.3 Laboratory Custody

The laboratory will follow the chain of custody procedures dictated in USEPA-CLP SOW for Inorganics and Organic Compounds and Appendix E, Section 10.

5.4 Sample Shipment Procedures

The following procedures will be followed when shipping samples for laboratory analysis:

1. Samples requiring refrigeration will be promptly chilled with wet ice to a temperature of approximately 4° Celsius (C) and packaged in an insulated cooler for transport to the analyzing laboratory;

2. Only shipping containers which meet all applicable state and federal standards for safe shipment will be used;

3. The shipping containers will be sealed with tape and a sample Custody seal that will allow the receiver to quickly identify any tampering which may have taken place during transport to the laboratory;

4. Shipment will be by overnight courier or hand delivery.

5.4 Field Documentation Responsibilities

It will be the responsibility of the project hydrogeologist to secure all documents produced in the field (i.e., geologists' daily logs, lithologic and sampling logs, communications, etc.) at the end of each days work.

The possession of all records will be documented; however, only the project hydrogeologist and project manager may remove field data from the Site for reduction and evaluation.

6.0 CALIBRATION PROCEDURES

All field equipment used during this investigation will be maintained, calibrated and operated in accordance with the manufacturer's instructions and manuals and the Field Standard Operating Procedures (Appendix C). Calibration and operation procedures for these instruments, along with the manufacturer's instructions and manuals, will be available at the site. Documentation of calibrations will be maintained in the project file, and the equipment logbook.

These instruments may include the following:

1) Century OVA - A flame-ionization organic vapor analyzer used to detect volatile organic compounds in air, including methane.
2) HNu - A photoionization meter used to detect volatile organic compounds in air.
3) Photovac Tip II - same as above
4) OVM - same as above
5) nephelometer - An instrument which measures the turbidity of a water sample.

Calibration procedures for laboratory instruments to be used in analysis of soil and water samples are included in the laboratory's Statement of Qualifications (SOQ). All calibration procedures and their frequency will be performed in accordance with CLP-SOW Inorganics (12/87) and Organics (2/88).

7.0 ANALYTICAL PROCEDURES

Ground-water, soil, and sediment samples collected during the course of the RI will be analyzed using CLP required methods for each analyte in each matrix. The methods to be used and the method detection limit for each are given in Table D-1.

8.0 DATA REDUCTION AND VALIDATION

All data from sampling tasks will be summarized, validated, and reported by the testing laboratory. As part of the quality assurance program, 100% of all analytical data for the RI tasks will be validated by a qualified party (other than the laboratory which conducted the analyses) in accordance with the USEPA Region II Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual. This validation will be a quality assurance check against laboratory supplied information.

Data will be validated according to EPA's current Standard Operating Procedures (SOPs): SOP No. HW-2, "Evaluation of Metals Data for the CLP," revision X, dated February 16, 1990 and SOP No. HW-6, "CLP Organics Data Review and Preliminary Review," Revision 7, dated March 26, 1990. Any data inconsistencies which are encountered will be reported to Roux Associates immediately . A Data Validation Report will be submitted to the USEPA Project Manager.

The CLP SOW deliverables will be made available to the USEPA upon request.

9.0 INTERNAL QUALITY CONTROL

Quality control will involve the collection of field replicates and the use of both field (equipment) blanks, trip blanks, matrix spikes and method blanks. In addition, quality control procedures for Intech Biolabs will be used (Appendix F).

10.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits will be performed as part of the quality control program. A performance audit independently collects measurement data using performance evaluation samples. A systems audit consists of a review of the total data production process which includes on-site inspections of field and laboratory operational systems and physical facilities for sampling, calibration, and measurement protocols.

A systems audit of the field procedures will be conducted by the Roux Associates Quality Assurance Unit. At least one unscheduled field audit will be performed during the course of the investigation and sampling program. The audit will review sampling methodology and sample chain-of-custody, as well as review all data reporting methods and data files.

Performance audits of the laboratory will be conducted by Roux Associates collecting and sending blind duplicates to the laboratory for analysis. Duplicates of ground-water and soil samples will be collected in the field and sent to the analytical laboratory.

Trip blanks for VOCs will be shipped along with the sample bottles from the laboratory and will be analyzed at the same time as all other samples. Field blanks will be prepared using Site sampling equipment and will be analyzed to determine whether the procedures may be biasing the data.

11.0 PREVENTATIVE MAINTENANCE

Preventative maintenance will be performed on all field equipment in accordance with procedures described by the manufacturer (Appendix C). The maintenance of laboratory equipment will be performed by the appropriate laboratory according to specified equipment calibration, operation, and maintenance procedures.

12.0 DATA ASSESSMENT PROCEDURES

Analytical data from the analytical laboratory will be assessed in accordance with the guidelines provided in Section 7.0 and the laboratory's SOPs. Samples that have not met validation criteria will be identified and documented by the analytical laboratory and Roux Associates Audits will be periodically performed by the QA/QC officer to verify that validation criteria have been met and that data assessment procedures have been documented.

The purpose of the data assessment is to ensure that the data generated are accurate and consistent with the QA Plan's objectives. The quality of the data is evaluated based on precision and accuracy as well as representativeness, completeness and consistency. A three phase evaluation approach is used.

Phase I: Evaluation of sampling and analytical procedures to accumulate the necessary information to meet QA plan objectives. This information is present in this QA plan.

Phase II: To assure that the data is generating the necessary information, results will be assessed during the data collection. This evaluation will be performed based on the performance audits, duplicate and spiked sample analyses and the completeness of the data (i.e., number of blanks, instrument calibration, etc.).

Phase III: To ensure that the QA plan objectives are being completed, the data generated will be evaluated after each sampling round results are submitted. Should the data not be complete, the QAO may recommend additional sampling.

13.0 CORRECTIVE ACTION PROCEDURES

If the quality control audit results in the detection of unacceptable conditions or data, the Project Manager is responsible for developing and initiating corrective action procedures with the approval of the EPA. Corrective action may include, but not necessarily be limited to, the following:

1. Re-analyzing the samples if the holding time criteria permit;

2. Resampling and analyzing;

3. Evaluating and amending sampling and analytical procedures; and

4. Accepting data while acknowledging a level of uncertainty. The reasons for the uncertainty in the data will be documented.

14.0 QUALITY ASSURANCE REPORTS

Quality assurance reports will be prepared periodically to evaluate and describe the performance of the data measurement systems or the data quality. Two separate reports will be generated for the two rounds of sampling. These reports will include the following:

1. Review of data accuracy, precision, and completeness;
2. Results of performance, systems, data and instrument audits;
3. Results of interlaboratory testing; and
4. Recommendations.

A formal schedule for quality assurance report preparation is not anticipated at this time.

Copies of these reports will be submitted to:

1) Arthur D. Sanders, President
Jerry Spiegel Associates

2) Richard G. Leland, Esq.
Rosenman and Colin

3) James F. O'Brien, Esq.
Boqut, Chetkof and O'Brien

4) Dorothy Allen
Project Officer, Anchor Chemical Site
Emergency and Remedial Response Division (USEPA)

5) James Doyle, Esq.
Office of Regional Counsel (USEPA)

6) Marsden Chen
Division of Hazardous Waste Management

TABLE D-1 DATA QUALITY REQUIREMENTS AND ASSESSMENTS

Parameter	Matrix	Detection Limit(s)	Quantitation Limit(a)	Estimated Accuracy	Accuracy Protocol	Estimated Precision(s')	Precision Protocol
TCL Volatile Organics	Water	(b)	10 ug/L	80-120%	Method 524.2	<20 RSD	Method 524.2
TCL Semivolatile Organics	Water	(b)	10 to 50 ug/L	10-111%(d)	CLP-SOW (2/88)	50 RPD(e)	CLP-SOW (2/88)
TCL Pesticides/PCBs	Water	(b)	0.05 to 1.0 ug/L	24-151%(d)	CLP-SOW (2/88)	27 RPD(e)	CLP-SOW (2/88)
TCL Metals	Water	(b)	5.0 to 5000 ug/L	(d)	CLP-SOW (7/88)	20 RPD(e)	CLP-SOW (7/88)
TCL Cyanide	Water	(b)	10 ug/L	(d)	CLP-SOW (7/88)	(e)	CLP-SOW (7/88)
TCL Mercury	Water	(b)	.002 ug/L	(d)	CLP-SOW (7/88)	(e)	CLP-SOW (7/88)
TCL Volatile Organics	Soil	(b)	5 to 10 ug/kg(c)	59-172%(d)	CLP-SOW (2/88)	24 RPD(e)	CLP-SOW (2/88)
TCL Semivolatile Organics	Soil	(b)	330 to 1600 ug/kg(c)	11-142%(d)	CLP-SOW (2/88)	/50 RPD(e)	CLP-SOW (2/88)
TCL Pesticides/PCBs	Soil	(b)	8.0 to 160 ug/kg(c)	20-150%(d)	CLP-SOW (2/88)	50 RPD(e)	CLP-SOW (2/88)
TCL Metals	Soil	(b)	(c)	(d)	CLP-SOW (7/88)	20 RPD(e)	CLP-SOW (7/88)
TCL Cyanide	Soil	(b)	(c)	(d)	CLP-SOW (7/88)	(e)	CLP-SOW (7/88)
TCL Mercury	Soil	(b)	(c)	(d)	CLP-SOW (7/88)	(e)	CLP-SOW (7/88)

(a) Quantitation limits are based on CLP SOW 7/88 requirements.
(b) Refers to instrument detection limit. Must be less than quantitation limit.
(c) Limits are based on wet weight of sample. Actual reported limits corrected to dry weight will be higher.
(d) Actual limits for matrix spikes surrogates and laboratory control samples are provided in the CLP SOW.
(e) Actual limits for relative percent difference (RPD) of Matrix spike pairs and duplicates are provided in the CLP SOW.
(s') Expected interlaboratory standard deviation.

301287

APPENDIX G

Contingency Plan

1.0 CONTINGENCY PLAN

The Contingency Plan provides a mechanism for addressing unexpected situations which may arise throughout the implementation of the Project Operations Plan (POP). Such situations may include, but not necessarily be limited to, the following:

- prolonged periods of inclement weather;
- unexpected field conditions that would prevent the completion of wells and borings in the locations identified in the POP;
- determination that sampling techniques are inappropriate; and
- identification of quality assurance/quality control problems.

The procedure for handling all unexpected problems that arise is as follows:

1. The Field Manager (FM) evaluates the problem and alternative solutions. If the appropriate solution is apparent, and the work plan or schedule will not be affected, the FM will implement the solution and make the appropriate notifications in the field log.

2. If the FM is not sure of the solution, or if the selected solutions will affect the work plan or schedule, the Project Manager (PM) will be called and the problem and alternate solution will be discussed.

3. If after this discussion, and necessary additional technical consultations with subcontractors or internally, changes to the work plan or schedule cannot be avoided, the EPA Project Manager will be contacted and the problem and alternative and proposed solutions explained.

The notification to EPA will occur prior to any plan or schedule revision except in the case where such revision involves health or safety. In such a case, the Site Health and Safety Officer will have authority to make such revisions and will be responsible for the documentation of these changes in the field log.

Examples of unexpected events which could occur during the investigation at the Anchor Chemical Site, and the actions to be taken upon the occurrence of such events follow:

- Prolonged periods of inclement weather - Field Manager will attempt to schedule work for longer days, and weekend days to comply with the project schedule. Alternatively, the sequence of tasks might be modified to allow some way to continue through the period of inclement weather. Should the delay become so extended as to affect the schedule, the Project Manager will notify the USEPA and recommend an appropriate change in schedule.

- Inadequate safe access to designated boring locations - Field Manager will move to the nearest accessible location if within ten feet of the designated location. Failing this, the Field Manager will list alternate locations consistent with investigation goals, and provide these to the Project Manager. The Project Manager will review these with USEPA to obtain approval for the preferred alternate.

- No recovery from split-spoon samples after two attempts - Field Manager will omit the sample if it is the only sampling problem of the boring. If there are multiple occurrences during a boring, he will discuss options with the driller and inform the Project Manager. If an acceptable option is apparent (e.g., different equipment) this will be attempted. If no obviously acceptable option is apparent, the Project Manager will review available options with USEPA to obtain approval for the preferred alternate.

- Drill rig cannot enter a room or other critical area in the building - If no schedule delay is involved, the Field Manger will arrange for other equipment. If a schedule change is required, the Project Manger and USEPA will be notified. To minimize the possibility of this happening, the drilling subcontractor will inspect all drilling locations for access prior to the start of the work.

- Quality assurance/quality control problems are identified - the Project Manager and USEPA will be notified at once. Deficiencies, errors, and significant defects discovered during system audits or data validation will require corrective actions. Corrective action will be implemented by revision of the analytical procedure, recalibration of instrument systems, or reinstruction of analysts where necessary. Corrective action will include, where possible, the re-analysis of samples which remain within published holding times. Such a re-analysis will occur under strict adherence to the specified analytical protocols.

APPENDIX H

Addendum 1

ADDENDUM 1

Project Operations Plan
Anchor Chemical Site, Hicksville, New York

This addendum addresses details of the tank investigation which were clarified in a meeting between representatives of Spiegel Associates, Roux Associates and Marine Pollution Control on March 21, 1991. This addendum serves as a supplement to the Project Operations Plan (POP)and the Roux Associates letter of March 14, 1991 which responded to the EPA comments regarding the POP. The following decisions were made by taking into account the safety of both contractors and the employees of the tenant, and the feasibility of performing a task given Site conditions.

Prior to the tank investigation, all employees of the tenant will be informed of the upcoming work in a Hazards Communication Meeting given by Spiegel Associates and the Health and Safety Officer from the company performing the tank investigation. During this meeting the tenant and her employees will be briefed on what to expect during the investigation (e.g. number of workers, equipment used, expected noise levels, air monitoring to be performed within the building, etc.), and basic safety precautions to be taken by all building occupants. The tenant and her employees will be instructed to remain away from the Exclusion Zones and the Contamination Reduction Zone during all investigative tasks.

The Contamination Reduction and Support Zones for the tank investigation will be located outside the east wall of the building, between the two doors which access the former Chemical Mixing Room (CMR) and the former Flammable Mixing Room (FMR) (Figure 15). Contractors will access the CMR and FMR through these outside doors so that the double doors into the warehouse can remain closed.

Throughout the tank investigation, air within the breathing zone of the Exclusion Zone will be continually monitored for volatile organic compounds (VOCs) using a portable photoionization meter (PID) and air sampling tubes. If any compound exceeds its action level (Table 5) within the Exclusion Zone, PID measurements will be taken within the northern portion of the warehouse to ensure the safety of the tenant and her employees. If PID measurements within the northern portion of the warehouse exceed action levels, the tenant and her employees will be evacuated. Air within the breathing zone of the Exclusion Zone will also be monitored for combustible gases. If 25% (or less if deemed necessary by the SHSO) of the lower explosive limit is reached, the building will be evacuated.

During a Site walk-through on March 21, 1991, the warehouse manager informed Spiegel Associates and Roux Associates that (to his knowledge) the only chemicals used in the building are linseed oil and glue. These products will be removed from the Exclusion Zone prior to the commencement of work.

The tank investigation will be performed on a room to room basis. The Group 1 tanks are located within the former CMR. During all intrusive tasks for the Group 1 tanks, the Exclusion Zone will encompass the room itself and a 70 square foot area (approximately) just outside the double doors leading into the warehouse (Figure 13). A dust barrier will be built around the part of the Exclusion Zone which is not within the CMR. This barrier will consist of plastic extending from the ceiling to the floor and will prohibit entrance to the Exclusion Zone from the warehouse. The double doors of the CMR will remain closed during the investigation to reduce noise in the rest of the building, and to contain any dust or debris created from the work. Exhaust fans (provided by the contractor) will be set up within the CMR to remove dust from the air and ensure good ventilation. These fans will draw air from the warehouse through the CMR to the outside. This will form a negative pressure inside the CMR so that any potential vapors or dust will flow away from the warehouse (east) to the outside.

The Group 3 tanks are located within the FMR. For this portion of the investigation the Exclusion Zone will encompass the room itself and the area just beyond the double doors leading to the warehouse (approximately 70 square feet). All intrusive tasks will be confined to the FMR, and the double doors leading to the warehouse will remain closed throughout the investigation. A dust barrier will be built outside the double doors. Exhaust fans will be set up within the FMR so that air movement will be from the warehouse, through the FMR to the outside.

During the working week for the employees of the tenant (Monday through Friday) work will be confined to the CMR or FMR. This will include excavation to locate the tanks, obtaining access to tank contents, sampling the tanks, extending two access pipes from each tank, mapping locations for soil borings, and emptying and resealing the tanks. Tanks will be emptied after the analytical results for that tank are known. No intrusive tasks will be performed outside the double doors of the CMR or the FMR during a weekday.

During a weekend when no employees of the tenant are in the building, all intrusive work will be performed and completed on the tank outside the CMR (Tank 16). If Tank 16 is not empty, its contents will be sampled then removed and properly stored (according to RCRA) separate from any other recovered substance until the analytical results for the tank are known. The tank will be resealed and the trench filled prior to the start of work the following Monday morning.

Soil borings will be drilled inside the building as part of the Round 2 sampling program. Soil borings will be drilled on a room to room basis. At that time, the tenant and her employees will not be allowed within the applicable Exclusion Zone as defined above for the tank investigation. The borings to be drilled near Tank 16 will be completed during the weekend when there are no employees of the tenant within the building.

APPENDIX E

Chain-of-Custody Form, Custody Seal
and Sample Label

ROUX

CHAIN OF CUSTODY

Consulting Ground-Water Geologists & Engineers
ROUX ASSOCIATES INC
775 PARK AVENUE, SUITE 255
HUNTINGTON, NEW YORK 11743
(516) 673-7200 FAX. (516) 673-7216

ANALYSES — PAGE OF

PROJECT NAME | PROJECT NUMBER

PROJECT LOCATION

SAMPLER(S)

SAMPLE DESIGNATION/LOCATION	DATE COLLECTED	TIME COLLECTED	SAMPLE MATRIX						TOTAL BOTTLES	PRESERVATION

SAMPLER'S RELINQUISHED BY: (SIGNATURE) FOR	DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE) FOR	DATE	TIME	SEAL INTACT Y OR N
RELINQUISHED BY: (SIGNATURE) FOR	DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE) FOR	DATE	TIME	SEAL INTACT Y OR N
RELINQUISHED BY: (SIGNATURE) FOR	DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE) FOR	DATE	TIME	SEAL INTACT Y OR N

DELIVERY METHOD

ANALYTICAL LABORATORY

COMMENTS

301297

CUSTODY SEAL

DATE ______________________

SIGNATURE ______________________

ROUX

The Huntington Atrium
775 Park Avenue
Suite 255
Huntington, New York 11743
516-673-7200

I-CHEM RESEARCH

CHEM (800) 443-1689 (800) 553-3696

SITE NAME	DATE
ANALYSIS	TIME
	PRESERVATIVE

Lot B0227053

SPECIALTY CLEANED CONTAINER

APPENDIX F

Roux Associates, Inc.
December 12, 1990 Letter
to Ms. Dorothy Allen, USEPA

301300

CONSULTING GROUND-WATER
GEOLOGISTS AND ENGINEERS
ROUX ASSOCIATES INC

ROUX

THE HUNTINGTON ATRIUM
775 PARK AVENUE
SUITE 255
HUNTINGTON, NEW YORK 11743 516 673-7200 FAX # 516 673-7216

December 12, 1990

Ms. Dorothy Allen
New York/Caribbean Compliance Branch
U.S. Environmental Protection Agency
26 Federal Plaza, Room 747
New York, NY 10278

Re: Anchor Chemical Superfund Site
Administrative Order No. II CERCLA-90208

Dear Ms. Allen:

This letter is an attempt to clarify the laboratory analyses required by EPA for Volatile Organic Compounds (VOC) for the above-referenced site.

Per our conversation on Monday, December 10, 1990, you requested that the initial analyses for the first sampling round be performed using CLP methods (Method 624). Should these results be below the Contract Required Quantitation Limits, reanalysis would be performed using Method 524.2 to verify the absence of these compounds using lower detection limits.

There are two problems with your request. First, the samples will exceed holding times while awaiting the results of CLP analyses and therefore cannot be reanalyzed. Secondly, to perform the Method 524.2 analyses in a manner which meets all EPA criteria, a laboratory dedicated to drinking water analyses would be needed (see Attachment 1). As we discussed, CLP laboratories will not guarantee meeting all the parameters specified by the EPA for data validation and therefore will not perform the 524.2 Method unless these parameters are amended. Because drinking water laboratories are not CLP, it would be necessary to conduct an audit and provide EPA with the extensive documentation listed in Attachment 2. This would greatly delay the start of the project.

Roux Associates suggests the following solution to address this problem. VOC samples will be analyzed by a CLP laboratory using a modified 524.2 in lieu of Method 624. The 524.2 Method will follow the specified protocol with the exception of those QA/QC parameters listed in Attachment 1. It appears that this analysis will successfully detect compounds at a lower detection limit, thus meeting the major criteria.

The laboratory information provided in the POP was supplied by Intech Biolabs. Although this laboratory is CLP approved, the submittals received were less than adequate. During our conversation, I relayed to you that other CLP laboratories were investigated and we were awaiting the arrival of the QA/QC procedures. We have received and evaluated the necessary documentation, and have enclosed the QA Plan and SOPs from CEIMIC laboratory.

Should you have any comments, questions, or require further information, please do not hesitate to call.

Very truly yours,

Linda Wilson
QA/QC Manager

Attachments

cc: R. Leland, Esq.
A. Sanders

301302

ATTACHMENT 1

301303

CEIMIC
CORPORATION
"Chemical Analysis for Environmental Management"

December 11, 1990

Ms. Linda Wilson
Roux Associates, Inc.
The Huntington Atrium
775 Park Avenue
Suite 255
Huntington, NY 11743

We have received and reviewed the letter from the USEPA addressed to you and dated November 20, 1990, containing additional QC requirements for the analysis of samples to be collected at Anchor Chemical for volatile organic analysis by Method 524.2. This letter contains our comments on these additional requirements.

Ceimic is a full service environmental laboratory with six GC/MS units and extensive experience with volatile organic analysis using Method 524.2 as well as CLP. Our experience has shown that, in general, the QC requirements addressed below may be achieveable in a dedicated "clean drinking water" type laboratory but are not practical in a full service environmental lab where various other activities are conducted for wastewater and hazardous waste analysis.

Requirement No. 5 specifies a 5-point calibration curve at the 4, 10, 20, 30 and 40 ug/L levels for each compound within the two days preceding sample analysis. Due to poor purging efficiency, this is not practical for vinyl acetate and the ketones including acetone, methyl ethyl ketone, 2-hexanone, and 4-methyl 2-pentanone since they may not be detected at the 4 ug/L level. We recommend that these compounds be eliminated from the 5-point calibration. It is also recommended that these compounds as well as methylene chloride will have an RSD exceeding the recommended 20%.

Requirement No. 6 specifies that the 12-hour continuing calibration be within 30% of the initial calibration. Our experience has shown that the response factors of the ketones and methylene chloride will exceed this criterion under normal conditions.

Requirement No. 7 specifies that a lab fortified blank at 1 ug/L for each analyte be run immediately after each continuing calibration, and the accuracy must be between 50% - 150% recovery. Our experience has shown that the ketones and methylene chloride may typically exceed the 50-150% window.

Requirement No. 9 specifies that the method blank be free of contamination to values less than 1 ug/L. This is not practical in a full service lab where common lab solvents such as acetone, freon and methylene chloride contribute to lab blank contamination in the typical range of 5 - 10 ug/L.

100 Dean Knauss Drive, Narragansett, R.I. 02882 • (401) 782-8900 • FAX (401) 782-8905

Requirement No. 10 specifies that re-analysis of samples, blanks, duplicates and calibration standards is necessary if the % surrogate recoveries exceed the ±20% window. Our experience has shown that this window is exceeded 40% of the time due to the extreme low level analysis, since any minor perturbation in system performance will result in the surrogate recovery varying more than ±20%. Therefore re-analysis may not be practical. Also, note that different surrogates are used for method 524.2 and USEPA CLP organic protocol (2/88).

If you have any questions, please call Peg Marple at (412) 788-4404.

Sincerely,

Kin S. Chiu /pm

Kin S. Chiu, Ph.D.
Technical Director

KSC/jkr

ATTACHMENT 2

Page 8-1 states that the data will be validated by an independent party. Figure 5 also delineates this. The background and experience of the data validation will be provided. CLP-SOW deliverables will be made available to the EPA.

P. D13 The name of the CLP laboratory and a copy of their quality control procedures should be submitted in the next draft of the POP. If a non-CLP laboratory is chosen to perform the work, EPA Project manager must be notified immediately in writing, since the non-CLP laboratory will need to meet CLP equivalent QA/QC requirements.

EPA requires that if a non-CLP laboratory is used, that laboratory must supply to the EPA Quality Assurance Officer (QAO), a copy of the in-house QA/QC manual which is applicable to the analyses to be performed. The QA/QC manual should cover the following topics:

- a) resumes;
- b) personnel training and experience;
- c) organizational structure;
- d) equipment available;
- e) reference materials/reagents;
- f) control charts;
- g) standard operating procedures;
- h) data reduction/reporting;
- i) chain-of-custody; and
- k) glassware preparation.

Also, the lab must provide results of performance evaluation samples (within the last six months) supplied by the EPA or a State certified program for those parameters of interest to the project.

A non-CLP laboratory must also undergo a technical systems audit performed by an independent party in order to evaluate the laboratory's capability to perform the work. A copy of the audit report should be sent directly to the EPA Quality Assurance Officer. A State audit report, outlining the laboratory's performance within the last year, will be acceptable. The format of the audit checklist can be taken from the CLP Invitation for Bid (IFB). The CLP IFBs are available from the Sample Management Office at (703) 557-2490.

Agreement from the laboratory to perform the above tasks must be obtained before the QA/QC Plan can be approved. Only after this information has been provided and found to be acceptable, can sampling and analysis begin.

A CLP laboratory will be chosen to perform this work. The name of the laboratory provided (Intech Biolabs) may not be used pending submitted requirements. Intech Biolabs QA/QC plan is provided in Appendix E.

P. D13 **Internal Quality Control** Laboratory QC procedures and measures can not be assessed because Appendix G is missing from the POP.

As stated above, laboratory QC procedures are included in Appendix E.

CRITERIA FOR ANALYTE-FREE WATER- APPENDIX F

The assigned values for the Contract Required Detection or Quantitation Limits (CRDLs/CRQLs) can be found in the most recent CLP SOWs. If the levels of detection needed on a specific site are lower than CLP CRDLs/CRQLs, then those levels are used to define the criteria for analyte free water. For example, if drinking water levels from method 524.2 are going to be used for the water VOA samples in this study, those levels must be used to define the criteria for analyte-free water.

• purgeable organics	<10 ppb
• semi-volatile organics	<CRQL
• pesticides	<CRQL
• PCBs	<CRQL
• inorganics	<CRDL

However, specifically for the common laboratory contaminants listed below, the allowable limits are three times the respective CRQLs.

- methylene chloride
- acetone
- toluene
- 2-butanone
- phthalates

The analytical testing required for the water to be demonstrated as analyte-free must be performed <u>prior</u> to the start of sample collection. The results must be kept on-site for review by RPA personnel during a field audit.

The quality of some of these copies is poor due to the quality of the originals furnished by the laboratory. We have attempted to improve the legibility without success. When new copies are received from the laboratory, these copies will be forwarded in an addendum.

WORK PLAN
REMEDIAL INVESTIGATION

Anchor Chemical Site
Hicksville, New York

April 10, 1991

Prepared for:

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1.0 INTRODUCTION

The Anchor Chemical Site (Site) is located at 500 W. John Street in Hicksville, Nassau County, New York, and is approximately 1.5 acres in size (Figure 1). The Site includes a building which housed a company (Anchor/Lith Kem-Ko) engaged in the production and mixing of cleaning solvents for the printing industry. A variety of chemicals, including organic solvents used in the manufacturing process, were stored in 17 underground storage tanks beneath the facility (see Section 2.3). The building on the Site is currently used as a furniture warehouse and assembly facility.

The Site is currently owned by K.B. Company, and managed by Spiegel Associates. It is included on the National Priorities List (NPL) of known or threatened releases of hazardous substances. The Remedial Investigation/Feasibility Study (RI/FS) is being conducted by Speigel Associates with oversight by U.S. Environmental Protection Agency (USEPA) Region II. The preparation of this Work Plan is required by the Administrative Order on Consent (Index No. II CERCLA-90208) (USEPA, 1989).

This Work Plan is for a Remedial Investigation only. A separate Work Plan for a Feasibility Study will be prepared upon completion of the RI Report. In addition to this Work Plan, a Projects Operations Plan (POP) has also been prepared as a separate document.

There have been several previous investigations at the Site. In 1977, the Nassau County Department of Health (NCDH) sampled liquid in one of the on-site drywells. In 1981, several underground tanks were found to be leaking and a ground-water monitoring program, utilizing on-site wells, was implemented. Six sets of ground-water samples were collected from the three wells between December 1982 and February 1985 by Lockwood, Kessler and Bartlett, Inc (LKB).

Roux Associates, Inc. (Roux Associates) was first retained by Ruskin, Schlissel, Moscou, Evans, and Faltischek, P.C., then counsel to the Site Manager, in October 1987 to conduct further ground-water sampling at the Site. This sampling was performed to determine whether or not organic contaminants were still present. Roux Associates was subsequently retained by Spiegel Associates to prepare this Work Plan and carry out the RI.

The objectives of the RI are to characterize the Site with regard to the extent of soil and/or ground-water contamination which have resulted from past activities at the Site, to evaluate alternatives for remediation, and to provide the technical basis for choosing a preferred remedial alternative. This Work Plan describes the Site and its history, the tasks that will be accomplished, the procedures to be followed in conducting the investigation, and the personnel who will be involved.

2.0 INITIAL SITE EVALUATION

2.1 Regional Hydrogeology

Nassau County, Long Island is located in the Coastal Plain physiographic province. There are three major water-bearing units underlying Nassau County (from shallow to deep): the upper glacial or water-table aquifer, Magothy aquifer, and Lloyd aquifer. These aquifers are the only source of fresh water for most of Nassau County. The locations of public water supply wells within two miles of the Site are shown in Figure 2.

In general, ground water under Nassau County flows downward from the water-table aquifer into deeper aquifers in the central portion of the County. As the flow migrates deeper, it becomes more horizontal and moves either north or south from the ground-water divide, an imaginary plane where water moves vertically downward to impermeable bedrock (or the bottom of the ground-water reservoir). This divide trends roughly east-west along the center of Long Island. As the water moves toward the north and south shores of the Island, it moves horizontally and then upwards towards discharge areas in Long Island Sound and the Atlantic Ocean. The Lloyd aquifer is the deepest aquifer. It is overlain by a thick confining clay (the Raritan) through which water moves extremely slowly from the overlying Magothy aquifer (Jensen and Soren, 1974).

The Magothy aquifer overlies the Lloyd aquifer/Raritan clay (Raritan Formation) and underlies the Upper Glacial aquifer. The Magothy is not present in northwestern Nassau County and it increases to over 1,000 feet in southern Nassau County. Wells in the Magothy commonly yield greater than 1,000 gallons per minute (gpm). Along the north shore, where the Magothy is absent, it has been replaced by upper glacial deposits. In general, the Upper Glacial aquifer is hydraulically connected to the underlying Magothy aquifer except in areas where clay layers such as the Gardiner's Clay (south shore) are present. The hydraulic connection between the two aquifers allows water to move readily through the Upper Glacial aquifer down into the Magothy aquifer, dependent upon the hydraulic gradient between the two aquifers.

Recharge to the Magothy from the upper glacial (water-table) aquifer occurs in the central portion of the County. Ground water in the water-table aquifer near the ground-water divide has a higher hydraulic head than ground water in the Magothy aquifer. This causes water to move downward toward the base of the Magothy. Water moving from the Upper Glacial aquifer can flow into the middle and upper portions of the Magothy aquifer to the north and south of the divide.

2.2 Site Description

The Anchor Chemical Site includes a building located on 1.5 acres of land. Land use in the area is predominantly commercial and recreational (Plate 1). The Site is bordered to the west by Stokvis Multiton Corp., a manufacturer of materials handling equipment, and to the south by West John Street. The Stokvis Multiton site is owned by Jerry Spiegel. A small parcel directly north of the Anchor Chemical site is owned by K.B. Company. Located on West John Street, across from the Anchor Chemical Site, is Franklin Ribbon & Carbon Co., Inc., a typewriter supply shipping firm; Konig Seats, an automotive seat importing/exporting company; Reliance Utilities, an oil company; and Universal Shellac, a manufacturer of abrasive products. Traversing west along the street are the Fishman Co., housewares, and General Instruments Corp., a large manufacturer of semi-conductors. To the east, Anchor Chemical is bordered by Cantiague Park. The park covers approximately 125 acres and contains various recreational facilities.

A spill of approximately 3,700 gallons of methyl ethyl ketone (MEK) occurred at 530 West John Street in January of 1982, and a recovery program was conducted in 1984. Several monitoring wells were installed at that facility in conjunction with the MEK cleanup (Figures 3 and 4). Monitoring wells were also installed at 600 West John Street in conjunction with a ground-water remediation program to remove volatile organic compounds (VOCs) at that facility (Plate 1). Both of these facilities are located west of Anchor Chemical. To the east of the Site in Cantiague Park there is a ground-water recharge basin (Figures 1 and 2).

The building, which has been used as a manufacturing facility and as a warehouse, has included two solvent blending rooms, a product packaging room, several container and drum storage areas, a testing laboratory and offices (Figure 5). The 17 underground storage tanks, which are made of steel and vary from 550 to 4,000 gallons in size, are located beneath the former mixing rooms (Figure 6).

Below-grade utilities at the Site include drywells, cesspools (now out of service) and sewer and water lines. The locations of the drywells, the unused cesspools, and the sewer and water lines are shown on Figure 7. The out of service cesspools and the water line are both located under the parking area at the front of the building.

The Site is located just south of Long Island's regional ground-water divide in an area underlain by the Glacial Formation, the Magothy Formation, the Raritan Clay and the Lloyd Aquifer. These units rest on bedrock that dips southward towards the Atlantic Ocean.

The Site lies just west of the center of the large mound of the potentiometric surface of the Magothy aquifer in Nassau County. Mounds in the aquifer potentiometric surface indicate recharge from the Upper Glacial aquifer. The location of the Site with respect to this surface indicates that recharge is occurring to the Magothy from the Upper Glacial aquifer near the Site (Doriski, 1987). The locations of public water supply wells within two miles of the Site are shown in Figure 2. No private wells are known to be located near the Site Myott, 1990) (Appendix A4).

Climatological data is provided for Nassau County as recorded at Mineola. Average temperatures are 33 degrees F and 72 degrees F for winter and summer, respectively. Total annual precipitation averages 42 inches, half of which falls between April and September. The average annual snowfall is 27 inches (Wulforst, 1987).

The soils in the area of the Site are classed by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) as Urban Land (Wulforst, 1987). This soil association consists mainly of areas covered by man made structures and paving. Very few undisturbed sites are in this unit. Soils of minor extent visible in exposed areas consist of the Hempstead, Enfield, and Riverhead series. These soils consist of loam to sandy loam soils which are generally deep, well drained and have slopes less than 3 percent. The Site itself is mostly paved, but is likely to be underlain by these permeable and well drained soils.

Since most of the Site is paved, most precipitation which occurs will drain as run-off. The run-off is collected in drywells on the Site which drain directly into the soils.

The average depth to water in this area is approximately 50 feet to 60 feet, which puts the water table at approximately 75 feet to 85 feet above mean sea level. County water-table maps (Koszalka, 1975) indicate that the general direction of ground-water flow in the area is from north-northeast to south-southwest. The presence of the ground-water recharge basin just to the east of the Site suggests the possibility that the ground-water flow direction to the Upper Glacial aquifer may be somewhat more to the west than the general county-wide trend. This will be determined in the course of the field investigation. In their 1985 report, LKB estimated the rate of horizontal ground-water flow at the Site, based on water levels measured in the three on-site wells, to be 0.45 feet per day (Lockwood, Kessler, & Bartlett, Inc. 1985).

There is no documented presence of wetlands in the area of the Site (Wulforst, 1987). The southern portions of Nassau County contain wetlands in the tidal flat areas, but these areas are not close to the Site.

2.3 Site History

Information provided in this Site History was obtained from the following sources:

Source	Personnel
Spiegel Associates	P. McGill
Nassau County Department of Health (NCDH) Files	L. Lutzker
Office of the Fire Marshall Files	R. Magee
U.S. Environmental Protection Agency Files	J. Doyle
Long Island Regional Planning Board	A. Kunz
Bogut, Chetkof & O'Brien	J. O'Brien
Anchor/Lith Kem-Ko	W. Lesser

Also, New York State Department of Environmental Conservation (NYSDEC) records reviewed.

A list of the references is provided in Section 6.0 of this Work Plan. As noted, many referenced documents cited in this section or applicable portions thereof are provided in Appendix A. Appendix A has been divided into four sections as follows: A1 is chemical survey and laboratory analyses information; A2 is UST correspondence, A3 is the data supporting request for legal action; and A4 is general property information. Published references and large reports are not included in Appendix A.

Prior to 1964, the block of land situated east of Cantiaque Rock Road and north of West John Street, which includes both the Site and Cantiaque Park, was privately owned farmland left fallow. During the early 1960's, the land which is now the park was deeded to the Town of Oyster Bay, and the adjacent property along West John Street was rezoned for industrial use (Kunz, 1990) (Appendix A4). A history of occupancy of the Site is presented in Table 1.

K.B. Company has owned the Site since September 31, 1964. During 1964, the existing building was constructed for the use of Anchor Chemical Company who occupied/leased the Site until 1978. Anchor Chemical Company operated a facility for the blending and packing of chemicals for the graphic arts industry (NCDH, 1983a) (Appendix A3). A list of the products made and raw materials used is provided in Table 2 (Anchor Chemical Co. 1977). Seventeen underground storage tanks were installed at the Site by the Franklin Company for Anchor Chemical in 1964. The seventeen tanks were used to store the chemicals and solvents listed in Table 3 (Klein, 1981) (Appendix A2). Table 3 also gives the capacities and construction for each of the underground storage tanks at the Site as well as all the available data on the testing and decommissioning of the tanks. The storage tanks are located beneath the former solvent mixing rooms as shown in Figure 5. A diagram of the tank layout is shown in Figure 6 (Klein, 1981).

In addition to the underground storage tanks, there were also seven above-ground storage tanks ranging in size from 550 to 1500 gallons, located in the blending rooms, that were reported to contain the same chemical products listed in Table 3 (NCDH, 1981) (Appendix A2).

A 1977 industrial chemical survey indicated that the company purchased and used 50,000 gallons (g) of methylene chloride, 13,000 g of 1,1,1-trichloroethane; 13,000 g ethylbenzene; 270 g of petroleum tars; 40 g dyes and organic pigment; 50,000 g of petroleum naphthas; 20,000 g of ethylene glycol monoethylether; 2000 g of glycerine glycols and 10,000 g of nonionic ethoxylated alcohol per year (NCDH, 1977) (Appendix A1)

In 1977, NCDH determined that floor drains in the mixing rooms were connected to a storm water drywell in the parking area north of the facility. Water used for washing chemical spills in these rooms was discharged into the drywell (NCDH, 1983a) (Appendix A3). A sampling of the drywell by NCDH in 1977 revealed the presence of the following chemicals and concentrations:

Chemical	Concentrations (parts per billion)
1,1,1 trichloroethane	2500
Trichloroethylene	>15000
Tetrachloroethylene	>20000

Subsequently, a spill prevention plan was submitted to NCDH and all lines leading from the building to the drywell were sealed (NCDH, 1983a and Jasser, 1977) (Appendix A3).

In 1978, Anchor Chemical was purchased by Chessco Industries, Inc. and became known as Anchor/Lith Kem-Ko. The facility operations remained the same until 1985 when Anchor/Lith Kem-Ko ceased operations at the Site (NCDH, 1983a).

According to Mr. Lesser, an employee of Anchor/Lith Kem-Ko during the period that Anchor/Lith Kem-Ko operated the facility (1978-1985), chemicals were blended in the rooms above the underground storage tank area (Figure 5) and packaged by a gravity feed machine. Samples of the mixtures were tested in the adjoining laboratory. The remainder of the building was used for storage and office space. Mr. Lesser also stated that there were no chemical spills during Anchor/Lith Kem-Ko's operation of the facility.

Anchor Chemical Company and later Anchor/Lith Kem-Ko maintained a New York State Certificate to Operate an Air Contamination Source which was first filed for on May 28, 1974 (NYSDEC, 1983a) (Appendix A4). No violations were on file at NCDH.

In May of 1981, Anchor/Lith Kem-Ko received a notice from the Nassau County Fire Marshall that they were in violation of Nassau County Fire Prevention Ordinance No. 51-81 Article III, which requires that all underground storage tanks containing flammable or combustible liquids be registered with the County Fire Marshall. Provisions for registration require that tanks be hydrostatically tested to determine if a leak of flammable or combustible liquid exists. If testing results indicate the presence of a leak, tanks shall either be repaired prior to further use or taken out of service. Anchor/Lith Kem-Ko had neither tested their tanks nor registered them with the County Fire Marshall prior to receipt of the Notice of Violation (Office of the Fire Marshall, 1981a, b, c) (Appendix A2). NCDH records indicate that 5 out of 14 tanks tested in 1981 failed air over product tests (Table 3). These five tanks were:

Tank No.	Contents
5	Naphthol spirits
6	Acetone
8	Mineral spirits*
11	Isopropyl alcohol
15	Textile spirits

*1,1,1-trichloroethane had been reported earlier (1965 and 1975)

These five tanks were taken out of service and decommissioned. (NCDH, 1983b and NCDH, 1983c) (Appendix A2). Three underground storage tanks containing 1,1,1-TCA, diethyl glycol and methylene chloride were not tested by the facility in 1981. NCDH requested that these three tanks be tested and that Anchor/Lith Kem-Ko provide a ground-water clean up plan by December 1, 1982 (NCDH 1982c). Testing of the remaining tanks in 1982 and 1983 indicated that tank No. 3, which contained methylene chloride, was leaking.

In 1982, NCDH informed Anchor/Lith Kem-Ko of a possible violation of Environmental Conservation Laws, Article 17, Section 1720401, concerning point discharges of chemicals, and requested they provide plans for an investigation of the possible contamination of soil and ground water (NCDH, 1982a) (Appendix A2). LKB of Syosset, New York was retained to conduct the investigation (Lockwood, Kessler & Bartlett, 1985).

Three monitoring wells were installed by LKB in September of 1982 (Appendix B). Soil samples collected by NCDH during the LKB investigation contained up to 490 parts per billion (ppb) methylene chloride and 22 ppb 1,1,1-trichloroethane (1,1,1-TCA) (NCDH, 1982b) (Appendix A1). Ground-water samples collected by NCDH and LKB contained up to 24,000 ppb 1,1,1-TCA, 1100 ppb tetrachloroethylene, 350 ppb dichloroethane, 41 ppb methylene chloride, and 55 ppb trichloroethylene (Table 4). Chlorodibromomethane was detected in Well 3 at concentrations up to 170 ppb (Lockwood, Kessler & Bartlett, 1985 and NCDH, 1982b.)

NCDH records indicate that five of the leaking tanks (No. 5, 6, 8, 11 and 15) were abandoned in place and filled with concrete slurry in accordance with county ordinance in 1983 (Nassau County Fire Commissioner, 1984) (Appendix A2).

In January 1983, the Site was included on the NYSDEC list of hazardous waste Sites in Nassau County, and on the National Priorities List (NYSDEC, 1983b) (Appendix A3). A Phase I report was prepared for NYSDEC by Woodward Clyde Consultants, Inc., (Woodward Clyde, 1983) (McGill, 1990).

Continued monitoring of ground water at the Site by LKB through 1984 indicated an apparent decrease in the concentration of contaminants in the ground water sampled (Table 4). In their 1985 report, LKB concluded that the contaminants had moved off site and were not traceable (Lockwood, Kessler & Bartlett, 1985).

NCDH records indicate that the decommissioning of the (12) remaining underground storage tanks by Barlo Equipment Corporation, was halted in August 1985 when Anchor/Lith Kem-Ko was evicted (NCDH, 1985 [Appendix A2]; Lesser, 1990 [Appendix

A4]). Tank decommission/abandonment documents for the twelve tanks were not available from any of the sources listed at the beginning of Section 2.3.

From November 1985 to July/August 1988, the Site was leased to Emery Worldwide, a freight company, and was used as a warehouse (McGill, 1990).

In 1987, Roux Associates was retained by Spiegel Associates to resample the wells previously installed by LKB. Samples were collected on October 27, 1987 from Wells 1 and 2 (Table 5). Well 3 was not sampled due to the presence of a thick, paste-like material lodged in the screen area which prevented proper purging. Four feet to five feet of silt was found at the bottom of Wells 1 and 2, however, this did not prevent the collection of water samples from these two wells. Well 3 was cleaned out so a sample could be collected, and a second round of sampling was conducted by Roux Associates in June 1989. Again, sediments were found in all the wells, although it was possible to obtain water samples. Well 1 and Well 3 showed measurable quantities of 1,1,1-TCA, 59 ppb and 8 ppb, respectively. Well 1 also had 4 ppb of 1,1-dichloroethane (Table 5).

In February 1991, Roux Associates resampled the wells. Only 9 ppb of 1,1,1-TCA was detected in Well MW-3. All remaining wells contained no detectable levels of any volatile organic compounds (Table 5).

In October 1989, the Site was leased to the current occupant, J.D. Brauner, a furniture manufacturer. The building is now used as a warehouse and retail sales room. Although some assembly of previously manufactured furniture components was observed during a Site inspection by Roux Associates, no actual manufacturing activities were observed. Several improvements/renovations were undertaken prior to their occupancy including the installation of new windows, the gutting of offices and repaving the parking area (McGill, 1990).

2.4 Results of Previous Investigations

Samples collected in the previous investigations described below have been analyzed for volatile organics but, to our knowledge, not for semi-volatiles or metals. This is probably because the history of the Site (Section 2.3) indicates that volatile organic solvents were the principal chemicals stored. However, as discussed in Section 4.4, sediment and water samples to be collected for this RI will be analyzed for the full Target Compound List to determine if semi-volatiles or metals are present at levels that might present a health or environmental threat.

Water samples taken by the NCDH in July 1977 from standing liquid in one of the drywells at the north end of the Site contained 1,1,1-trichloroethane (2,500 ppb), trichloroethylene (>1,500 ppb), and tetrachloroethylene (>20,000 ppb). In response to the finding, Anchor Chemical Company sealed the surface drains in the mixing rooms which had drained to the northern drywell and started drumming drainage from delivery hoses. (Lockwood, Kessler, & Bartlett, 1985).

Ground-water samples were collected between November 1982 and February 1985 by LKB. The ground water was found to contain methylene chloride, 1,1-dichloroethylene, 1,1-dichloroethane, 1,1,1-trichloroethane, trichloroethylene, and tetrachloroethylene at concentrations which ranged from 2 ppb to 24,000 ppb (Table 4). The laboratory reporting forms are given in Appendix B. Based on their sampling results over the three years, LKB concluded in their report that although the chemicals had come from the Site, the contamination had decreased over time (Lockwood, Kessler, and Bartlett, 1985).

A sampling of the water in Wells 1 and Well 2 in October 1987 and in all three wells in June 1989 was performed by Roux Associates. The results are given in Table 5 and the Laboratory reporting forms for these two sampling events are contained in Appendix C.

All the chemicals detected in the ground water to date are VOCs. These consist predominantly of chlorinated hydrocarbons, except for acetone which was detected once, and traces of benzene, toluene, and xylenes which were also detected once.

3.0 PROJECT PLANNING

3.1 RI Tasks

The Remedial Investigation at Anchor Chemical will be divided into six main tasks:

Task 1 - Investigation of Site History
Task 2 - Underground Tank Inspection
Task 3 - Installation of Monitoring Wells
Task 4 - Characterization of Ground Water and Sediment
Task 5 - Survey of Supply Wells
Task 6 - Drilling of Soil Borings and Sampling of Soil and Ground Water

These tasks are described in detail in Section 4.0 of this Work Plan. The tasks have been designated to provide the data necessary to characterize conditions at the Site and to meet the Data Quality Objectives discussed in Section 3.3.

Task 1 is complete, and the Site history is presented in Section 2.3 of this Work Plan. Pertinent information obtained during the historical review of the Site is included in Appendix A. Any additional historical information relevant to environmental conditions at the Site that comes to light during the RI will be included in the RI report.

Task 2, underground tank inspection, will determine the status of underground tanks for which documentation for closure is not available. A review of the available records has been performed and the results are presented in Section 2.3 and Table 3.

Task 3, the installation of the new monitoring wells, both shallow and deep, is necessary to determine the extent and severity of ground-water contamination at the Site. This task is particularly crucial due to the problems encountered in the past with the three existing wells.

Task 4 is the initial characterization of the quality of ground water and sediment at the Site. Ground-water samples will be analyzed for the compounds on the Target Compound List (TCL). Sediment and sludge samples will also be analyzed for TCL compounds. The data generated by this task will be used to develop the analytical program for Task 6.

Task 5, a survey of supply wells, will include contacting the water districts, NYSDEC and Nassau County for information regarding the locations of supply wells or private wells for commercial or residential use.

Task 6 includes the drilling of soil borings and a second round of ground-water samples to further confirm the first round results and evaluate the possibility of seasonal variation. The second round analytical program will be chosen based on the results of Task 4.

3.2 Scoping

The purposes of scoping are to indicate the extent to which the release, or threat of release, may pose a threat to public health or welfare; the type of removal measures and/or remedial measures to abate the threat; and to establish priorities for implementation. A preliminary determination of ARARs is also performed.

3.2.1 Preliminary Risk Assessment

This section presents a preliminary assessment of potential public health risk associated with any contaminants identified in the soil, sediment and ground water at the Site. This is based on Site history, hydrogeology, land use, demography, and potential contaminant type and distribution.

As presented in Sections 2.3 and 2.4, past investigations of this Site have indicated the presence of volatile organic compounds in monitoring wells and leaking underground storage tanks. The identification of migration pathways and exposure routes, which will be evaluated in the RI, indicate the existence of certain health risks. Based on the current knowledge of the site, the various exposure pathways are identified below.

<u>Ground Water</u>

Historical information on the Site indicates varying concentrations of VOCs in ground water. Ground water is used for drinking water in the general vicinity of the Site. For this reason ground-water monitoring wells will be installed and sampled, along with a survey of any existing public supply or private wells in the area, to evaluate the potential exposure routes.

Soil

With the exception of a small grassed area, the Site is completely paved. Because it is located in an industrial area, there are no children playing or engaging in recreational activities on the Site. Therefore, exposure through direct soil contact or soil ingestion is not considered a potential risk.

Sediments

As previously stated, most of the Site is paved so that all precipitation which occurs will drain as run-off. This run-off is collected in drywells on the site. These drywells are not connected to any sewage system, but instead drain directly into the soils. There are no wetlands or surface water bodies on or adjacent to the Site. Therefore, exposure through direct contact of sediments or environmental endangerment from sediment contamination is not considered a potential risk.

Surface Water

There are no surface-water bodies on or close to the site that are likely to serve as conduits for conducting any chemicals identified at the site. Therefore, surface water contamination is not considered a potential risk.

Air

With the exception of a small grassed area, the entire site is paved. This grassed areas is located some distance from the UST locations and thus is not likely to have surface concentrations of chemicals believed to be of concern at this site. Therefore, air contamination is not considered a potential risk at this Site.

3.2.2 Preliminary Scoping of Possible Remedial Alternatives

Preliminary scoping of remedial alternatives is based on the existing data collected on the compounds listed in Section 2.4, which are known to have leaked from the underground tanks at the Site. To date all the chemicals detected in the ground water are VOCs.

Existing information is not sufficient to determine the levels of chemicals in soil and ground water at the Anchor Chemical Site. Based on the previous analytical results, volatile organics are assumed to be the contaminants of concern. However, metals and semi-volatile compounds may also be present.

If ground water is pumped and treated to remove volatile organics, it may also require treatment for metals and semi-volatile organics, in order to comply with the ARARs (see Section 3.2.3).

Tentatively identified remedial alternatives are discussed below.

No Action

The no action alternative will be evaluated to provide a comparative basis for other remedial alternative evaluations. At the Site, the no action alternative means that no remedial actions for soil and ground-water containment or treatment will be designed and implemented. The no action alternative would include public health and environmental evaluations (including risk assessment), long-term ground-water monitoring, and institutional controls (e.g., limit the use of private well water for drinking and irrigation purposes).

Containment

Containment alternatives would include: 1) impermeable barriers and caps to completely isolate the contaminated soil from contact with ground water; and 2) diversion of ground water from contact with contaminated soil.

Ground-Water Treatment and Disposal

Contaminated ground water at the Site can be pumped and treated onsite. The treated ground water would be discharged to on-site/off-site recharge basins or storm or sanitary sewers. If the RI results indicate that organics are of concern, air stripping can be used to remove volatile organics. Other organics can be removed by carbon adsorption, chemical oxidation (e.g., ozonation, hydrogen peroxide, etc.), and aerobic biodegradation. Metals, if of concern, could be removed by chemical precipitation or ion exchange.

Soil Treatment and Disposal

Depending on its location relative to the building, contaminated soil, if any is found at the Site, can be handled by either excavation/onsite treatment/disposal or in-situ treatment. For the former case, onsite treatment would involve aeration to remove volatile organics and/or biodegradation for semi-volatile organics. For the latter case, in-situ vapor recovery would be used to remove volatiles or in-situ solidification/stabilization for semi-volatiles and/or metals.

3.2.3 Preliminary Identification of ARARs

The ARARs preliminarily identified below have been categorized as "applicable", "relevant and appropriate", and "to be considered", based upon EPA guidance in the existing National Contingency Plan (55 Fed Reg 8666-8865, March 8, 1990), as modified by the Superfund Amendment and Reauthorization Act of 1986 (SARA). Primary consideration is given to these remedial alternatives that attain or exceed the criteria presented by those regulations found to be "Applicable" or "Relevant and Appropriate".

SARA defines ARARs as:

- any standard requirement, criteria, or limitation under any federal environmental law; and
- any promulgated standard, requirement, criteria, or limitation under a state environmental or facility siting law that is more stringent than any federal standard, requirement, criteria, or limitation.

The purpose of this definition is to make CERCLA responses consistent with both Federal and state environmental requirements.

Within these jurisdictional boundaries ARARs are further segregated in accordance with the activity they are expected to affect. Three different categories of ARARs will be evaluated.

a. Ambient or Chemical Specific Requirements:
Health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These

values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

b. Performance, Design, or other Action Specific Requirements:
Technology- or activity-based requirements or limitations taken with respect to hazardous wastes.

c. Location-Specific Requirements:
Restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations.

A preliminary list of potential ARARs is given below.

Federal

- Resource Conservation Recovery Act (RCRA) Groundwater Protection Standards (40 CFR 264, Subpart F).
- Safe Drinking Water Act, National Primary Drinking Water Regulations, Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16).
- Occupational Safety and Health Standards (OSHA) (29 CFR Part 1910).
- Clean Water Act (CWA), Ambient Water Quality Criteria.
- Safe Drinking Water Act: Sole-Source Aquifer Requirements (40 CFR 149).

State

- 6 NYCRR Part 703 - NYSDEC Groundwater Quality Regulation.
- 6 NYCRR Part 750-757 - Implementation of NPDES Program in NYS.
- 6 NYCRR Parts 701, 702 - Surface Water Quality Standards and 704.
- Technical and Operations Guidance Series (TOGS)
  (Note: The TOGS currently contain both promulgated standards and criteria and non-promulgated guidelines. During the RI, only promulgated standards and criteria will be considered ARARs. The non-promulgated guidelines will be considered and discussed separately.)
  - 1.1.1; April 1, 1987 - Ambient Water Quality Standards and Guidance Values
  - 1.6.1; April 1, 1987 - Regional Authorization for Temporary Discharges

- 2.1.2; April 1, 1987 - Underground Injection/Recirculation (UIR) at Groundwater Remediation Sites

- 6 NYCRR Part 201 - Permits and Certificates
- 6 NYCRR Part 212 - General Process Emission Sources
- 6 NYCRR Part 257 - Air Quality Standards
- NYSDOH PWS 69 - Organic Chemical Action Steps for Drinking Water
- Part 5 of the State Sanitary Code, Drinking Water Supplies
- Part 170 of Title 10 of the NYCRR, Water Supply Sources
- Five Environmental Health Manual items dealing with chemical contamination of public drinking water supplies
- Draft documentation for the generic organic chemical standards in drinking water
- NYSDOH Interim Report of Point-of-Use Activated Carbon Treatment Systems.

3.3 Data Quality Objectives

The overall objective of the RI/FS is to determine the nature and extent of the threat posed by the past release of hazardous substances at the Site, and ultimately to select a remedial alternative which mitigates the threat to human health and the environment. The data collected during the RI must be sufficiently precise and accurate to be used to accomplish the goals of the RI/FS. Four levels of data quality will be considered as follows:

(1) Screening (Level 1): This provides the lowest data quality but the most rapid results. It is often used for health and safety monitoring at the Site, preliminary comparison to ARARs, initial Site characterization to locate areas for subsequent and more accurate analyses, and for engineering screening of alternatives (bench-scale tests).

(2) Field Analyses (Level 2): This provides rapid results and better quality than in Level 1. Analyses include mobile lab generated data.

(3) Engineering (Level 3): This provides an intermediate level of data quality and is used for site characterization. Engineering analyses include mobile-lab generated data and CLP analytical lab methods (e.g., CLP-SAS with quick turnaround).

(4) Confirmational (Level 4): This provides the highest level of data quality and is used for purposes of risk assessment, engineering design, and cost recovery documentation. These analyses require full CLP analytical and data validation procedures.

4.0 RI TASKS

The RI tasks (Tasks 1 - 6) have been designed to provide reliable data on the current quality of the soil and ground water at the Site and to determine whether or not suspected source of contamination at the Site, specifically past leaks from the five underground storage tanks and discharge to drywells, represent a continuing source of contamination to the ground water. For this reason, the field tasks (Tasks 3 - 6) have been organized to examine the ground-water quality first, followed by sediment and soil quality.

4.1 Task 1 - Investigation of Site History

A thorough examination of all documented past activities relating to chemical usage and disposal at the Site has been completed (Task 1). All pertinent records at the NYSDEC, NCDH, Fire Marshall and USEPA offices have been reviewed. In addition, all pertinent records in the possession of Anchor/Lith Kem-Ko have been requested and all records which could be obtained from them have been reviewed. In addition, the manufacturer's Material Safety Data Sheets (MSDS) for all solvents known to have been stored at the Site were obtained and reviewed. The information from the MSDS were also be evaluated with regard to the possibility of floating and sinking chemicals (i.e., less or more dense than water but not miscible in water). Soil samples will be collected at the water table in all well borings and analyzed for floating chemicals. The need for additional wells bridging the water table will be based on the results of the soil samples collected during Task 3. These wells, if needed, will be installed as part of Task 6. The MSDS will be appended to the RI report. The results of the investigation of the Site history are given in Section 2.3. Any additional pertinent historical information obtained during the RI will be included in the RI report.

4.2 Task 2 - Underground Tank Inspection

A review of all available records for the underground tanks at the Site has been conducted. From this review, documentation of the proper closure of Tanks 5, 6, 8, 11 and 15 is available. Documentation of closure of the remaining 12 tanks could not be located.

This tasks will be to determine the actual status of Tanks 1-4, 7, 9, 10, 12-14, 16 and 17. To accomplish this, a subcontractor will be retained to conduct the following:

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1. saw cut hole (approximately 1 foot by 1 foot or larger) in concrete floor over each tank;
2. remove concrete debris and soil;
3. expose and open each tank;
4. sample and analyze any contents and determine volume;
5. confirm tank location;
6. pump out any remaining contents;
7. temporarily seal holes and concrete floor.

After the results from the soil sampling have been obtained, the decision will be made to 1) perform remediation tasks on the contaminated soils, or 2) fill the empty tanks with concrete slurry then backfill holes and repair the concrete floor.

The tank contractor will be aware of the possible underground tank contents, and will comply with the appropriate requirements presented in the Site Health and Safety Plan. Additional details regarding the tank inspection are given in the Project Operations Plan.

4.3 Task 3 - Installation of Monitoring Wells

A total of seven new monitoring wells will be installed at the Site (Figure 7). Four wells (MW-4, MW-5, MW-6 and MW-7) will be screened in the Upper Glacial aquifer at approximately 70 feet below land surface, and three (MW-1D, MW-5D, and MW-7D) screened in the Magothy aquifer at approximately 140 feet below land surface to form three shallow/deep monitoring well clusters at locations MW-1, MW-5 and MW-7. These clusters will provide data on the vertical ground-water gradient and ground-water quality with depth at the Site.

As per USEPA guidance, the screened intervals of shallow wells will not be across the water table. The depth selected will be based on photoionization readings, or, if all readings for the particular well are the same, the screen will be set at 10 feet below the water table. During well installation, an assessment will be made to determine if floating product exists at the saturated/unsaturated zone interface. The method for accomplishing this is described below.

The monitoring wells will be drilled using a truck mounted hollow stem auger rig. Upon completion of the borehole, a 4-inch diameter stainless steel (type 304) casing with a 10-foot long screen will be installed through the auger. When the screen and casing are in place, a clean, graded silica sand will be used to pack the annular space around the screen. The sand pack will be installed through a tremie pipe to prevent bridging. At the well clusters, the deep well will be installed first. A photoionization meter will be used to scan the split spoon samples for each well. One deep downgradient well will be logged continuously (24 inch intervals). All other wells will be logged at five foot intervals.

Two soil samples from each well (or cluster) location will be selected for TCL analysis. One sample will be from the screen zone and one from the water table. Background soil conditions will be determined by the results of analyses of two soil samples from MW-6. If floating organics are detected in the soil samples from the water table, a discussion with EPA will be held to determine if wells bridging the water table should be installed. These wells would be constructed and sampled in the same manner as the other wells installed for this RI. Samples would be analyzed for the same compounds as the other ground-water samples collected for Task 6.

When the well screen has been properly sand packed, two feet of fine sand will be placed immediately over the filter pack and a five foot thick layer of clean, certified 100% bentonite high solids grout will be tremied onto the top of the fine sand to seal the annular space. The remainder of the annular space will then be grouted with a cement/bentonite slurry to two feet below grade. Well MW-6 will be finished above grade as shown on Figure 8. The other wells will be finished flush with grade, have locking caps installed, and protective meter boxes cemented in place over each well (Figure 9). USEPA guidelines will be followed for all steps of well drilling and construction; drill cuttings will be stored on site and samples analyzed for storage and disposal requirements prior to disposal. RCRA regulations will be followed (e.g., closed dumpster).

Upon completion, each well will be developed by surging and pumping to remove any fine sediment from around the screen zone and to establish a good hydraulic connection between the aquifer and well. Development will continue until the water is less than 50 nephelometric turbidity units (NTUs), as required by the NYSDEC.

The monitoring well locations and elevations will be surveyed by a New York State Licensed Land Surveyor to the nearest 0.01 feet with a closure of ± 0.05 feet for the Site. The elevation measuring point will be marked on each well casing and all water level measurements will be referenced to this point. All elevations and depths, including well casings, will be referenced to mean sea level.

Water levels in all the wells will be measured using a steel tape at least three times; once after development and prior to each of the two ground-water sampling events. The initial water-level measurements will be taken at least two days after development. Information on the vertical hydraulic gradient will be provided from the three monitoring well clusters. The responsiveness of each well to water-level fluctuations in the aquifer will be tested by measuring recovery rates after pumping.

Specific capacity tests will also be performed to determine hydraulic conductivity. Specific capacity tests will be run in at least one shallow and, if necessary based on water quality data, one deep well. If the geology is not homogeneous across the site, more than one well will be tested. The specific capacity tests will be analyzed to estimate hydraulic conductivity at the Site. The specific capacity of a well is its yield per unit of drawdown after a given time has elapsed. Dividing the yield of the well by the drawdown gives the specific capacity (Driscoll, 1986). Several undisturbed (Shelby tube) samples will be collected for porosity measurements.

An attempt will be made to redevelop the three presently existing wells (MW-1, MW-2 and MW-3). If these three wells can be redeveloped, they will be fitted with locking caps, and sampled during the first round of ground-water sampling. If MW-1 and MW-2 cannot be used they will be replaced by new wells located within 10 feet of their present position and these replacement wells will be sampled during round one. If MW-3 cannot be developed it will not be replaced since MW-4 can be considered a suitable replacement.

4.4 Task 4 - Characterization of Ground Water and Sediment Based on Target Compound Analysis

Two weeks after the monitoring wells have been installed and developed, ground water will be sampled and analyzed following USEPA approved protocols to determine the quality of the ground water at the Site. The ground-water samples will be analyzed for the compounds on the Target Compound List (TCL) plus the thirty highest peaks of a forward library search. Analyses for Target Analyte List (TAL) parameters will be performed on unfiltered samples.

The initial characterization will also include the collection and analysis of sediment and sludges in the nine original drywells and in one of the non-operational cesspools.

The nine original drywells were constructed of concrete rings with holes in the sides and no bottoms. Thus, sediment samples can be collected directly through the bottom of each drywell. The five new drywells (Figure 7) are constructed the same way except that they have concrete bottoms. Thus, water drains through the sides only. Sediment samples cannot be collected directly through the bottoms of these drywells.

Nine sediment samples from the original drywells and one from the cesspool will be collected with a stainless steel hand auger. The hand auger will be advanced to a depth of approximately two feet below the upper surface of sediments in the bottom of the drywell or cesspool. A sample will then be collected of the sediments between one and two feet below the surface. This depth is deep enough that volatile organics will be present and shallow enough to be potentially the most contaminated with metals and semi-volatiles if any are present. A deep boring and additional sampling will be performed in DW-1. Two additional drywells will be selected for additional sampling from a deep boring based on laboratory results from the sediment samples. The deep boring in DW-1 and two additional drywells will be sampled as part of Task 6.

The ten sediment samples will be analyzed for TCL compounds. A USEPA Contract Laboratory Program (CLP) laboratory will be retained for all analyses, and all analytical data will be validated by an independent validator (other than the laboratory which performed the analyses). A summary of the proposed analytical RI program is given in

Table 6. Since the results of Task 4 must be obtained before starting Task 6, there will be an approximate ten week period between these two tasks.

4.5 Task 5 - Survey of Supply Wells

The area immediately around the Site is served by the Hicksville Water District. The area to the west of the Site is served by the Westbury Water District. The locations of public supply wells within 2 miles of the Site are shown on Figure 2. Based on a phone conservation with a representative of the Nassau County Department of Health, there are no known private residential wells in the vicinity of the Site.

Task 5 will include contacting the water districts for all current well locations, well status and any other pertinent information they have regarding the supply wells within two miles of the Site. The appropriate divisions and offices within NYSDEC and Nassau County will also be contacted for information regarding the locations of any private wells for commercial or residential use known to them. A map will then be prepared showing all well locations and all available well data (logs, analyses, etc.) will be included in an appendix.

4.6 Task 6 - Drilling of Soil Borings and Sampling of Soil and Ground Water

Nine soil borings will be drilled at possible contamination source areas and the locations will be surveyed by a licensed surveyor. This includes borings in three of the nine original earth bottom old drywells (Figure 7) and six borings near the underground chemical storage tank area as shown on Figure 6. The most northerly drywell, DW-1, (Figure 7) will have a boring drilled since a spill of organic liquid was reported at this location. Two other drywells with the highest levels of VOCs in the sediment samples (Task 4.4) will also be selected, with EPA approval, for borings.

Based on the results of the tank inspection conducted in Task 2, and the results of ground-water sample analyses (Task 4), a determination will be made regarding the number and locations of soil borings to be drilled at the Site. A minimum of six borings will be drilled adjacent to tanks in each tank group. Three groups are shown on Figure 6. The boring will be a straight-down boring from inside the building, near the tank. The boring will be as deep as feasible with the drilling equipment available, but will under any circumstances extend at least ten feet below the bottom of the tanks. The maximum depth of the boring will be the water table.

Drilling will be accomplished using a skid-mounted auger rig. Split-spoon soil samples will be collected at five-foot intervals from land surface to the bottom of the borings. A hydrogeologist will log each core sample in detail and will include any qualitative signs of contamination (odor, staining, etc.). All split-spoon samples taken during the drilling of soil borings will be screened at five foot intervals using a portable photoionization meter to assess relative concentrations of VOCs in each sample. Two soil samples will be collected from each boring based on the PID readings.

A total of 18 soil samples and 10 ground-water samples will be analyzed for round two (Task 6). Data from the first round of ground-water and sediment sampling (Task 4) will be evaluated and an appropriate analytical suite for the second round will be selected. The selected suite of analytical parameters will be those compounds on the TCL that were detected above instrument detection limits. If a compound is detected anywhere and for any matrix, it must remain as an analyte for all Round 2 samples in all matrices. Also, if historical information indicates the use or presence of a compound at the Site, this compound shall remain an analyte for all Round 2 samples in all matrices regardless of Round 1 results. To exclude a whole category of compounds, such as metals, VOCs, semi-volatile organics or pesticides, no compounds in the category will be detected above the instrument detection limits. EPA will approve all analytical exclusions applied to the Round 2 sampling. If, however, data validation indicates questionable Round 1 results, then all Round 2 samples will be analyzed for the full TCL. A USEPA CLP Laboratory will be used for all analyses, and all data will be validated by an independent validator acceptable to EPA.

4.7 Data Analysis and RI Report

All data obtained during the RI, along with any pertinent data from previous investigations, will be compiled, analyzed, interpreted and presented as a draft report. The report will, at a minimum, include the following:

- an executive summary;
- an introduction;
- a detailed Site description and history, including the history of each storage tank indicating the chemicals contained and if and when the tank leaked;
- a detailed description of all work accomplished;
- a site plan showing locations of all wells and borings with the surveyor's reference points;
- a detailed description of regional and site-specific geology;
- geologic logs of all borings, including surveyed location of the boring and elevation of the top of the casing and the ground surface, OVA readings, depth to ground water, casing specifications, screened interval, and types of material used;
- geologic cross-sections compiled from the boring logs;
- well installation diagrams;
- a table of well construction details;
- results of all aquifer tests;
- a description of ground-water flow;
- a table of all water-level data;
- hydrogeologic cross-sections;
- a discussion of ground-water quality and contaminant transport;
- tables of all analytical results including detection limits with differentiation between compounds detected below detection limits and those not detected, with ground-water analyses reported in ppb and soil analyses reported in parts per million (ppm);
- maps to show the extent of organic compounds in soil;
- a detailed map (1" = 10') of the Site showing locations of tanks and associated piping, sampling locations and levels of any detected compounds in the soil;
- a detailed map of the Site indicating the uses of various areas of the Site and building including the locations of surface drains and sewer pipes;
- piezometric surface contour maps (1" = 50') for the shallow and deep wells for each of two rounds of water-level measurements;
- isoconcentration maps (1" = 50') for total volatile organics and for any single contaminant consistently detected in the shallow or deep wells;

- a surveyor's report listing ground elevations, locations, elevations of top of casings and ground-water level reference point elevations for sampling locations;
- a discussion of the results, findings and conclusions of the investigation; and
- recommendations for additional investigative work or bench studies, if any are warranted.

To facilitate USEPA personnel review and approval of the RI, the recommended USEPA RI Report Format will be followed to the extent appropriate for this program. An outline of the report format is presented in Table 7.

After review and comment on the draft report by agency representatives, a final RI report will be prepared and distributed appropriately.

5.0 PROJECT MANAGEMENT AND SCHEDULE

5.1 Organization and Staffing

The RI for the Anchor Chemical Site will be managed by Roux Associates, as the prime contractor. The overall project staffing and organization is shown in Figure 10. Resumes of Key Personnel are given in Appendix D. The duties of the Roux Associates personnel to be assigned to this project are as follows:

Project Principal - Paul Roux will have overall responsibility for the project. He will plan the project, review all data collected and assist with interpretations and report preparation. Mr. Roux will work on remedial alternative screening and will be available for meetings as requested.

Project Manager - Joanne Yeary will have overall responsibility for all aspects of the RI portion of the project and will be the contact for USEPA on all RI project matters. Ms. Yeary will plan and direct the field investigation, be present on Site to observe major activities, review all data generated, write reports and meet with USEPA and others as requested.

Field Manager - Harry Gregory will be responsible for the drilling and sampling program, including inspection of drilling equipment and supplies prior to start of job, inspection of existing wells, decisions regarding necessary changes in well construction to meet actual field conditions, supervision of all drilling, logging of all samples, inspection of well construction activities, preparation of detailed logs, measurement of water levels when no drilling is in progress, coordination of drilling and sampling activities with other Site activities, and implementation and enforcement of health and safety programs. A technician will be available to assist Mr. Gregory with the health and safety prcgram as needed.

Quality Assurance Officer - Michael DeCillis will be the Quality Assurance Officer for this project. Mr. DeCillis will inspect each major pnase of the field work to ensure that all protocols are followed, and will prepare QA reports to be submitted to the Project Manager.

Principal Engineer - James Worrall will review chemical and hydrogeologic data and assist the Project and Task Managers in interpretations and report preparation where appropriate during the Remedial Investigation. Mr. Worrall will assist in the screening and selection of remedial alternatives, and will be available for meetings as requested.

Health and Safety Officer - Linda Wilson will be the Health and Safety Officer for this project. Ms. Wilson will prepare the Health and Safety Plan (HASP) which provides specific procedures to be implemented for personal protection. The HASP will be approved by EPA as part of the Project Operations Plan (POP) submittal. Ms. Wilson will revise the Health and Safety Plan, if required, based on the findings of preliminary Site investigation. Any necessary revisions to the HASP will be submitted to EPA for approval.

Geologist/Technician - Roux Associates' geologists and technicians will assist where necessary with water-level measurements, photoionization measurements, sampling, pick-up and delivery of equipment and samples to facilitate field operations, and decontamination of core barrels and other equipment.

Data Validator - All data will be validated by an independent validator according to the USEPA Region II CERCLA Quality Assurance Manual.

5.2 Project Schedule

The proposed schedule for the Site Characterization portion of the project is shown on Figure 11. A schedule for the Feasibility Study and any Post Screening Field Investigations that may be necessary will be prepared as part of the RI final report.

Any unavoidable delays under conditions specified in the Consent Order (weather, equipment failure) will be offset by working extra time and weekends, if necessary. Oral and/or written reports to the client's representative and the USEPA will explain schedule problems, if any occur, and detailed steps taken to stay within the overall schedule.

Respectfully Submitted,

ROUX ASSOCIATES, INC.

James Worrall
Principal Engineer

Paul Roux
President

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Table 1. History of Occupancy, Anchor Chemical Site
500 West John Street, Hicksville, New York

Years	Name	Type of Business
Prior To 1964	----	Farmland left fallow
1964 - 1978	Anchor Chemical Company	Blend & package chemicals for the graphic arts industry
1978 - 1985	Anchor/Lith Kem-Ko	Blend & package chemicals for the graphic arts industry
1985 - 1988	Emery Worldwide Freight	Shipping company
1989 - Present	J.D. Brauner	Furniture Manufacturer

Source: Spiegel Associates (McGill, 1990)

TABLE 2. List of Principal Products Made and Raw Materials Consumed by Anchor Chemical Company in 1977. (Source: NCDH Files).

PRINCIPAL PRODUCTS		RAW MATERIALS
Fountain Mix #18		Water; gum arabic 14° baume solution; chrome alum 50% zinc nitrate solution; ethyloxilated alcohol surfactant 6
Maxi Kleen		Water; citric acid; 62% solution chromium chloride; 70% solution hydroxyacetic acid; glycerine.
On the Press		Isopropyl alcohol; ethylene glycol; cuprous chloride; HCL.
PD Gum		Water; gum arabic 14% baume solution; phosphoric acid.
P.P.C. #1	100 Gal.	Water; monosodium phosphate; isopropyl alcohol; buty cellosolve; ethylene glycol; glycerine; phosphoric acid.
Velvee		Water; SL-62 (biodegradable surfactant); isopropyl alcohol; ionol concentrate.
TAME		Water; sodium citrate; citric acid; gum arabic 14° baume solution; ethylene glycol; butyl cellosolve; IPA Union Carbide emulsion L7001.
		Textile Spirits Napthol Spirits Mineral Spirits Methylene Chloride Acetone Solvatone V.M. & P Naptha 1,1,1 Trichloroethane Diethyl Glycol Ethyl Acetate

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Table 3. Underground Storage Tank Data, Anchor Chemical, Hicksville, New York.

Tank Number	Capacity (gallons)	Construction	Product(s)	Date Installed	Date Tested	Test Results	Abandoned/ Decommissioned
1	3,000	steel	Napthol Spirits (1)	1964	1981	passed	
2	3,000	steel	Mineral Spirits (2) Aromatic 100 (3)	1964	1981	passed	
3	3,000	steel	Methylene Chloride	1964	1982	failed	
4	3,000	steel	Textile Spirits (Hexane)	1964	1981	passed	
5	4,000	steel	Napthol Spirits	1964	1981	failed	1983
6	2,000	steel	Acetone Solvatone	1964	1981	failed	1983
7	2,000	steel	Cellosolve (2-Ethoxyethanol)	1964	1981	passed	
8	1,500	steel	1,1,1-Trichloroethane Mineral Spirits	1964	1981	failed	1983
9	1,500	steel	Diethyl Glycol	1964	1983	passed	
10	1,500	steel	Mineral Spirits 66 Cellosolve	1964	1981	passed	
11	1,500	steel	Isopropyl alcohol	1964	1981	failed	1983
12	1,500	steel	1,1,1-Trichloroethane	1964	1983	passed	
13	1,500	steel	Ethyl acetate Isopropanol	1964	1981	passed	
14	1,000	steel	Butyl cellosolve (2-Butoxyethanol)	1964	1981	passed	
15	4,000	steel	Textile Spirits	1964	1981	failed	1983
16	1,000	steel	VM&P Naptha (2)	1964	1981	passed	
17	550	steel	Acetone	1964	1981	passed	

(1) Hydrocarbon mixture; also called petroleum naphtha
(2) Mix of hydrocarbons of the methane series, also called VM&P Naptha
(3) Mix of aromatic hydrocarbons, C8-C10

Table 4. Volatile Organic Compounds Detected at Quantifiable Concentrations in Ground-Water Samples at the Anchor Chemical Site by Lockwood, Kessler & Bartlett, Inc.

Date Sampled:	12/14/82	6/15/83	1/30/84	7/10/84	11/1/84	2/28/85
Parameter (Concentrations in ug/L)						
Well No. 1						
Methylene chloride	9	<5	<5	<5	<2	<2
1,1-Dichloroethane	12	<5	8	<5	4	<2
1,1,1-Trichloroethane	800	180	1000	400	65	26
Trichloroethylene	19	2	3	<1	<1	<1
Tetrachloroethylene	48	5	2	<1	<1	<1
Chloroform	<1	<1	<1	10	<1	<1
Well No. 2						
1,1,1-Trichloroethane	6	<1	3	<1	<1	<1
Well No. 3						
Methylene chloride	<5	<5	<1	<5	<2	<2
1,1-Dichloroethylene	800	250	*	*	*	*
1,1-Dichloroethane	350	50	5	<5	<2	<2
1,1,1-Trichloroethane	24000	7000	80	60	7	4
Trichloroethylene	55	10	<1	<1	<1	<1
Tetrachloroethylene	1100	410	3	<1	<1	<1
Chlorodibromomethane	170	9	<1	<1	<1	<1
1,2-Dichloroethylene	100	17	<5	<5	<2	<2
Chloroform	12	2	<1	<1	<1	<1
1,2-Dichloroethane	31	<5	<5	<5	<2	<2
Benzene	*	3	<1	<1	<1	<1
Toluene	*	2	<2	<2	<2	<2
Acetone	*	110	<20	<10	<10	<10

* Not analyzed for

The less than symbol (<) indicates that the parameter of interest is present at a concentration less than the stated value and possibly not present at all. The value is a function of the limitations of the analytical instrumentation and the physical and chemical testing procedures.

Table 5. Volatile Organic Compounds Detected at Quantifiable Concentrations in Ground-Water Samples at the Anchor Chemical Site by Roux Associates, Inc.

Compund (Concentrations in ug/L)	Well 1	Well 2	Well 3
<u>October 27, 1987</u>			
1,1,1-Trichloroethane	21.2	1.5	*
Xylene	<1	1.5	*
<u>June 22, 1989</u>			
1,1-Dichloroethane	4	<2	<2
1,1,1-Trichloroethane	59	<1	8
<u>February 1, 1991</u>			
1,1,1-Trichloroethane	<1	<1	9

* Not sampled

Table 6. Summary of Sampling Program, Anchor Chemical Site, Hicksville, New York.

Sample Matrix - Ground Water [1)]

No. of Samples	Analyte	Holding Times	Analytical Method	Preservation
Round 1				
10 ground water [2)] 1 field blank 1 trip blank/day 1 environmental duplicate 1 matrix spike 1 matrix spike duplicate	VOC	10 days	Method 624 (CLP-SOW 2/88)	low/med conc. HCl to pH <2, then cool to 4°C
	Extractable Organics	7 days to extraction 40 days to analysis	Method 625 (CLP-SOW 2/88)	low/med conc.: cool to 4°C
	Metals	180 days	CLP-SOW 7/88	low/med conc. HNO_3 to pH <2 then cool to 4°C
	Mercury	28 days	CLP-SOW 7/88	
	Cyanide	14 days	CLP-SOW 7/88	
	Pest/PCB	7 days to extraction 40 days to analysis	Method 608 (CLP-SOW 2/88)	low/med conc.: cool to 4°C
Round 2:				
10 ground water [3)] 1 field blank 1 trip blank/day 1 environmental duplicate 1 matrix spike 1 matrix spike duplicate	Parameters of concern as determined during Round 1. Wells with no detected VOCs in Round 1 will be analyzed for low level organics.		CLP-SOW 2/88 CLP-SOW 7/88 SOW-OLC 01.1 Draft (4/90)	

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Table 6. Summary of Sampling Program, Anchor Chemical Site, Hicksville, New York.

Sample Matrix: Soil/Sediment				
No. of Samples	**Analyte**	**Holding Times**	**Analytical Methods**	**Preservation**
Round 1:				
9 drywell (sediment) 10 wells (soil) 1 cesspool (sediment) 1 field blank 1 environmental duplicate 1 matrix spike 1 matrix spike duplicate	VOC Extractable Organics Pesticides/PCBs Metals Mercury Cyanide	10 days 7 days to extraction 40 days to analysis 7 days to extraction 40 days to analysis 180 days 28 days 14 days	USEPA Method 624 USEPA Method 625 CLP-SOW 7/88 CLP-SOW 7/88 CLP-SOW 7/88	low/medium conc.: cool to 4°C low/medium conc.: cool to 4°C low/medium conc.: cool to 4°C
4 wells (soil)	TOC (in screen zones of shallow wells)	14 days	USEPA Region II 7/88	4°C
Round 2:				
18 borings (soil) 1 field blank 1 environmental duplicate 1 matrix spike 1 matrix spike duplicate	to be determined by Round 1 results			
Tank Contents: Unknown 4)	RCRA toxicity characteristic constituents, ignitibility, corrosivity and reactivity	10 days	TCLP	4°C ± 2°C; store in dark

1) Field analyses performed for pH, conductivity, temperature & turbidity.
2) Nine samples if MW-3 cannot be developed and sampled.
3) If water-table bridging wells are needed (Section 4.3) additional samples will be required.
4) All tanks that contain liquids or solid sludges will be sampled.

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Table 7 Proposed RI Format

Executive Summary

1. Introduction
   1.1 Purpose of Report
   1.2 Site Background
      1.2.1 Site Description
      1.2.2 Site History
      1.2.3 Previous Investigations

2. Study Area Investigation
   2.1 Surface Features (topographic mapping, etc.) (natural and manmade features
   2.2 Contaminant Source Investigation
   2.3 Geological Investigation
   2.4 Soil and Vadose Zone Investigation
   2.5 Ground-Water Investigation

3. Physical Characteristics of the Study Area
   3.1 Surface Features
   3.2 Geology
   3.3 Soils
   3.4 Hydrogeology
   3.5 Demography and Land Use

4. Nature and Extent of Contamination
   4.1 Sources
   4.2 Soils and Vadose Zone
   4.3 Ground Water

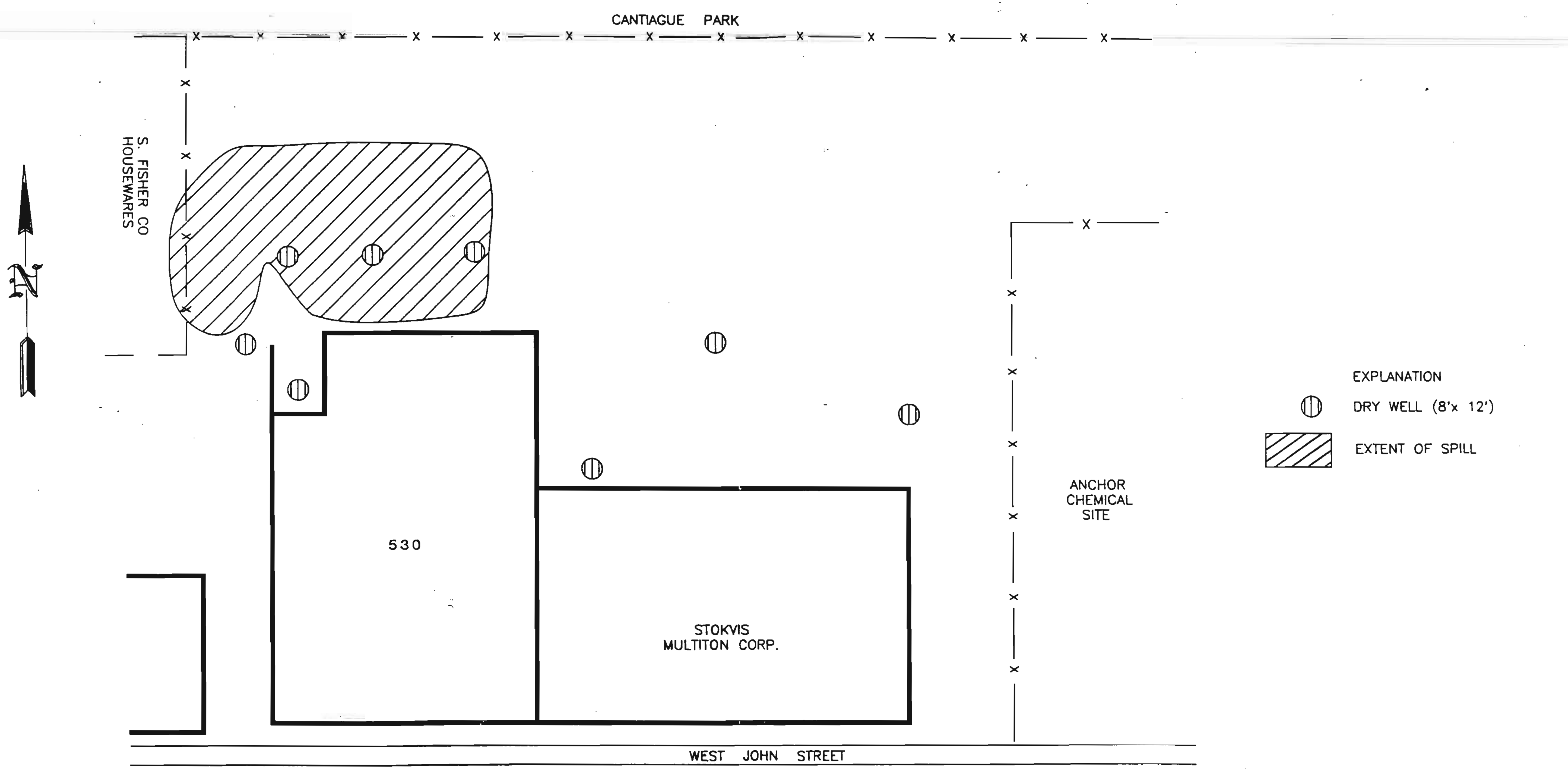
5. Contaminant Fate and Transport
   5.1 Potential Routes of Migration (i.e., air, ground water, etc.)
   5.2 Contaminant Persistence
   5.3 Contaminant Migration

6. Summary and Conclusions
   6.1 Summary
      6.1.1 Nature and Extent of Contamination
      6.1.2 Fate and Transport

   6.2 Conclusions
      6.2.1 Data Limitations and Recommendations for Future Work
      6.2.2 Recommended Remedial Action Objectives

Appendices

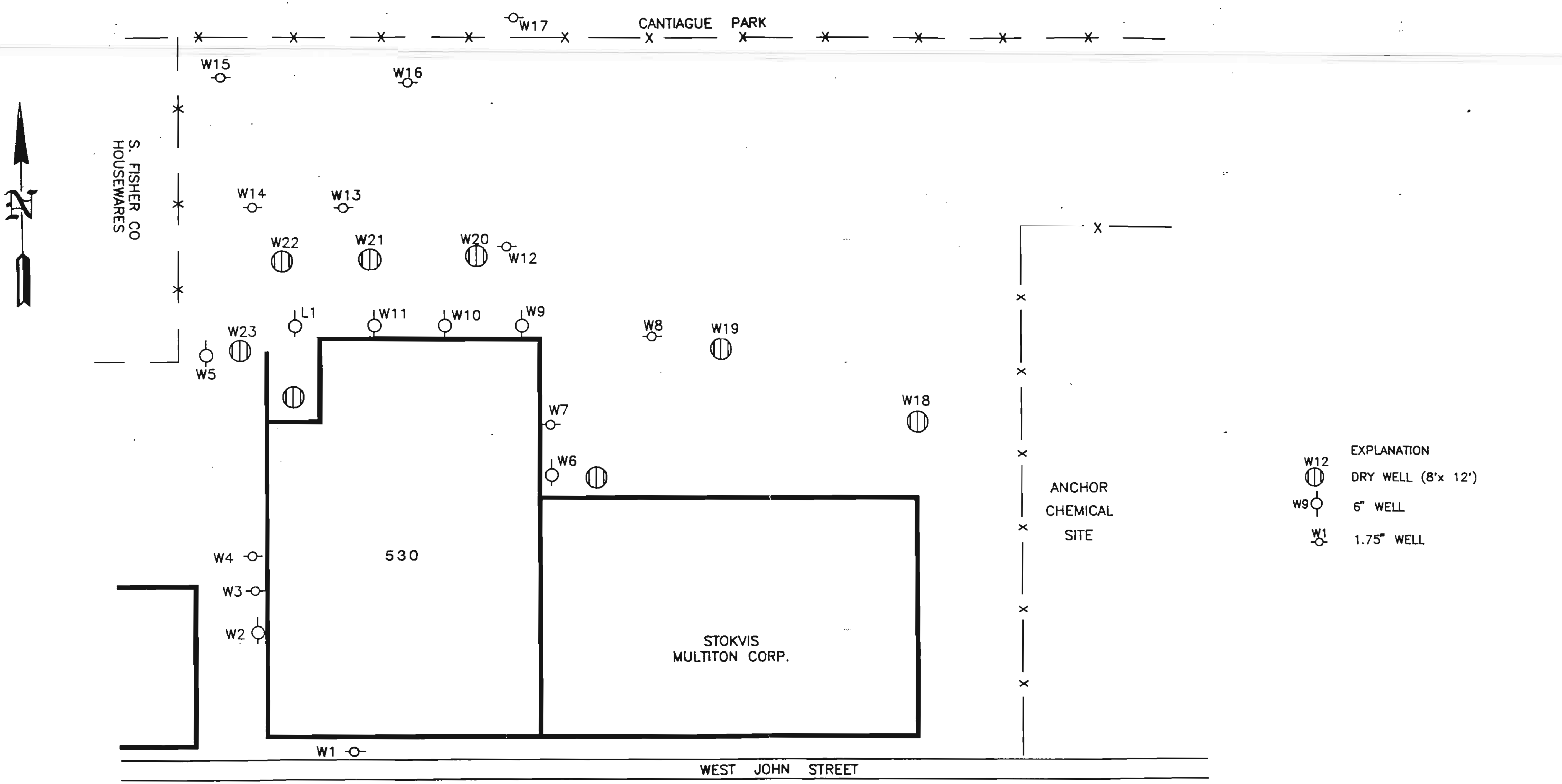
A. Technical Memoranda on Field Activities (if available)
B. Analytical Data and QA/QC Evaluation Results



SOURCE: ROY F. WESTON, INC.
(NO SCALE GIVEN)

Title: LOCATION OF MEK SPILL			
Prepared for: SPIEGEL ASSOCIATES			
ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by K.S.	Date: 4/90	Figure 3
	Prepared by S.W.	Scale	
	Project Mgr: K.S.	Revision: 0	
	File No: 11603Y		

301355



SOURCE: ROY F. WESTRON, INC.
(NO SCALE GIVEN)

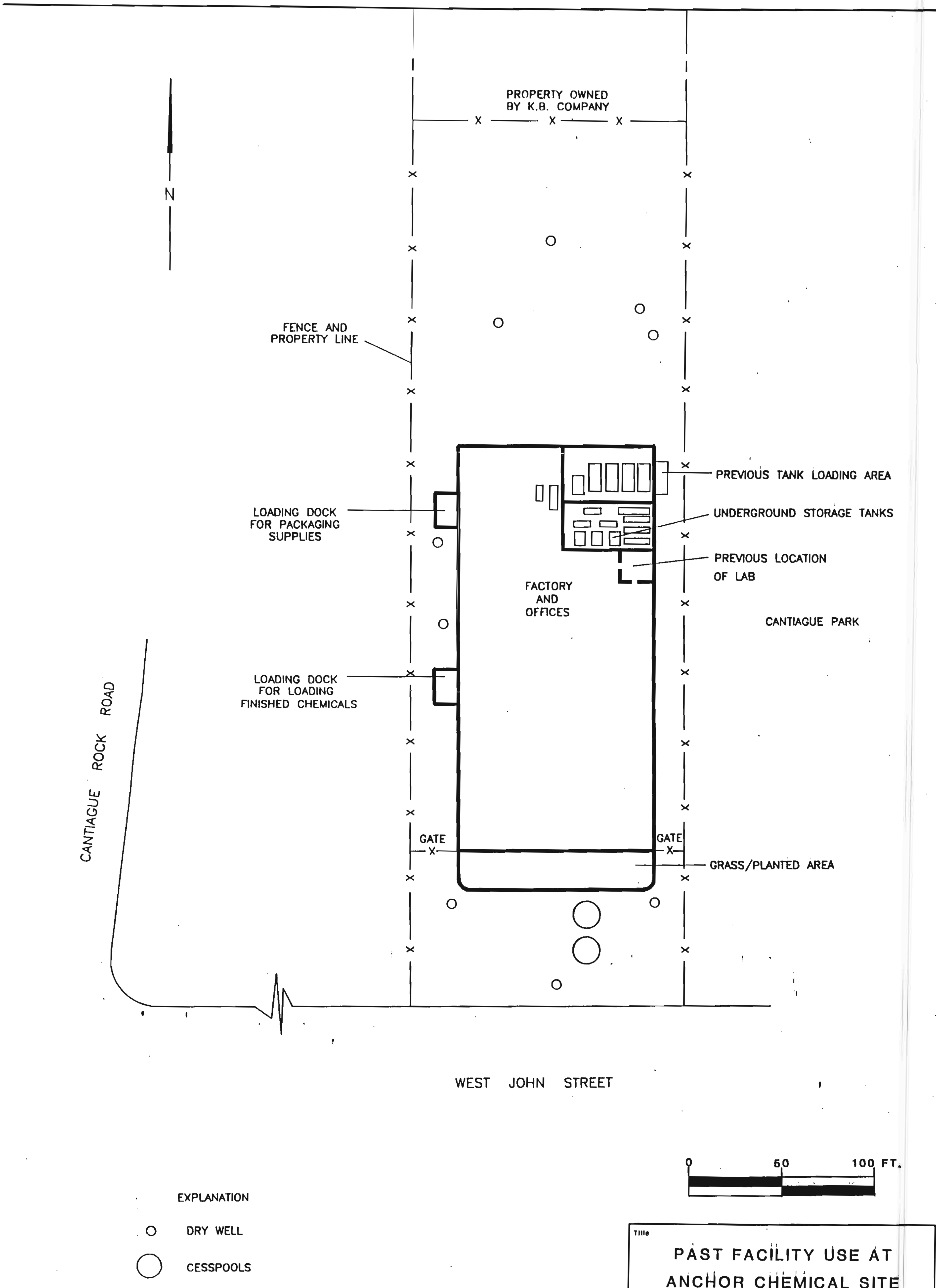
Title:
LOCATION OF GROUND-WATER MONITORING WELLS INSTALLED TO MONITOR MEK SPILL

Prepared for:
SPIEGEL ASSOCIATES

ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: K.S.	Date: 4/90	Figure
Prepared by: S.W.	Scale:	
Project Mgr: K.S.	Revision: 0	4
File No: 11603.Y		

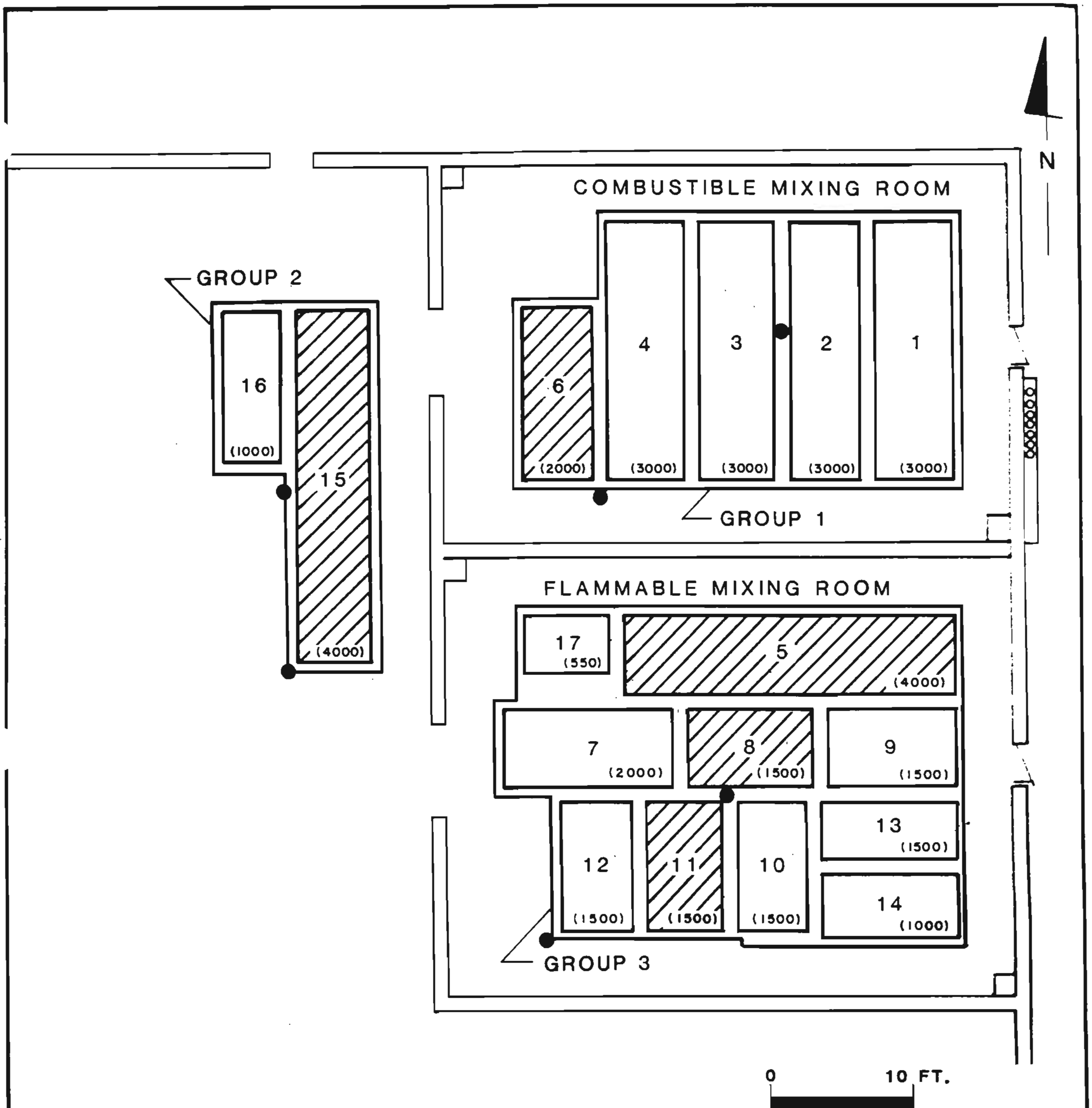
301356



Title	PAST FACILITY USE AT ANCHOR CHEMICAL SITE HICKSVILLE, NEW YORK
Prepared for	SPIEGEL ASSOCIATES

ROUX ROUX ASSOCIATES INC Consulting Ground Water Geologists & Engineers	Compiled by: K.S.	Date: 10/90	Figure 5
	Prepared by C.L.	Scale: SHOWN	
	Project Mgr K.S.	Revision: 0	
	File No: 11603Y		

301357



EXPLANATION

● PROBABLE BORING LOCATION (MAY BE MOVED BASED ON ACCESS)

(2000) TANK FILLED WITH AN INERT SOLID MATERIAL

TANK CAPACITY IN GALLONS

Title:

ARRANGEMENT OF UNDERGROUND STORAGE TANKS AT ANCHOR CHEMICAL SITE

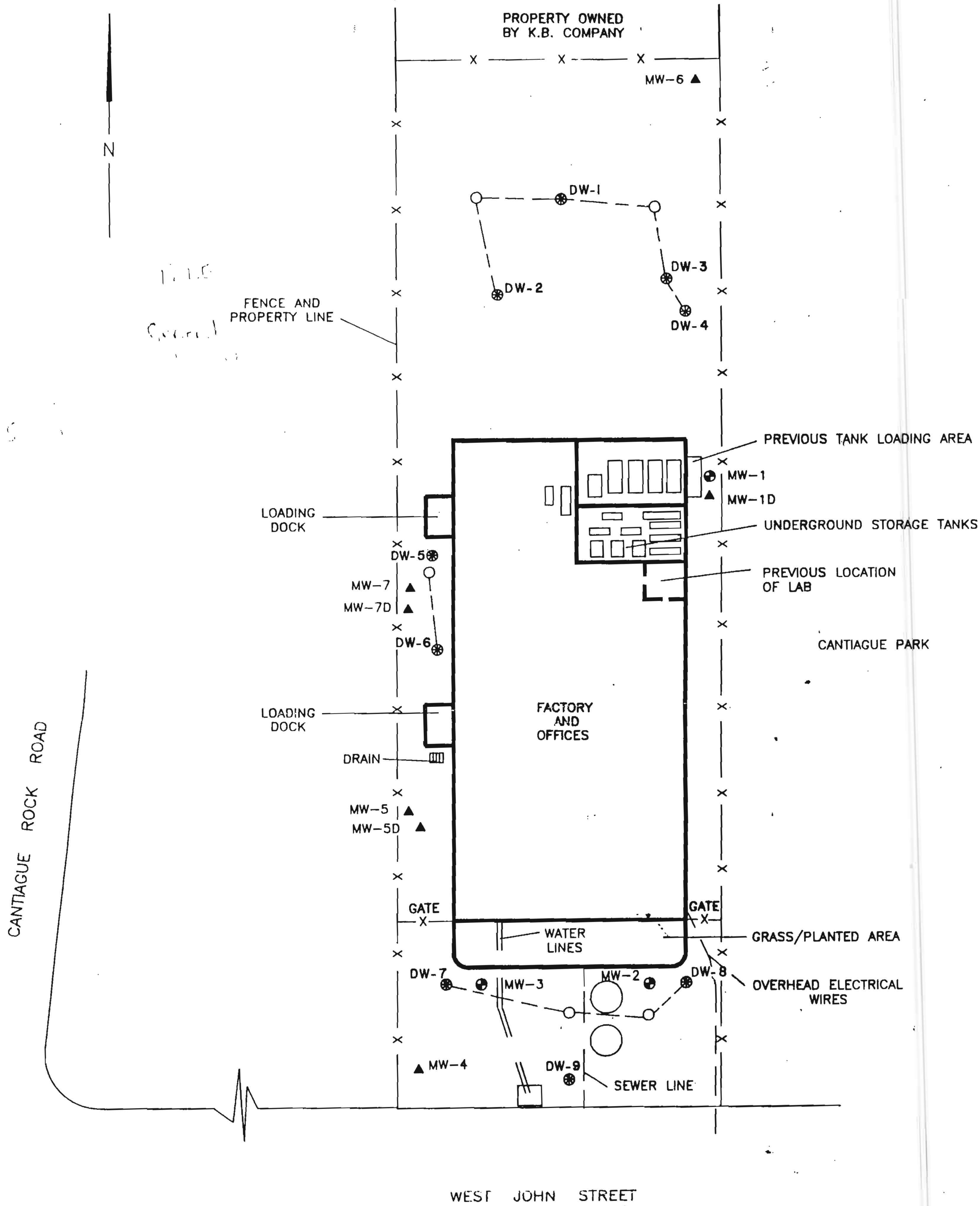
HICKSVILLE, NEW YORK

Prepared for: SPIEGEL ASSOCIATES

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: E. B.	Date 4/90	Figure 6
Prepared by: V. M.	Scale SHOWN	
Project Mgr K. S.	Revision 0	
File No 11603 Y		

301358



EXPLANATION

- O NEW DRYWELL, INSTALLED IN 1989 (NOT TO BE SAMPLED)
- LOCATION OF UNUSED CESSPOOLS
- MW-3 EXISTING WELL LOCATION AND DESIGNATION
- MW-4 PROPOSED WELL LOCATION AND DESIGNATION
- DW-1 EXISTING (OLD) DRYWELL PROPOSED FOR SEDIMENT SAMPLE
- – – – – PVC DRAIN LINES

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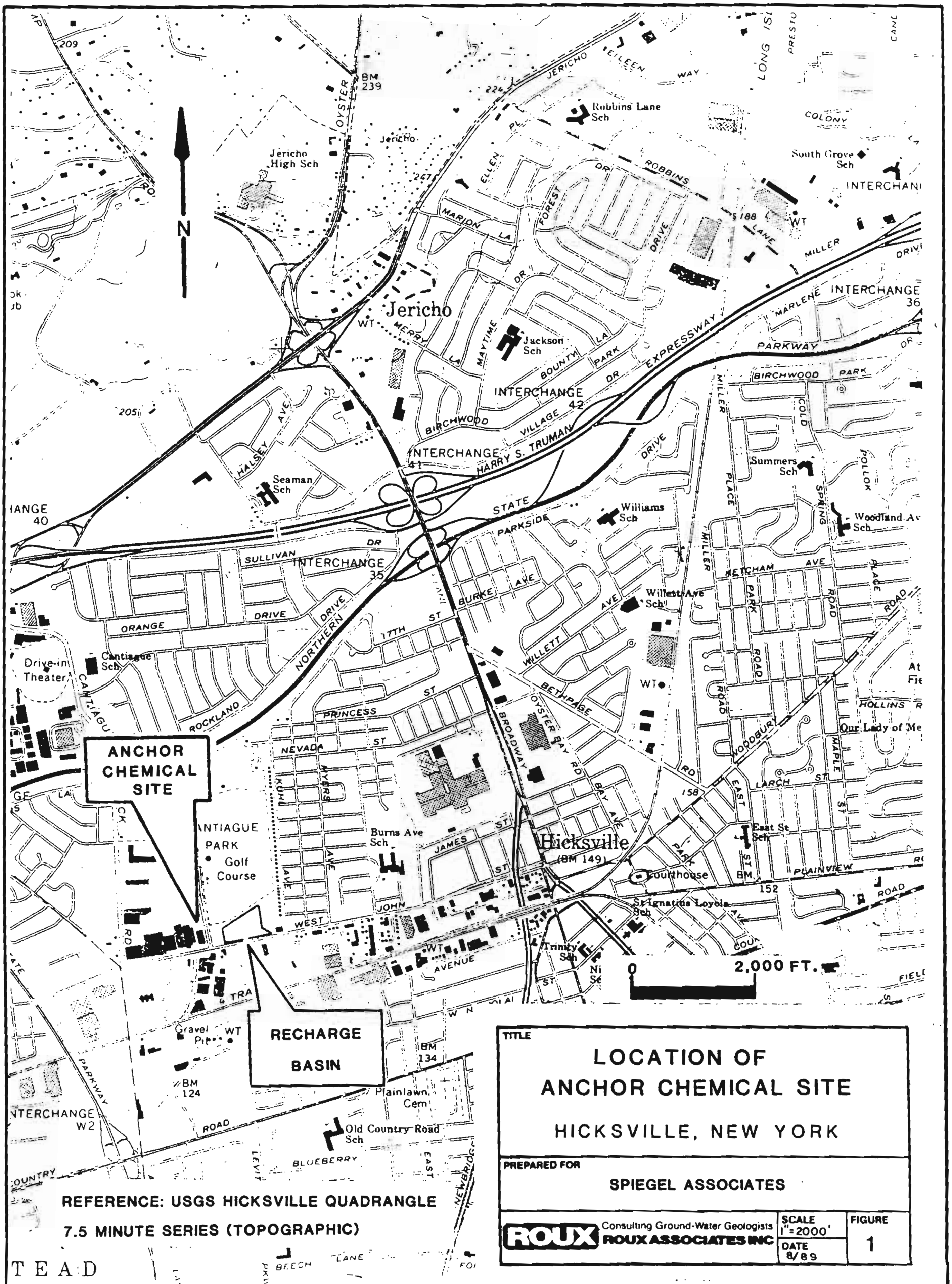
Title: PROPOSED LOCATIONS OF WELLS AND BORINGS AT ANCHOR CHEMICAL SITE HICKVILLE, NEW YORK			
Prepared for: SPIEGEL ASSOCIATES			
ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: K.S.	Date: 10/90	Figure 7
	Prepared by: C.L.	Scale: SHOWN	
	Project Mgr: K.S.	Revision: 0	
	File No: 11603I8		



TITLE

LOCATION OF ANCHOR CHEMICAL SITE

HICKSVILLE, NEW YORK

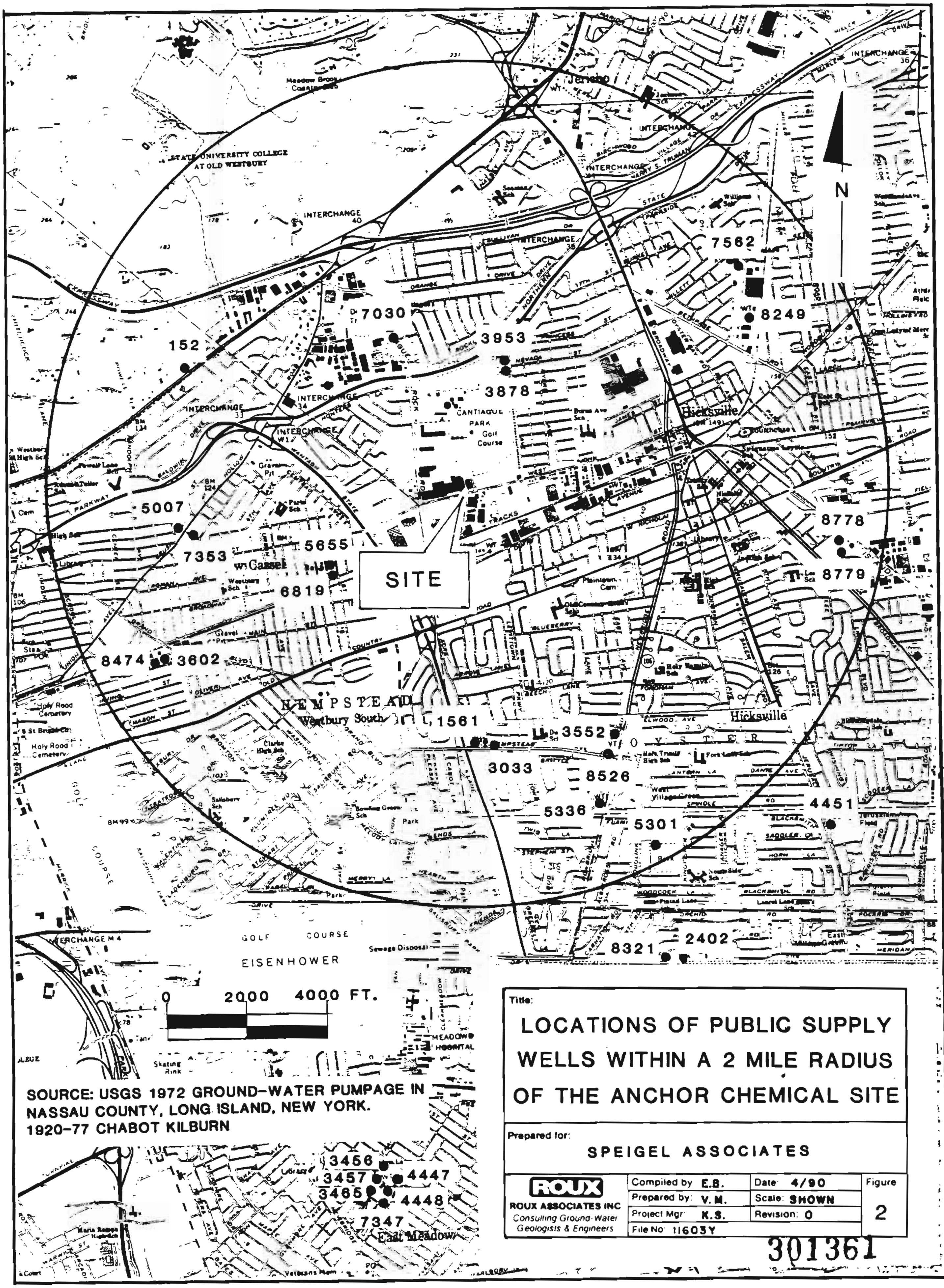
PREPARED FOR

SPIEGEL ASSOCIATES

ROUX Consulting Ground-Water Geologists ROUX ASSOCIATES INC

SCALE	FIGURE
1"=2000'	1
DATE 8/89	

301360



SOURCE: USGS 1972 GROUND-WATER PUMPAGE IN NASSAU COUNTY, LONG ISLAND, NEW YORK. 1920-77 CHABOT KILBURN

Title:

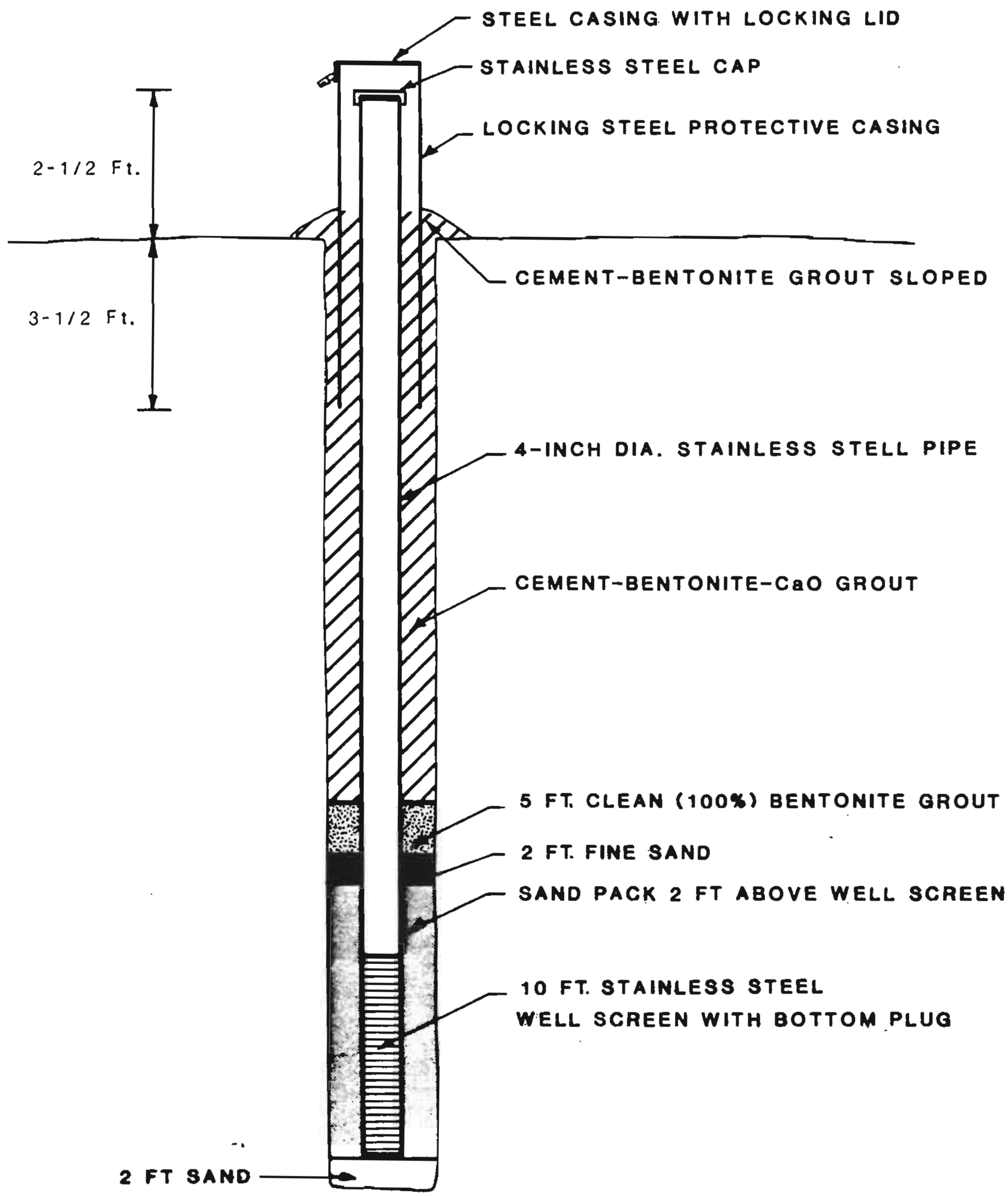
LOCATIONS OF PUBLIC SUPPLY WELLS WITHIN A 2 MILE RADIUS OF THE ANCHOR CHEMICAL SITE

Prepared for:

SPEIGEL ASSOCIATES

ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by E.B.	Date: 4/90	Figure 2
	Prepared by: V.M.	Scale: SHOWN	
	Project Mgr: K.S.	Revision: 0	
	File No: 11603Y		

301361



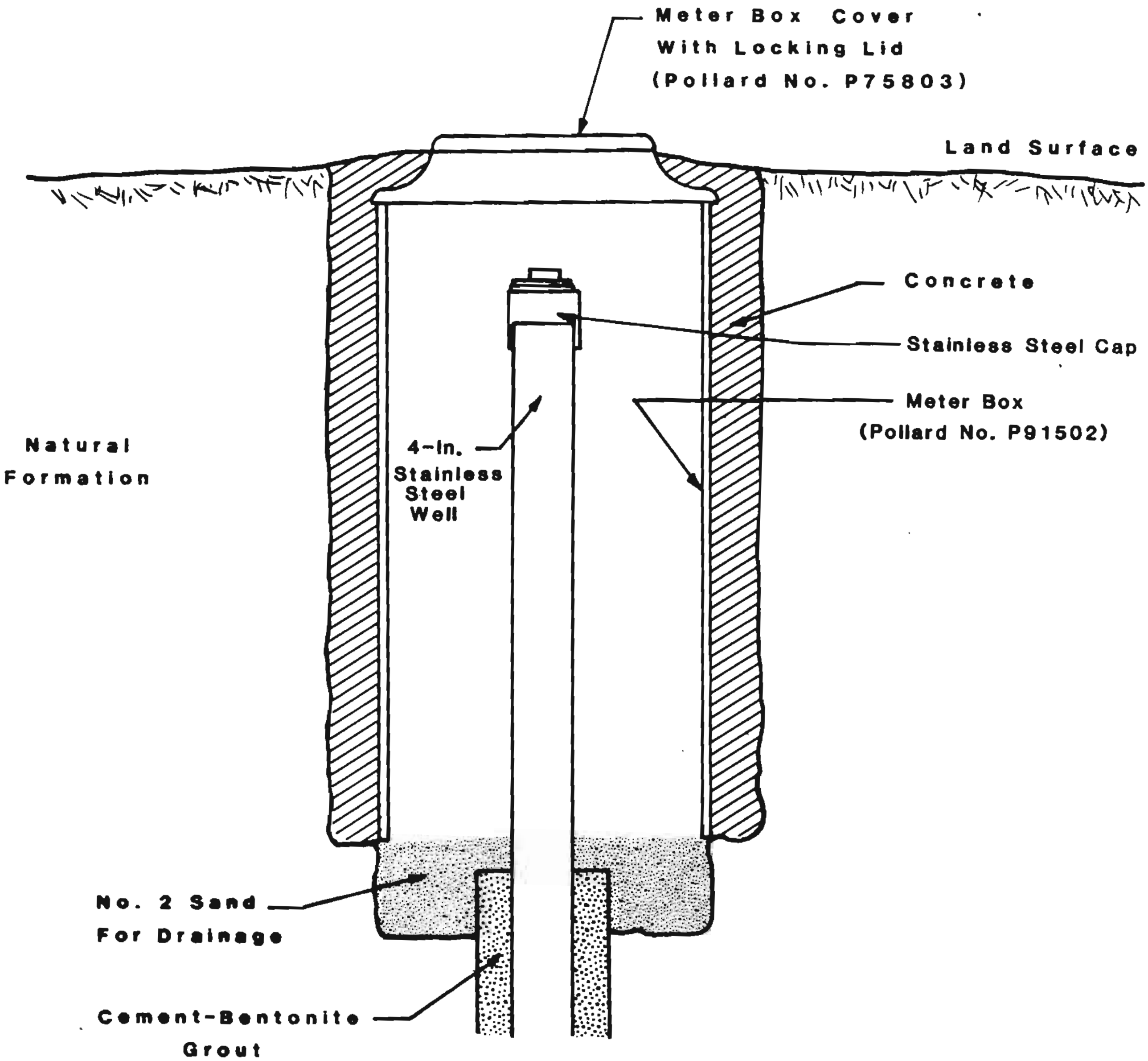
301362

Title:

USEPA MONITORING WELL SPECIFICATIONS

Prepared for: SPIEGEL ASSOCIATES

ROUX ASSOCIATES INC Consulting Ground-Water Geologists & Engineers	Compiled by: PR	Date: 10/90	Figure
	Prepared by: SW	Scale: NONE	8
	Project Mgr: PR	Revision: 0	
	File No: 11603Y		



Title:

PROPOSED METER BOX CONFIGURATION FOR MONITORING WELLS

Prepared for:

SPEIGEL ASSOCIATES

ROUX
ROUX ASSOCIATES INC
Consulting Ground-Water Geologists & Engineers

Compiled by: P. R.	Date: 10/90	Figure
Prepared by: C. R.	Scale: SHOWN	9
Project Mgr: P. R.	Revision: 0	
File No: 11603Y		

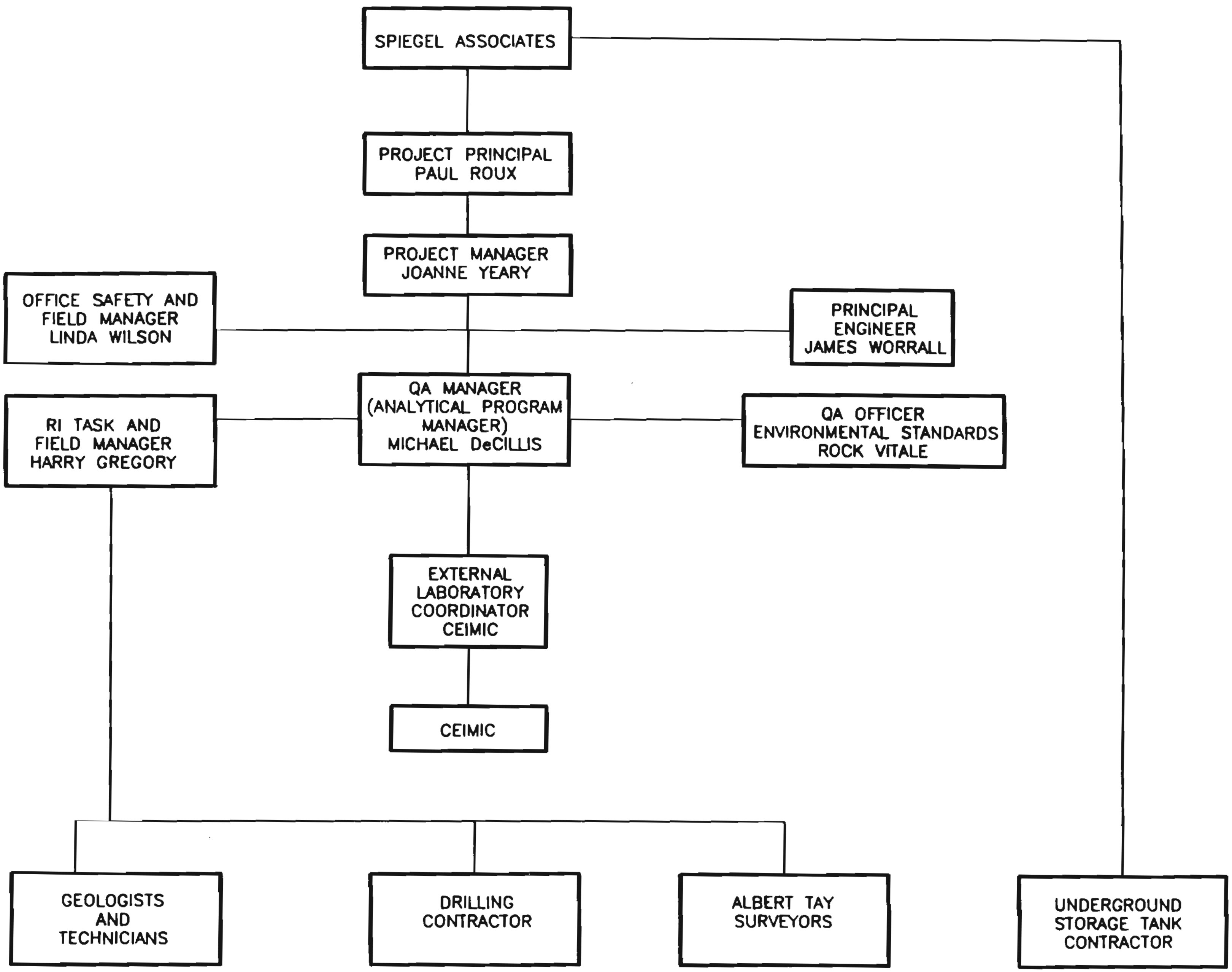


FIGURE 10

301364

FIGURE 11 – REMEDIAL INVESTIGATION SCHEDULE
ANCHOR CHEMICAL SITE
HICKSVILLE, NEW YORK

WEEKS AFTER START

		1	2	3	4	5		8	9		20	21	22		33	34	35	36	37
TASK 1	INVESTIGATION OF SITE HISTORY *																		
TASK 2	UNDERGROUND TANK INSPECTION	●	●	●	●	●													
TASK 3	INSTALLATION OF MONITORING WELLS			●	●	●													
TASK 4	CHARACTERIZATION OF GROUND WATER & SEDIMENT BASED ON TARGET COMPOUND ANALYSES							●	●										
TASK 5	SURVEY OF SUPPLY WELLS							●	●										
TASK 6	DRILLING OF SOIL BORINGS AND SAMPLING OF SOIL AND GROUND WATER										●	●	●						
DATA ANALYSES AND REPORT															●	●	●	●	●

TWO-WEEK DELAY (column after week 5)

TEN-WEEK DELAY (columns after weeks 9 and 22)

NOTE: (1) A SCHEDULE FOR THE FS WILL BE PREPARED AND SUBMITTED AS PART OF THE RI REPORT.

(2) THERE IS A TWO-WEEK DELAY INCLUDED AFTER TASK 3 TO ALLOW WELL RECOVERY AND A TEN-WEEK DELAY INCLUDED AFTER EACH OF TASKS 5 AND 6 TO ALLOW FOR SAMPLE ANALYSES AND DATA VALIDATION.

(3) THERE IS A TWO TO FOUR WEEK PERIOD REQUIRED TO CONTRACT AND MOBILIZE SUBCONTRACTORS

* TASK 1 IS COMPLETED

APPENDIX A

Reference Documentation

A1. Chemical Survey and Laboratory Analyses Information

Anchor Chemical Company, 1977. Production Data (Source: NCDH Files)

DANGEROUS CHEMICALS

SAFE CHEMICAL

DON'T USE products containing	Why you should not use	What it is commonly used for	DO USE these safer Anchor replacements to reduce the hazard	
BENZENE (Benzol)	Highly poisonous. Flammable and explosive. Highly toxic coal tar solvent. Damages blood. Can cause cancer. Inhalation of concentrated vapors can lead to death. Contact with skin must be avoided. Swells rubber. Personnel and plant hazard.	Hard Dried Ink Remover	Solv-A-Ton Rx A	Cleaner 909
		Type cleaner	Aled Plate Wash Anchor Type Wash Anc-Sol Rx 81	Solvent #95 Typosol Fotopoly
		Glaze Removers (Rollers & Blankets)	Wash R228 Randisolv	A-60 Solvent Velvee
		Cleaning film	Film-Kleen	Robinol
CARBON TETRACHLORIDE	Highly poisonous. Deadly vapors. Produces phosgene gas in heat. Contact with skin should be avoided. May be fatal if inhaled or swallowed. Fair solvent. Swells rubber. Personnel hazard.	Press Wash (Rollers & Blankets)	Kendu Litho Solvent ZEV A-60 Solvent	Wash R228 Murolene Ronolene Blanco
		Type Wash (non-flammable)	Solvent #95	Robinol
		Degreaser	Robinol	D.R.D.
CARBON DISULFIDE	Highly flammable and explosive. Highly poisonous. Extremely disagreeable odor. Personnel and plant hazard.	Blanket Tack Remover	Wash R228 Kendu	Velvee
GASOLINE	Highly flammable. Explosive. Can cause lead poisoning. Poor solvency. Can cause dermatitis. Personnel and plant hazard.	Type Wash	Aled Plate Wash Anchor Type Wash Anc-Sol Rx 81 Fotopoly	Solvent #95 Typosol Robinol
		Press Wash (Rollers & Blankets)	Litho Solvent Pressolv Anc-Sol Rx 81 Kendu	Wash R228 Murolene Ronolene A-60 Solvent
		Degreaser	Robinol	D.R.D.
KEROSENE TURPENTINE	Causes dermatitis. Poor solvent. Dries slow. Causes rust. Swells natural rubber and most synthetics. Personnel hazard.	Roller Wash	Pressolv	Wash R228
		Press Wash	ZEV Litho Solvent Anc-Sol Rx 81	A-60 Solvent Wash R228 Ronolene
		Litho Plate Wash	Ancotine	
METHANOL (Wood alcohol)	Highly poisonous. Affects optic nerves. Causes dermatitis. Corrodes lead and type. Warps wood blocks. Personnel hazard.	Type Wash	Aled Plate Wash Anchor Type Wash	Typosol Solvent #95
TOLUENE (Toluol)	Flammable and highly toxic coal tar solvent. Dissolves and swells rubber. Can cause dermatitis. Personnel and plant hazard.	Type Wash	Aled Plate Wash Anchor Type Wash	Typosol Solvent #95
		Press Wash (Rollers & Blankets)	Pressolv Litho Solvent Anc-Sol Rx 81 A-60 Solvent	Wash R228 Ronolene Murolene ZEV
XYLENE (Xylol)	Flammable and highly toxic coal tar solvent. Dissolves and swells rubber. Can cause dermatitis. Personnel and plant hazard.	Press Wash (Rollers & Blankets)	Pressolv Litho Solvent Anc-Sol Rx 81 A-60 Solvent	Wash R228 Ronolene Murolene ZEV
TRICHLORETHYLENE PERCHLORETHYLENE	Poisonous. Can cause dermatitis. Prolonged inhalation of excessive amounts of toxic vapor can cause irritation of eyes and mucuous membranes. Can break down when exposed to open flame to phosgene gas and hydrogen chloride. Swells rubber.	Type Wash (non-flammable)	Solvent #95	Robinol
		Press Wash (Rollers & Blankets)	Pressolv Litho Solvent Anc-Sol Rx 81 A-60 Solvent	Wash R228 Ronolene Murolene ZEV
LYE	Extremely caustic. Contact with skin causes serious burns. Splash in eyes causes blindness. Requires special protective clothing. Personnel hazard.	Glaze Remover (Rollers & Blankets)	Wash R228 Solv-A-Ton RxA	Randisolv Velvee
NAPHTHA BENZINE	Petroleum solvents. Highly flammable and explosive. Causes dermatitis. Poor solvency. Swells natural rubber. Personnel and plant hazard.	Blanket Wash	A-60 Solvent Litho Solvent Anc-Sol Rx 81 Wash R228	ZEV Murolene Ronolene Kendu

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EXXON COMPANY, U.S.A.
A DIVISION OF EXXON CORPORATION

DATE ISSUED: 11/07/88
SUPERSEDES DATE: 05/02/88

MATERIAL SAFETY DATA SHEET

EXXON COMPANY, U.S.A. P.O. BOX 2180 HOUSTON, TX 77252-2180

A. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
AROMATIC 100 ComB

CHEMICAL NAME
Petroleum Solvent

PRODUCT APPEARANCE AND ODOR
Clear water-white liquid
Aromatic hydrocarbon odor

EMERGENCY TELEPHONE NUMBER
(713) 656-3424

PRODUCT CODE
132030 - 00652

CAS NUMBER
64742-95-6

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION
This product can be defined as: Light aromatic solvent naphtha (petroleum)	64742-95-6	100%
It consists predominantly of C8-C10 aromatic hydrocarbons, primarily C9.		
This product contains: Xylene	1330-20-7	Approximately 5 mass %

See Section E for Health and Hazard Information.

See Section H for additional Environmental information.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

Health	Flammability	Reactivity	BASIS
1	2	0	Recommended by Exxon

EXPOSURE LIMIT FOR TOTAL PRODUCT
50 ppm (245 mg/m3) for an 8-hour workday

BASIS
Recommended by Exxon

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
If splashed into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN
In case of skin contact, remove any contaminated clothing and wash skin thoroughly with soap and water.

INHALATION
If overcome by vapor, remove from exposure and call a physician immediately. If breathing is irregular or has stopped, start resuscitation, administer oxygen, if available.

INGESTION
If ingested, DO NOT induce vomiting; call a physician immediately.

D. FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM)
COMBUSTIBLE - Per DOT 49 CFR 173.115
41°C (106°F)
ASTM D 56, Tag Closed Cup

AUTOIGNITION TEMPERATURE
Approximately 471°C (880°F)
ASTM D 2155

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION

Health	Flammability	Reactivity	BASIS
1	2	0	Recommended by Exxon

HANDLING PRECAUTIONS
This liquid is volatile and gives off invisible vapors. Either the liquid or vapor may settle in low areas or travel some distance along the ground or surface to ignition sources where they may ignite or explode.

Keep product away from ignition sources, such as heat, sparks, pilot lights, static electricity, and open flames.

FLAMMABLE OR EXPLOSIVE LIMITS (APPROXIMATE PERCENT BY VOLUME IN AIR)
Estimated values: Lower Flammable Limit 0.9% Upper Flammable Limit 7%

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES
Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires involving this type of product, depending on size or potential size of fire and circumstances related to the situation. Plan fire protection and response strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protection Guide on Hazardous Materials", Eighth Edition (1984):

Use dry chemical, foam or carbon dioxide. Water may be ineffective, but water should be used to keep fire-exposed containers cool. If a leak or spill has ignited, use water spray to disperse the vapors and to protect men attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

NOTE: The inclusion of the phrase "water may be ineffective" is to indicate that although water can be used to cool and protect exposed material, water may not extinguish the fire unless used under favorable conditions by experienced fire fighters trained in fighting all types of flammable liquid fires.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS
Fumes, smoke, carbon monoxide, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING
"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

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E. HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS
Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)
High vapor concentrations (greater than approximately 1000 ppm) are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic, and may have other central nervous system effects including death.

NATURE OF HAZARD AND TOXICITY INFORMATION
Product contacting the eyes may cause eye irritation.

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE
Petroleum Solvents/Petroleum Hydrocarbons - Skin contact may aggravate an existing dermatitis.

F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE
Approximately 152-168°C (306-335°F)

SPECIFIC GRAVITY (15.6 C/15.6 C)
0.872

MOLECULAR WEIGHT
120

pH
Essentially neutral

POUR, CONGEALING OR MELTING POINT
Less than -18°C (0°F)
Pour Point by ASTM D 97

VISCOSITY
0.78 cP @ 25°C ASTM D 445

VAPOR PRESSURE
Less than 10 mm Hg @ 25°C
ASTM D 2879

VAPOR DENSITY (AIR = 1)
Approximately 4.1

PERCENT VOLATILE BY VOLUME
100 @ 1 atm. and 25°C (77°F)

EVAPORATION RATE @ 1 ATM. AND 25 C (77 F)
(n-BUTYL ACETATE = 1)
0.2

SOLUBILITY IN WATER @ 1 ATM. AND 25 C (77 F)
Negligible; less than 0.1%

G. REACTIVITY

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite or calcium hypochlorite.

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H. ENVIRONMENTAL INFORMATION

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Shut off and eliminate all ignition sources. Keep people away. Recover free product. Add sand, earth or other suitable absorbent to spill area. Minimize breathing vapors. Minimize skin contact. Ventilate confined spaces. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas.
Assure conformity with applicable governmental regulations. Continue to observe precautions for volatile, combustible vapors from absorbed material.

THE FOLLOWING INFORMATION MAY BE USEFUL IN COMPLYING WITH VARIOUS STATE AND FEDERAL REGULATIONS UNDER VARIOUS ENVIRONMENTAL STATUES:

REPORTABLE QUANTITY (RQ), EPA REGULATION 40 CFR 302 (CERCLA Section 102)
The RQ for cumene is 1 pound. This product contains approximately 5% cumene.

The RQ for ethylbenzene is 1,000 pounds. This product contains approximately 1.5% ethylbenzene.

The RQ for xylene is 1,000 pounds. This product contains approximately 5% xylene.

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355 (SARA Sections 301-304)
Not applicable

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372 (SARA Sections 311-313)
This product contains approximately 5% cumene.

This product contains approximately 1.5% ethylbenzene.

This product contains approximately 5% xylene.

This product contains approximately 21% 1,2,4-Trimethyl benzene.

EPA HAZARD CLASSIFICATION CODE:	Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard	Not Applicable
	XXX		XXX			

I. PROTECTION AND PRECAUTIONS

VENTILATION
Use only with ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. Use explosion-proof equipment. No smoking or open lights.

RESPIRATORY PROTECTION
Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES
Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION
Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT
Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing which could result in prolonged or repeated skin contact.

WORK PRACTICES / ENGINEERING CONTROLS
Keep containers and storage containers closed when not in use. Do not store near heat, sparks, flame or strong oxidants. To prevent fire or explosion risk from static accumulation and discharge, effectively ground product transfer system in accordance with the National Fire Protection Association standard for petroleum products.

PERSONAL HYGIENE
Minimize breathing vapor or mist. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before reuse. Remove contaminated shoes and thoroughly clean and dry before reuse. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION

TRANSPORTATION INCIDENT INFORMATION
For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents, DOT P 5800.3.

DOT IDENTIFICATION NUMBER
UN 1255

OSHA REQUIRED LABEL INFORMATION
In compliance with hazard and right-to-know requirements, the following OSHA Hazard Warnings should be found on a label, bill of lading or invoice accompanying this shipment.

DANGER!

COMBUSTIBLE

Note: Product label will contain additional non-OSHA related information.

The Environmental Information included under Section H hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by Exxon Company, U.S.A. in order to provide additional health and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these rating systems, together with Exxon's interpretation of the available data.

FOR ADDITIONAL INFORMATION ON HEALTH EFFECTS CONTACT:
DIRECTOR OF INDUSTRIAL HYGIENE
EXXON COMPANY, U.S.A.
P. O. BOX 2180 ROOM 3157
HOUSTON, TX 77252-2180
(713) 656-2443

FOR OTHER PRODUCT INFORMATION CONTACT:
MANAGER, MARKETING TECHNICAL SERVICES
EXXON COMPANY, U.S.A.
P. O. BOX 2180 ROOM 2355
HOUSTON, TX 77252-2180
(713) 656-5949

301374

UNOCAL CHEMICALS DIVISION
PETROCHEMICALS GROUP

Product Name: NAPHTHOL SPIRITS 66/3
Product Code No: 11103

MANUFACTURER:

UNOCAL CHEMICALS DIVISION
UNION OIL COMPANY OF CALIFORNIA
1345 N. MEACHAM
SCHAUMBURG, ILLINOIS 60196

CONTACT FOR FURTHER INFORMATION:
MSDS COORDINATOR (312) 490-2500

Transportation Emergencies:
Call CHEMTREC
(800) 424-9300 Cont. U.
(202) 483-7616 (Collect
from Alaska & Hawaii
Health Emergencies:
CALL LOS ANGELES POISON
INFORMATION CENTER (24 hrs
(213) 664-2121

PRODUCT IDENTIFICATION

PRODUCT NAME: NAPHTHOL SPIRITS 66/3

SYNONYMS: AMSCO SOLV 1103

GENERIC NAME: VOLATILE SOLVENT

CHEMICAL FAMILY: HYDROCARBON MIXTURE

DOT PROPER SHIPPING NAME: PETROLEUM NAPHTHA

ID NUMBER: UN1255

DOT HAZARD CLASSIFICATION: COMBUSTIBLE LIQUID

CAS NUMBER: 64742-48-9

SECTION I - HAZARDOUS INGREDIENTS/EXPOSURE LIMITS

		LIMITS	UNITS	AGENCY	TYPE
STODDARD SOLVENT	8052-41-3	100.0000	PPM	ACGIH	TWA
		200.0000	PPM	ACGIH	STEL
		500.0000	PPM	OSHA	TWA

SECTION II - EMERGENCY AND FIRST AID PROCEDURES

EMERGENCY
Have physician call LOS ANGELES POISON INFORMATION CENTER (24 hrs.) (213) 664-2121

EYE CONTACT:

IF IRRITATION OR REDNESS FROM EXPOSURE TO VAPORS DEVELOPS, MOVE VICTIM AWAY FROM EXPOSURE AND INTO FRESH AIR. IF IRRITATION OR REDNESS PERSISTS, SEEK MEDICAL ATTENTION. FOR DIRECT CONTACT, HOLD EYELIDS APART AND FLUSH THE AFFECTED EYE(S) WITH CLEAN WATER. SEEK MEDICAL ATTENTION.

SKIN CONTACT:

REMOVE CONTAMINATED CLOTHING. CLEANSE AFFECTED AREA(S) THOROUGHLY BY WASHING WITH MILD SOAP AND WATER. IF IRRITATION OR REDNESS DEVELOPS AND PERSISTS, SEEK MEDICAL ATTENTION.

SECTION II - EMERGENCY AND FIRST AID PROCEDURES ***EMERGENCY***
Have physician call LOS ANGELES POISON INFORMATION CENTER (24 hrs.) (213) 664-2121

INHALATION (BREATHING):

IF IRRITATION OF NOSE OR THROAT DEVELOPS, MOVE VICTIM AWAY FROM SOURCE OF EXPOSURE AND INTO FRESH AIR. IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION. IF VICTIM IS NOT BREATHING, ARTIFICIAL RESPIRATION SHOULD BE ADMINISTERED. IF BREATHING DIFFICULTIES DEVELOP, OXYGEN SHOULD BE ADMINISTERED BY QUALIFIED PERSONNEL. SEEK IMMEDIATE MEDICAL ATTENTION.

INGESTION (SWALLOWING):

ASPIRATION HAZARD: DO NOT INDUCE VOMITING OR GIVE ANYTHING BY MOUTH BECAUSE THIS MATERIAL CAN ENTER THE LUNGS AND CAUSE SEVERE LUNG DAMAGE. IF VICTIM IS DROWSY OR UNCONSCIOUS, PLACE ON THE LEFT SIDE WITH THE HEAD DOWN. IF POSSIBLE, DO NOT LEAVE VICTIM UNATTENDED. SEEK MEDICAL ATTENTION.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

EYE CONTACT:

THIS MATERIAL MAY CAUSE EYE IRRITATION. DIRECT CONTACT WITH THE LIQUID OR EXPOSURE TO VAPORS OR MISTS MAY CAUSE BURNING, TEARING AND REDNESS.

SKIN CONTACT:

THIS MATERIAL MAY CAUSE SKIN IRRITATION. PROLONGED OR REPEATED EXPOSURE TO THIS MATERIAL MAY CAUSE REDNESS, BURNING, AND DRYING AND CRACKING OF THE SKIN. NO HARMFUL EFFECTS HAVE BEEN DEMONSTRATED IN SKIN ABSORPTION STUDIES. PERSONS WITH PRE-EXISTING SKIN DISORDERS MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS MATERIAL.

INHALATION (BREATHING):

BREATHING HIGH CONCENTRATIONS OF VAPORS OR MISTS MAY CAUSE IRRITATION OF THE NOSE AND THROAT. SIGNS OF NERVOUS SYSTEM DEPRESSION (E.G., DROWSINESS, DIZZINESS, LOSS OF COORDINATION, AND FATIGUE). RESPIRATORY SYMPTOMS ASSOCIATED WITH PRE-EXISTING LUNG DISORDERS (E.G., ASTHMA-LIKE CONDITIONS) MAY BE AGGRAVATED BY EXPOSURE TO THIS MATERIAL.

INGESTION (SWALLOWING):

INGESTION OF EXCESSIVE QUANTITIES MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT. SIGNS OF NERVOUS SYSTEM DEPRESSION (E.G., DROWSINESS, DIZZINESS, LOSS OF COORDINATION, AND FATIGUE). ASPIRATION HAZARD - THIS MATERIAL CAN ENTER LUNGS DURING SWALLOWING OR VOMITING AND CAUSE LUNG INFLAMMATION AND DAMAGE.

COMMENTS:

THIS SUBSTANCE HAS NOT BEEN IDENTIFIED AS A CARCINOGEN OR PROBABLE CARCINOGEN BY NTP, IARC OR OSHA.
REPORTS HAVE ASSOCIATED REPEATED AND PROLONGED OCCUPATIONAL OVEREXPOSURE TO SOLVENTS WITH PERMANENT BRAIN AND NERVOUS SYSTEM DAMAGE (SOMETIMES REFERRED TO AS SOLVENT OR PAINTERS' SYNDROME).
INTENTIONAL MISUSE BY DELIBERATELY CONCENTRATING AND INHALING THIS PRODUCT MAY BE HARMFUL OR FATAL.

SECTION IV - SPECIAL PROTECTION INFORMATION

VENTILATION:

IF CURRENT VENTILATION PRACTICES ARE NOT ADEQUATE FOR MINIMIZING EXPOSURES, ADDITIONAL VENTILATION OR EXHAUST SYSTEMS MAY BE REQUIRED. WHERE EXPLOSIVE MIXTURES MAY BE PRESENT, SYSTEMS SAFE FOR SUCH LOCATIONS SHOULD BE USED.

RESPIRATORY PROTECTION:

THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I). DEPENDING ON THE AIRBORNE CONCENTRATION, USE A RESPIRATOR OR GAS MASK WITH APPROPRIATE CARTRIDGES AND CANNISTERS (NIOSH APPROVED, IF AVAILABLE) OR SUPPLIED AIR EQUIPMENT.

PROTECTIVE GLOVES:

THE USE OF GLOVES IMPERMEABLE TO THE SPECIFIC MATERIAL HANDLED IS ADVISED TO PREVENT SKIN CONTACT AND POSSIBLE IRRITATION.

EYE PROTECTION:

APPROVED EYE PROTECTION TO SAFEGUARD AGAINST POTENTIAL EYE CONTACT, IRRITATION OR INJURY IS RECOMMENDED.

OTHER PROTECTIVE EQUIPMENT:

IT IS SUGGESTED THAT A SOURCE OF CLEAN WATER BE AVAILABLE IN WORK AREA FOR FLUSHING EYES AND SKIN. IMPERVIOUS CLOTHING SHOULD BE WORN AS NEEDED.

SECTION V - REACTIVITY DATA

STABILITY:

STABLE

INCOMPATIBILITY (MATERIALS TO AVOID):

THIS PRODUCT IS INCOMPATIBLE WITH STRONG ACIDS OR BASES, OXIDIZING AGENTS AND SELECTED AMINES.

HAZARDOUS DECOMPOSITION PRODUCTS:

COMBUSTION MAY YIELD CARBON MONOXIDE AND/OR CARBON DIOXIDE.

HAZARDOUS POLYMERIZATION:

WILL NOT OCCUR

SECTION VI - SPILL OR LEAK PROCEDURES

HIGHWAY OR RAILWAY SPILLS
Call CHEMTREC (800) 424-9300 Cont. U.S.
(Collect) (202) 483-7616 from Alaska & Hawa

PRECAUTIONS IN CASE OF RELEASE OR SPILL:

STAY UPWIND AND AWAY FROM SPILL. KEEP ALL SOURCES OF IGNITION AND HOT METAL SURFACES AWAY FROM SPILL. IF SPILL IS INDOORS, VENTILATE AREA OF SPILL. KEEP OUT OF DRAINS, SEWERS OR WATERWAYS. USE SAND OR OTHER INERT MATERIAL TO DAM AND CONTAIN SPILL. DO NOT FLUSH AREA WITH WATER. FOR SMALL SPILLS, DO NOT FLUSH WITH WATER; USE ABSORBANT PADS. CALL SPILL RESPONSE TEAM IF LARGE SPILL. CONTACT FIRE AUTHORITIES AND APPROPRIATE STATE/LOCAL AGENCIES.

WASTE DISPOSAL METHOD:

DISPOSE OF PRODUCT IN ACCORDANCE WITH LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

HANDLING AND STORAGE PRECAUTIONS:

KEEP CONTAINERS TIGHTLY CLOSED. KEEP CONTAINERS COOL, DRY, AND AWAY FROM SOURCES OF IGNITION. USE AND STORE THIS PRODUCT WITH ADEQUATE VENTILATION. AVOID INHALATION OF VAPORS AND PERSONAL CONTACT WITH THE PRODUCT. USE GOOD PERSONAL HYGIENE PRACTICE. "EMPTY" CONTAINERS RETAIN RESIDUE (LIQUID AND/OR VAPOR) AND CAN BE DANGEROUS. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS OR OTHER SOURCES OF IGNITION: THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. "EMPTY" DRUMS SHOULD BE COMPLETELY DRAINED, PROPERLY BUNGED AND PROMPTLY SHIPPED TO THE SUPPLIER OR A DRUM RECONDITIONER. ALL OTHER CONTAINERS SHOULD BE DISPOSED OF IN AN ENVIRONMENTALLY SAFE MANNER AND IN ACCORDANCE WITH GOVERNMENTAL REGULATIONS. BEFORE WORKING ON OR IN TANKS WHICH CONTAIN OR HAVE CONTAINED THIS PRODUCT, REFER TO OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS, ANSI Z49.1, AND OTHER GOVERNMENTAL AND INDUSTRIAL REFERENCES PERTAINING TO CLEANING, REPAIRING, WELDING, OR OTHER CONTEMPLATED OPERATIONS.

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

HAZARD RANKING

NFPA HAZARD CLASS	HEALTH HAZARD: 1	0 = LEAST	HMIS HAZARD CLASS	HEALTH:	1
	FLAMMABILITY: 2	1 = SLIGHT		FLAM:	2
	REACTIVITY: 0	2 = MODERATE		REACT:	0
	OTHER: -	3 = HIGH		P.P.E.:	-
		4 = EXTREME			

LOWER EXPLOSIVE LIMIT (% VOL.)	UPPER EXPLOSIVE LIMIT (% VOL.)
1.0	6.0

FLASH POINT

104, TCC F

EXTINGUISHING MEDIA:

EXTINGUISH WITH DRY CHEMICAL, CO_2, WATER SPRAY OR FOAM.

FIRE & EXPLOSION HAZARDS:

THIS MATERIAL IS COMBUSTIBLE AND MAY BE IGNITED BY HEAT OR FLAME. THIS MATERIAL WILL BURN, BUT WILL NOT IGNITE READILY.

FIRE FIGHTING PROCEDURES:

THE USE OF A SCBA IS RECOMMENDED FOR FIRE FIGHTERS. WATER SPRAY MAY BE USEFUL IN MINIMIZING VAPORS AND COOLING CONTAINERS EXPOSED TO HEAT AND FLAME. AVOID SPREADING BURNING LIQUID WITH WATER USED FOR COOLING PURPOSES.

SECTION IX - PHYSICAL DATA

APPROX. BOILING POINT	VAPOR DENSITY (AIR = 1)	VAPOR PRESSURE
316 TO 360 F	4.9	2.9 MM HG @ 20C

EVAPORATION RATE (N-BUTYL ACETATE = 1)	% VOLATILE	% SOLUBILITY IN WATER
0.21	100%	NEGLIGIBLE (< 5%)

SPECIFIC GRAVITY (TEMP/TEMP)	APPEARANCE	ODOR
0.772 (60F/60F)	CLEAR, LITTLE IF ANY COLOR	CHARACTERISTIC

301378

SECTION XI - DOCUMENTARY INFORMATION

ISSUE DATE: 3/11/88 PRODUCT CODE NO. 11103

PREV. DATE: 6/16/87 PREV. PROD. CODE NO. 1103

MSDS NO: 6289 PREV. MSDS NO: 856

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

008589 HEXANE

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

****

Product Name: HEXANE TEX
CAS NUMBER: 110-54-3

Data Sheet No:	0004344-004
Prepared:	05/31/89
Supersedes:	03/04/86

05 50 087 0472620-

ANCHOR LITHKEMKO
50 INDUSTRIAL LOOP N
ORANGE PARK FL 32073

PRODUCT: 2448000
INVOICE: 663040
INVOICE DATE: 10/26/89
TO: SAME

Rec'd 11/9/89

ATTN: PLANT MGR./SAFETY DIR.

SECTION I - PRODUCT IDENTIFICATION

General or Generic ID: ALIPHATIC HYDROCARBON

DOT Hazard Classification: FLAMMABLE LIQUID (173.115)

SECTION II - COMPONENTS

IF PRESENT, IARC, NTP AND OSHA CARCINOGENS AND CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA TITLE III SECTION 313 ARE IDENTIFIED IN THIS SECTION. SEE DEFINITION PAGE FOR CLARIFICATION

INGREDIENT	% (by WT)	PEL	TLV	Note
HEXANE CAS #: 110-54-3	>95	50 PPM	50 PPM	(1)

Notes:

(1) NIOSH RECOMMENDS A LIMIT OF 100 PPM - 8 HOUR TIME WEIGHTED AVERAGE, 510 PPM CEILING. THESE LIMITS ARE FOR N-HEXANE. THE OSHA PEL AND THE ACGIH TLV FOR OTHER ISOMERS OF HEXANE IS 500 PPM, TWA; 1000 PPM SHORT TERM EXPOSURE LIMIT (STEL).

SECTION III - PHYSICAL DATA

Boiling Point	for PRODUCT	149.00 - 159.00 Deg F (65.00 - 70.55 Deg C) @ 760.00 mm Hg
Vapor Pressure	for PRODUCT	125.00 mm Hg @ 68.00 Deg F (20.00 Deg C)
Specific Vapor Density	AIR = 1	3.0
Specific Gravity		.672 - .684 @ 60.00 Deg F (15.55 Deg C)
Percent Volatiles		100.00%
Evaporation Rate	(N-BUTYL ACETATE = 1)	9.00

SECTION IV - FIRE AND EXPLOSION INFORMATION

FLASH POINT(TCC) -25.0 Deg F (-31.7 Deg C)

EXPLOSIVE LIMIT (PRODUCT) LOWER - 1.0%

EXTINGUISHING MEDIA: REGULAR FOAM OR CARBON DIOXIDE OR DRY CHEMICAL

HAZARDOUS DECOMPOSITION PRODUCTS: MAY FORM TOXIC MATERIALS:, CARBON DIOXIDE AND CARBON MONOXIDE, VARIOUS HYDROCARBONS, ETC.

FIREFIGHTING PROCEDURES: WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMAND MODE WHEN FIGHTING FIRES.

SPECIAL FIRE & EXPLOSION HAZARDS: MATERIAL IS HIGHLY VOLATILE AND READILY GIVES OFF VAPORS WHICH MAY TRAVEL ALONG THE GROUND OR BE MOVED BY VENTILATION AND IGNITED BY PILOT LIGHTS, OTHER FLAMES, SPARKS, HEATERS, SMOKING, ELECTRIC MOTORS, STATIC DISCHARGE, OR OTHER IGNITION SOURCES AT LOCATIONS DISTANT FROM MATERIAL HANDLING POINT.

NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

ALL FIVE GALLON PAILS AND LARGER METAL CONTAINERS INCLUDING TANK CARS AND TANK TRUCKS SHOULD BE GROUNDED AND/OR BONDED WHEN MATERIAL IS TRANSFERRED.

NFPA CODES: HEALTH- 1 FLAMMABILITY- 3 REACTIVITY- 0

SECTION V - HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL 50 PPM

THRESHOLD LIMIT VALUE 50 PPM

SEE SECTION II

301380

 CONTINUED ON PAGE: 2

SECTION V - HEALTH HAZARD DATA (Continued)

EFFECTS OF ACUTE OVEREXPOSURE: FOR PRODUCT

EYES - CAN CAUSE SEVERE IRRITATION, REDNESS, TEARING, BLURRED VISION.
SKIN - PROLONGED OR REPEATED CONTACT CAN CAUSE MODERATE IRRITATION, DEFATTING, DERMATITIS.
BREATHING - EXCESSIVE INHALATION OF VAPORS CAN CAUSE NASAL AND RESPIRATORY IRRITATION, CENTRAL NERVOUS SYSTEM EFFECTS INCLUDING DIZZINESS, WEAKNESS, FATIGUE, NAUSEA, HEADACHE AND POSSIBLE UNCONSCIOUSNESS, AND EVEN DEATH.
SWALLOWING - CAN CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING, AND DIARRHEA. ASPIRATION OF MATERIAL INTO THE LUNGS CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.

FIRST AID:

IF ON SKIN: THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING BEFORE RE-USE.

IF IN EYES: FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY, GET MEDICAL ATTENTION.

IF SWALLOWED: DO NOT INDUCE VOMITING, KEEP PERSON WARM, QUIET, AND GET MEDICAL ATTENTION. ASPIRATION OF MATERIAL INTO THE LUNGS DUE TO VOMITING CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.

IF BREATHED: IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET AND GET MEDICAL ATTENTION.

PRIMARY ROUTE(S) OF ENTRY:

INHALATION, SKIN CONTACT

EFFECTS OF CHRONIC OVEREXPOSURE: FOR PRODUCT

PROLONGED AND REPEATED EXPOSURE TO N-HEXANE MAY DAMAGE PERIPHERAL NERVE TISSUE (THAT OF THE ARMS AND LEGS) AND RESULT IN MUSCULAR WEAKNESS AND LOSS OF SENSATION IN THE EXTREMITIES (PERIPHERAL NEUROPATHY).METHYL ETHYL KETONE MAY POTENTIATE (SHORTEN THE TIME OF ONSET) PERIPHERAL NEUROPATHY CAUSED BY N-HEXANE.

OVEREXPOSURE TO THIS MATERIAL (OR ITS COMPONENTS) HAS BEEN SUGGESTED AS A CAUSE OF THE FOLLOWING EFFECTS IN HUMANS:, CENTRAL NERVOUS SYSTEM EFFECTS

SECTION VI - REACTIVITY DATA

HAZARDOUS POLYMERIZATION: CANNOT OCCUR

STABILITY: STABLE

INCOMPATIBILITY: AVOID CONTACT WITH:, STRONG OXIDIZING AGENTS.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

SMALL SPILL: ABSORB LIQUID ON PAPER, VERMICULITE, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND TRANSFER TO HOOD.

LARGE SPILL: ELIMINATE ALL IGNITION SOURCES (FLARES, FLAMES INCLUDING PILOT LIGHTS, ELECTRICAL SPARKS). PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN COMPLETED. STOP SPILL AT SOURCE, DIKE AREA OF SPILL TO PREVENT SPREADING, PUMP LIQUID TO SALVAGE TANK. REMAINING LIQUID MAY BE TAKEN UP ON SAND, CLAY, EARTH, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND SHOVELED INTO CONTAINERS.

WASTE DISPOSAL METHOD:

SMALL SPILL: ALLOW VOLATILE PORTION TO EVAPORATE IN HOOD. ALLOW SUFFICIENT TIME FOR VAPORS TO COMPLETELY CLEAR HOOD DUCT WORK. DISPOSE OF REMAINING MATERIAL IN ACCORDANCE WITH APPLICABLE REGULATIONS.

LARGE SPILL: DESTROY BY LIQUID INCINERATION.

CONTAMINATED ABSORBENT MAY BE DEPOSITED IN A LANDFILL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION VIII - PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED (SEE SECTION II), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

VENTILATION: PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).

PROTECTIVE GLOVES: WEAR RESISTANT GLOVES SUCH AS:, NITRILE RUBBER

EYE PROTECTION: CHEMICAL SPLASH GOGGLES IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER)

OTHER PROTECTIVE EQUIPMENT: TO PREVENT REPEATED OR PROLONGED SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.

SECTION IX - SPECIAL PRECAUTIONS OR OTHER COMMENTS

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED.SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

301381

Ashland
P.O. BOX 2219
COLUMBUS, OHIO 43216
(614) 889-3333
Telephone
1 (800) 274-5263 or
1-800-ASHLAND

 LAST PAGE--SEE ATTACHMENT PAGE ENCLOSED--LAST PAGE

DEFINITIONS

This definition page is intended for use with Material Safety Data Sheets supplied by the Ashland Chemical Company. Recipients of these data sheets should consult the OSHA Safety and Health Standards (29 CFR 1910), particularly subpart G - Occupational Health and Environmental Control, and subpart I - Personal Protective Equipment, for general guidance on control of potential Occupational Health and Safety Hazards.

SECTION I
PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID: Chemical family or product description.

DOT HAZARD CLASSIFICATION: Product meets DOT criteria for hazards listed.

SECTION II
COMPONENTS

Components are listed in this section if they present a physical or health hazard and are present at or above 1% in the mixture. If a component is identified as a CARCINOGEN by NTP, IARC or OSHA as of the date on the MSDS, it will be listed and footnoted in this section when present at or above 0.1% in the product. Negative conclusions concerning carcinogenicity are not reported. Additional health information may be found in Section V. Components subject to the reporting requirements of Section 313 of SARA Title III are identified in the footnotes in this section, along with typical percentages. Other components may be listed if deemed appropriate.

Exposure recommendations are for components. OSHA Permissible Exposure Limits (PELs) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) appear on the line with the component identification. Other recommendations appear as footnotes.

SECTION III
PHYSICAL DATA

BOILING POINT: Of product if known. The lowest value of the components is listed for mixtures.

VAPOR PRESSURE: Of product if known. The highest value of the components is listed for mixtures.

SPECIFIC VAPOR DENSITY: Compared to AIR = 1. If Specific Vapor Density of product is not known, the value is expressed as lighter or heavier than air.

SPECIFIC GRAVITY: Compared to WATER = 1. If Specific Gravity of product is not known, the value is expressed as less than or greater than water.

pH: If applicable.

PERCENT VOLATILES: Percentage of material with initial boiling point below 425 degrees Fahrenheit.

EVAPORATION RATE: Indicated as faster or slower than ETHYL ETHER, unless otherwise stated.

SECTION IV
FIRE AND EXPLOSION DATA

FLASH POINT: Method identified.

EXPLOSION LIMITS: For product if known. The lowest value of the components is listed for mixtures.

HAZARDOUS DECOMPOSITION PRODUCTS: Known or expected hazardous products resulting from heating, burning or other reactions.

SECTION IV (cont.)

EXTINGUISHING MEDIA: Following National Fire Protection Association criteria.

FIREFIGHTING PROCEDURES: Minimum equipment to protect firefighters from toxic products of vaporization, combustion or decomposition in fire situations. Other firefighting hazards may also be indicated.

SPECIAL FIRE AND EXPLOSION HAZARDS: States hazards not covered by other sections.

NFPA CODES: Hazard ratings assigned by the National Fire Protection Association.

SECTION V
HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMIT: For product.

THRESHOLD LIMIT VALUE: For product.

EFFECTS OF ACUTE OVEREXPOSURE: Potential local and systemic effects due to single or short term overexposure to the eyes and skin or through inhalation or ingestion.

EFFECTS OF CHRONIC OVEREXPOSURE: Potential local and systemic effects due to repeated or long term overexposure to the eyes and skin or through inhalation or ingestion.

FIRST AID: Procedures to be followed when dealing with accidental overexposure.

PRIMARY ROUTE OF ENTRY: Based on properties and expected use.

SECTION VI
REACTIVITY DATA

HAZARDOUS POLYMERIZATION: Conditions to avoid to prevent hazardous polymerization resulting in a large release of energy.

STABILITY: Conditions to avoid to prevent hazardous or violent decomposition.

INCOMPATIBILITY: Materials and conditions to avoid to prevent hazardous reactions.

SECTION VII
SPILL OR LEAK PROCEDURES

Reasonable precautions to be taken and methods of containment, clean-up and disposal. Consult federal, state and local regulations for accepted procedures and any reporting or notification requirements.

SECTION VIII
PROTECTIVE EQUIPMENT TO BE USED

Protective equipment which may be needed when handling the product.

SECTION IX
SPECIAL PRECAUTIONS OR OTHER COMMENTS

Covers any relevant points not previously mentioned.

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ADDITIONAL COMMENTS

Containers should be either reconditioned by CERTIFIED firms or properly disposed of by APPROVED firms. Disposal of containers should be in accordance with applicable laws and regulations. "EMPTY" drums should not be given to individuals. Serious accidents have resulted from the misuse of "EMPTIED" containers (drums, pails, etc.). Refer to Sections IV and IX.

NCDH, 1977. Industrial Chemical Survey, Anchor Chemical Company (Source: NCDH Files)

DIVISION OF PURE WATERS
BUREAU OF INDUSTRIAL

1977 INDUSTRIAL CHEMICAL SURVEY

(H)

PART I

PLEASE COMPLETE AND RETURN TO THE ABOVE ADDRESS, ATTENTION: INDUSTRIAL CHEMICAL SURVEY.

COMPANY NAME	SIC CODE (If known)	OFFICE USE
AI[illegible]OR CHEMICAL CO., INC.	2842	28 773

COMPANY MAILING ADDRESS	CITY	STATE	ZIP CODE
500 West John St.	Hicksville	New York	11801

PLANT NAME (If different)	CONTACT NAME	TELEPHONE
	Alfred A. Jasser	Area 516-433-080

PLANT ADDRESS (If different) Street	CITY	STATE	ZIP CODE

PRINCIPAL BUSINESS OF PLANT
Blend and pack chemical specialties for Graphic Arts Industries

NOTE: (If parent company, give name and addresses of all divisions, subsidiaries, etc. located in New York State. A separate questionnaire is to be complete and submitted for each.)

PART II
Discharge Information

WATER

1. Does your plant discharge liquid wastes to a municipally owned sanitary sewer system? ☐ Yes ☐
   Name of System
2. Is your facility permitted to discharge liquid wastes under a State (SPDES) or Federal (NPDES) permit? Permit Number ☐ Yes ☐
3. Do you discharge liquid wastes in any other manner? ☐ Yes ☐
   Explain

If any of the above are "Yes":
a. Do you discharge process or chemical wastes — (i.e. water used in manufacturing including direct contact cooling water and scrubber water)? ☐ Yes ☐
b. Do you discharge non-contact cooling water? ☐ Yes ☐
c. Do you discharge collected storm drainage only? ☐ Yes ☐
d. Do you discharge sanitary wastes only? ☑ Yes ☐

AIR

1. Does your facility have sources of possible emissions to the atmosphere? ☒ Yes ☐
2. Enter Location and Facility Code as shown on your Air Pollution Control Application for Permits and Certification (If applicable) 2 8 2 4 0 0 0 1 7 2

SOLID & CONCENTRATED LIQUID WASTES

1. List Name and Address of Firm (Including yourself) removing wastes other than office and cafeteria refuse.

Name	Master Sanitation Co.
Address	P.O. Box 625 City Huntington State NY Zip Code 11743
Name	
Address	City State Zip Code

2. List Location(s) of Landfill(s) owned and used by your facility.

		Active
1	NONE	☐
2	NONE	☐

PESTICIDES

1. Does this facility:
   Manufacture Pesticides or Pesticide Product Ingredients? ☐ Yes
   Produce Pesticides or Pesticide Product Ingredients? ☐ Yes
   Formulate Pesticides? ☐ Yes
   Repackage Pesticides? ☐ Yes
2. EPA Establishment Number ☐☐☐☐☐☐ – ☐☐ – ☐☐☐

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SUBSTANCES OF CONCERN
(Refer to attached TABLE I)

Complete all information for those substances your facility has used, produced, stored, distributed or otherwise disposed of since January 1, 1971. Do n include chemicals used only in analytical laboratory work. Enter the name and code from Table I. If facility uses a substance in any of the Classes A — which is not specified in the list, enter it as code class plus 99, e.g. B99 with name, usage, etc.

NAME OF SUBSTANCE	CODE	AVERAGE ANNUAL USAGE	AMOUNT NOW ON HAND	GAL.	LB.	PURPOSE OF USE (State whether produced, reacted, blend packaged, distributed, no longer used, e
Methylene chloride	A02	50,000	1,500	x		blended with other mate and packaged
1,1,1 trichlorethane	A07	13,000	180	x		blended and packaged wi other materials
ethylbenzene	D06	13,000	760	x		blended and packaged wi other materials
petroleum tars (Napthalene Anthracene)	E02	270	50		x	blended and packaged wi other materials
dyes and organic pigments	F24	40	20		x	blended with other mate

6/79- Ron Jasser relocated in Conn. (203) 644-2577 - He is the one one who can give information on Chemicals.

If you use chemicals of unknown composition, list trade name or other identification, name of supplier and complete information.

NAME OF SUBSTANCE	AVERAGE ANNUAL USAGE	AMOUNT NOW ON HAND	GAL.	LB.	SUPPLIER	PURPOSE OF USE (State whether produced, react blended, packaged, distribut no longer used, etc.)

I hereby affirm under penalty of perjury that information provided on this form is true to the best of my knowledge and belief. False statements made here are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law.

SIGNATURE (Owner, Partner, or Officer): [signature]
DATE: February 10,1977

NAME (Printed or Typed): ALFRED A. JASSER
TITLE: President

301386

...all information for those substances your facili... used, produced, stored, distributed or otherwis... ...osed of since January 1, 1971. On ...
...chemicals used only in analytical laboratory work.

...Of Substance/Trade Name ...lier and Address	CODE	AVERAGE ANNUAL USAGE	AMOUNT NOW ON HAND	GAL. (✓)	LB.	PURPOSE OF USE (State whether produced, reacted, blended, packaged, distributed, no longer used, etc.)
...thylene Chloride	402	30,000	1500	✓		Blended with other material
1,1,1-Trichlorethane	A07	19,000	160	✓		Package blended packaged with other material
...thylbenzene	B06	13,000	760	✓		Blended & packaged with other material
...troleum tar	E02	240	50	✓		Heated & packaged with other material
...organic pigments	F24	40	20		✓	Blended with other material
... addition to the above substances not included above						
Petroleum naphtha distillate		50,000 gal.		✓		
...thylene glycol monoethyl ether		20,000 gal.		✓		
...lycerine, glycols		2000 gal.		✓		
...onionic ~~ethoxylated~~ alcohol ethoxylated		10,000 gal.		✓		

Final Discharge Point

- ☐ Sewers
- ☒ Cesspools
- ☐ Sumps or basins
- ☐ Drums
- ☐ Landfills
- ☐ Other

Recommended Action

- ☐ Immediate abatement
- ☒ Sample
- ☒ SPDES Appication
- ☐ Reinspection
- ☐ Referred to ______
- ☐ No Action

STATIONARY COMBUSTION AND INCINERATION

A. Heating System	☐ None	☒ Boiler	☐ Space Heaters
B. Fuel	☐ Electric	☒ Gas	☐ Oil
C. Incinerator	☐ Yes	☐ No	

I hereby affirm under penalty of perjury that information provided on this form is true to the best of my knowledge and belief. False statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal Law.

...ure (Owner, Partner, or Officer): Alfred A. Jasser

DATE: 2/9/77

...(Printed or Typed): Alfred A. Jasser

TITLE: Pres.

...pectors Name

301387

NCDH, 1981. Environmental Health Continuation Sheet (Source: NCDH Files)

ENVIRONMENTAL HEALTH
Continuation Sheet
Nassau County Health Department

Owner or Agent : Matt Jemco (Anchor Chemical)
Address: Hicksville
Inspector

DATE	COMMENTS
	On 8/11/81 Walter Parrish of DEC called regarding tests on tanks ordered by NCFM for above facility.
	There are 17 tanks, allegedly in vaults, under the building. The tanks were installed in 1964 and are used to hold fresh chemicals (solvents).
	Mattiace Petrochemical is reportedly the supplier. According to our records the solvents are mixed and repackaged and supplied as cleaning materials to the printing trades.
	16 of the tanks were hydrostatically tested (not Kent-Moore test) and 6 did not pass the test. However, the meaning of the test results is not clear. The 17th tank which was not tested, contained Methylene Chloride
	[initials]
	On 8/11/81 called Rich Kellner of NCFM office. Although tests showed something wrong, could be a vent failed or piping leaked (used 5 psi pressure). No drop in petrometers! If anything may have had slight products losses - Some tanks passed retest.
	Failed systems will be emptied; will have 1 year to decide to remove or permanently abandon. Tank sizes are 1000-4000 gal. Also 7 tanks in mixing room elevated off floor - 550 to 1500 gal.
	Have me a run down on some of the

EH 109a 1/68
DH-1198, 9/71

301389 (CONT.)

HEALTH
Continuation Sheet
Nassau County Health Department

Agent : (Anchor Chemical)
Address: Hicksville

DATE | UNIT | COMMENTS

...in the tanks - There are listed being:

111 Trichlor
VM&P Naptha
Aromatic 100
Methyl Acetate
Varsol 3
Acetone
Methylene Chloride
Methosol 100
Mineral Spirits
Ethylene Glycol
Glycol Ether
2 Butyl oxyethanol
Isopropyl Alcohol

Parent Corp will have to decide on disposition of tanks. Complicated by location of tanks under building. Building was constructed for Anchor chemical and tanks designed in. Facility was described as very cooperating.

J.G.

301390

CHEMICAL TANKS February 4, 1975

TANK	DIM.	CAP.	PRODUCT
1	64"D 18'L	3000	(1) N.S. 663 napthal spirits
2	64"D 18'L	3000	(2) AROM 100
3	64"D 18'L	3000	(3) MC methylene chloride
4	64"D 18'L	3000	(2) AROM 100
5	64"D 24'L	4000	(1) NS 663
6	64"D 12'L	2000	(12) Acetone
7	64"D 12'L	2000	(4) EE Cello
8	64"D 9'L	1500	(5) Chloro NU
9	64"D 9'L	1500	A~~ROM 100~~ DEG.
10	64"D 9'L	1500	(6) BC
11	64"D 9'L	1500	(7) Iso. #99
12	64"D 9'L	1500	(8) Varsol 3
13	48"D 10'4"L	1000	(9) EA Ethyl Acetate
14	48"D 10'4"L	1000	EE Acetate not used
15	64"D 24'L	4000	(11) TEX
16	48"D 10'4"L	1000	(10) SP NAPH VM & P
17	48"D 6'L	550	EE CELLO

OIL TANKS ABOVE GROUND

TANK #	CAP.	GRADE
L-1	550	M30+
L-2	550	M40+
L-3	1500	M 650
L-4	1500	A. O. 502
L-5	1000	M20+
L-6	1000	A.O. 302
L-7	550	M 157

NCDH, 1982b. Division of Laboratories & Research, Environmental Health Laboratories. Soil and Ground-Water Analytical Data from Anchor Lith Kem-Ko (Source: NCDH Files)

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF LABORATORIES & RESEARCH
ENVIRONMENTAL HEALTH LABORATORIES

RESULTS OF EXAMINATION

REPORTING LAB: TRACE ORGANICS

LAB ACCESS NO.: 201473

SOURCE: ANCHOR LITHKEMKO - 500 W.JOHN ST., HICKSVILLE   WELL# 1 50FT

MATRIX: SOIL

DATE SAMPLED: 09/13/82

MDC - MINIMUM DETECTABLE CONCENTRATION

NA - NOT ANALYZED

NR - NO RESULT DUE TO TECHNICAL REASONS-RESAMPLE SUGGESTED

	MDC (ppb)	RESULTS (ppb)
VOLATILE HALOGENATED - GASES		
CHLOROMETHANE	NA	NA
DICHLORODIFLUOROMETHANE	NA	NA
[illegible]METHANE	NA	NA
VINYL CHLORIDE	10	NA
CHLOROETHANE	NA	NA
VOLATILE HALOGENATED		
METHYLENE CHLORIDE	120	410
TRICHLOROFLUOROMETHANE	20	< 20
1,1-DICHLOROETHYLENE	20	< 20
1,1-DICHLOROETHANE	200	< 200
c & t-1,2-DICHLOROETHYLENE	140	< 140
CHLOROFORM	20	< 20
1,2-DICHLOROETHANE	100	< 100
1,1,1-TRICHLOROETHANE	20	22
CARBONTETRACHLORIDE	20	< 20
1,2-DICHLOROPROPANE	NA	NA
BROMODICHLOROMETHANE	20	< 20
TRICHLOROETHYLENE	20	< 20
c-1,3-DICHLOROPROPENE / DIBROMOCHLOROMETHANE / 1,1,2-TRICHLOROETHANE	20	< 20
t-1,3-DICHLOROPROPENE	NA	NA
BROMOFORM	20	< 20
TETRACHLOROETHYLENE	20	< 20
1,1,2,2-TETRACHLOROETHANE	NA	NA
VOLATILE NON-HALOGENATED		
BENZENE	80	< 80
TOLUENE	80	< 80
CHLOROBENZENE	100	< 100
ETHYLBENZENE	60	< 60
XYLENE	80	< 80
DICHLOROBENZENE	200	< 200

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF LABORATORIES & RESEARCH
ENVIRONMENTAL HEALTH LABORATORIES

RESULTS OF EXAMINATION

REPORTING LAB: TRACE ORGANICS

LAB ACCESS NO.: 201472

SOURCE: ANCHOR LITHKEMKO - 500 W.JOHN ST., HICKSVILLE WELL# 1 65FT

MATRIX: SOIL

DATE SAMPLED: 09/13/82

[illegible] - MINIMUM REPORTABLE CONCENTRATION

NA - NOT ANALYZED

NR - NO RESULT DUE TO TECHNICAL REASONS-RESAMPLE SUGGESTED

301395

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF LABORATORIES & RESEARCH
ENVIRONMENTAL HEALTH LABORATORIES

RESULTS OF EXAMINATION

REPORTING LAB: TRACE ORGANICS

LAB ACCESS NO.: 201551

SOURCE: ANCHOR LITHKEMKO, HICKSVILLE - WELL# 1

MATRIX: WATER

DATE SAMPLED: 09/21/82

MRC - MINIMUM REPORTABLE CONCENTRATION

NA - NOT ANALYZED

NR - NO RESULT DUE TO TECHNICAL REASONS-RESAMPLE SUGGESTED

VOLATILE HALOGENATED - GASES	MDL (ppb)	RESULTS (ppb)
CHLOROMETHANE	NA	NA
DICHLORODIFLUOROMETHANE	NA	[illegible]
BROMOMETHANE	NA	NA
VINYL CHLORIDE	10	NA
CHLOROETHANE	NA	NA

VOLATILE HALOGENATED

METHYLENE CHLORIDE	6	31
TRICHLOROFLUOROMETHANE	1	< 1
1,1-DICHLOROETHYLENE	1	[illegible]
1,1-DICHLOROETHANE	10	[illegible]
c & t-1,2-DICHLOROETHYLENE	7	< 7
CHLOROFORM	1	1
1,2-DICHLOROETHANE	5	< 5
1,1,1-TRICHLOROETHANE	1	440
CARBONTETRACHLORIDE	1	< 1
1,2-DICHLOROPROPANE	NA	NA
BROMODICHLOROMETHANE	1	< 1
TRICHLOROETHYLENE	1	17
c-1,3-DICHLOROPROPENE / DIBROMOCHLOROMETHANE / 1,1,2-TRICHLOROETHANE	1	< 1
t-1,3-DICHLOROPROPENE	NA	NA
BROMOFORM	1	< 1
TETRACHLOROETHYLENE	1	43
1,1,2,2-TETRACHLOROETHANE	NA	NA

VOLATILE NON-HALOGENATED

BENZENE	4	< 4
TOLUENE	4	< 4
CHLOROBENZENE	5	< 5
ETHYLBENZENE	3	< 3
XYLENE	4	< 4
DICHLOROBENZENE	10	< 10

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NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF LABORATORIES & RESEARCH
ENVIRONMENTAL HEALTH LABORATORIES

RESULTS OF EXAMINATION

REPORTING LAB: TRACE ORGANICS

LAB ACCESS NO.: 201552

SOURCE: ANCHOR LITHKEMKO, HICKSVILLE - WELL# 2

MATRIX: WATER

DATE SAMPLED: 09/21/82

201552

MRC - MINIMUM REPORTABLE CONCENTRATION

NA - NOT ANALYZED

NR - NO RESULT DUE TO TECHNICAL REASONS-RESAMPLE SUGGESTED

301398

VOLATILE HALOGENATED - GASES	MRC (ppb)	RESULTS (ppb)
[illegible]	NA	NA
[illegible]	NA	NA
[illegible]	NA	NA
[illegible] CHLORIDE	10	NA
CHLOROETHANE	NA	NA

VOLATILE HALOGENATED	MRC (ppb)	RESULTS (ppb)
METHYLENE CHLORIDE	6	41
TRICHLOROFLUOROMETHANE	1	< [illegible]
1,1-DICHLOROETHYLENE	1	[illegible]
1,1-DICHLOROETHANE	10	[illegible]
c & t-1,2-DICHLOROETHYLENE	7	< 7
CHLOROFORM	1	1
1,2-DICHLOROETHANE	5	< 5
1,1,1-TRICHLOROETHANE	1	440
CARBONTETRACHLORIDE	1	< 1
1,2-DICHLOROPROPANE	NA	NA
BROMODICHLOROMETHANE	1	< 1
TRICHLOROETHYLENE	1	18
c-1,3-DICHLOROPROPENE		
DIBROMOCHLOROMETHANE / 1,1,2-TRICHLOROETHANE	1	< 1
t-1,3-DICHLOROPROPENE	NA	NA
BROMOFORM	1	< 1
TETRACHLOROETHYLENE	1	42
1,1,2,2-TETRACHLOROETHANE	NA	NA

VOLATILE NON-HALOGENATED	MRC (ppb)	RESULTS (ppb)
BENZENE	4	< 4
TOLUENE	4	< 4
CHLOROBENZENE	5	< 5
ETHYLBENZENE	3	< 3
XYLENE	4	< 4
DICHLOROBENZENE	10	< 10

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF LABORATORIES & RESEARCH
ENVIRONMENTAL HEALTH LABORATORIES

RESULTS OF EXAMINATION

REPORTING LAB: TRACE ORGANICS

LAB ACCESS NO.: 201553

SOURCE: ANCHOR LITHKEMKO, HICKSVILLE - WELL# 3

MATRIX: WATER

DATE SAMPLED: 09/21/82

MRC - MINIMUM REPORTABLE CONCENTRATION

NA - NOT ANALYZED

NR - NO RESULT DUE TO TECHNICAL REASONS-RESAMPLE SUGGESTED

VOLATILE HALOGENATED - GASES	MPC (ppb)	RESULTS (ppb)
CHLOROMETHANE	NA	NA
[illegible]	NA	[illegible]
[illegible]	[illegible]	
VINYL CHLORIDE	[illegible]	[illegible]
CHLOROETHANE	NA	NA

VOLATILE HALOGENATED

METHYLENE CHLORIDE	6	7
TRICHLOROFLUOROMETHANE	1	< 1
1,1-DICHLOROETHYLENE	1	270
1,1-DICHLOROETHANE	10	[illegible]
c & t-1,2-DICHLOROETHYLENE	7	28
CHLOROFORM	1	[illegible]
1,2-DICHLOROETHANE	5	[illegible]
1,1,1-TRICHLOROETHANE	1	11000
CARBONTETRACHLORIDE	1	< 1
1,2-DICHLOROPROPANE	NA	NA
BROMODICHLOROMETHANE	1	< 1
TRICHLOROETHYLENE	1	39
c-1,3-DICHLOROPROPENE / DIBROMOCHLOROMETHANE / 1,1,2-TRICHLOROETHANE	1	2
t-1,3-DICHLOROPROPENE	NA	NA
BROMOFORM	1	< 1
TETRACHLOROETHYLENE	1	470
1,1,2,2-TETRACHLOROETHANE	NA	NA

VOLATILE NON-HALOGENATED

BENZENE	4	NR
TOLUENE	4	< 4
CHLOROBENZENE	5	< 5
ETHYLBENZENE	3	< 3
XYLENE	4	< 4
DICHLOROBENZENE	10	< 10

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF LABORATORIES & RESEARCH
ENVIRONMENTAL HEALTH LABORATORIES

RESULTS OF EXAMINATION

REPORTING LAB: TRACE ORGANICS

LAB ACCESS NO.: 202018

SOURCE: WELL# 3 - ANCHOR LITHKEMKO 500 W. JOHN ST., HICKSVILLE

MATRIX: WATER

DATE SAMPLED: 12/14/82

MRC - MINIMUM REPORTABLE CONCENTRATION

NA - NOT ANALYZED

NR - NO RESULT DUE TO TECHNICAL REASONS-RESAMPLE SUGGESTED

CHEMICAL EXAMINATION FOR TRACE ORGANIC CONSTITUENTS IN WATER, HAZARDOUS WASTES AND SOLID WASTES

Division of Laboratories and Research

... of Health

JS

3 ☑ Special
4 ☐ Complaint
5 ☐ Other

Field No.

N No. (Public Water Supply Only)

Source Information (Please Print)

Premises	Anchor Lithkemko	Date Collected	12 / 14
Address	500 W. John St.	Date Received	12 / 14
Town	Hicksville	Date Reported	
Collection Point	Well #2 Well No.	Collection Time	11:29
		Collected By:	V. Nigro

Sampler's Comments:

-sample transported on ice.

Bureau

1 ☑ Land Resources Management
2 ☐ Public Water Supply
3 ☐ Water Pollution Control
4 ☐ Environmental Sanitation
9 ☐ Other (specify)

SAMPLE TYPE

AQUEOUS				NON-AQUEOUS	
1	Community Well	6	Surface Water	1	Soil
2	Non-Community Well	7	Waste Water	2	Sludge
3	Private Well	8	Industrial Effluent	3	Waste Solvent
(4)	Monitoring Well	9	Raw Supply Water	4	Oil
5	Drinking Water	10	Distribution Water	5	Other (specify)

ANALYSIS TYPE

(A)	Purgeable halogenated hydrocarbons	I	Phthalates
B	Purgeable halogenated hydrocarbons - gases	J	Herbicides
(C)	Purgeable nonhalogenated hydrocarbons	K	Nitrosamines
D	Halogenated pesticides	L	Benzidines
E	Polychlorinated biphenyls	M	Nitroaromatic hydrocarbons
F	Polycyclic aromatic hydrocarbons	N	Haloethers
G	Aldehydes + ketones	O	Chlorinated hydrocarbons
H	Phenols	P	Other (specify)

Examiner's Comments:

301403

[illegible] HALOGENATED - GASES	(ppb)	(ppb)
[illegible]THANE	NA	NA
[illegible]FLUOROMETHANE	NA	NA
[illegible]	NA	NA
VINYL CHLORIDE	10	NA
CHLOROETHANE	NA	NA
VOLATILE HALOGENATED		
METHYLENE CHLORIDE	5	NR
TRICHLOROFLUOROMETHANE	1	1
1,1-DICHLOROETHYLENE	1	NR
1,1-DICHLOROETHANE	4	230
cis-1,2-DICHLOROETHYLENE	1	64
CHLOROFORM	1	10
1,1,2-TRICHLOROTRIFLUOROETHANE	1	< 1
1,2-DICHLOROETHANE	4	28
1,1,1-TRICHLOROETHANE	1	11000
CARBONTETRACHLORIDE	1	< 1
1,2-DICHLOROPROPANE	2	< 2
BROMODICHLOROMETHANE	1	<. 1
TRICHLOROETHYLENE	1	43
c-1,3-DICHLOROPROPENE		
DIBROMOCHLOROMETHANE	1	< 1
1,1,2-TRICHLOROETHANE		
t-1,3-DICHLOROPROPENE	NA	NA
BROMOFORM	1	< 1
TETRACHLOROETHYLENE	1	470
1,1,2,2-TETRACHLOROETHANE	NA	NA
VOLATILE NON-HALOGENATED		
BENZENE	4	NR
TOLUENE	4	< 4
CHLOROBENZENE	5	< 5
ETHYLBENZENE	3	< 3
XYLENE (o,m,p)	4	< 4
DICHLOROBENZENE (o,m,p)	10	< 10

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF LABORATORIES & RESEARCH
ENVIRONMENTAL HEALTH LABORATORIES

RESULTS OF EXAMINATION

REPORTING LAB: TRACE ORGANICS

LAB ACCESS NO.: 202019

SOURCE: WELL# 2 - ANCHOR LITHKEMKO 500 W. JOHN ST., HICKSVILLE

MATRIX: WATER

DATE SAMPLED: 12/14/82

MRC - MINIMUM REPORTABLE CONCENTRATION

NA - NOT ANALYZED

NR - NO RESULT DUE TO TECHNICAL REASONS-RESAMPLE SUGGESTED

VOLATILE HALOGENATED - GASES	MRC (ppb)	RESULTS (ppb)
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
BROMOMETHANE	[illegible]	[illegible]
VINYL CHLORIDE	10	NA
CHLOROETHANE	NA	NA

VOLATILE HALOGENATED	MRC (ppb)	RESULTS (ppb)
METHYLENE CHLORIDE	5	< 5
TRICHLOROFLUOROMETHANE	1	< 1
1,1-DICHLOROETHYLENE	1	< 1
1,1-DICHLOROETHANE	4	< 4
c & t-1,2-DICHLOROETHYLENE	1	< 1
CHLOROFORM	1	< 1
1,1,2-TRICHLOROTRIFLUOROETHANE	1	< 1
1,2-DICHLOROETHANE	4	< 4
1,1,1-TRICHLOROETHANE	1	5
CARBONTETRACHLORIDE	1	< 1
1,2-DICHLOROPROPANE	2	< 2
BROMODICHLOROMETHANE	1	< 1
TRICHLOROETHYLENE	1	< 1
c-1,3-DICHLOROPROPENE		
DIBROMOCHLOROMETHANE	1	< 1
1,1,2-TRICHLOROETHANE		
t-1,3-DICHLOROPROPENE	NA	NA
BROMOFORM	1	< 1
TETRACHLOROETHYLENE	1	< 1
1,1,2,2-TETRACHLOROETHANE	NA	NA

VOLATILE NON-HALOGENATED	MRC (ppb)	RESULTS (ppb)
BENZENE	4	< 4
TOLUENE	4	< 4
CHLOROBENZENE	5	< 5
ETHYLBENZENE	3	< 3
XYLENE (o,m,p)	4	< 4
DICHLOROBENZENE (o,m,p)	10	< 10

Nassau County Department of Health
Summary of Results of NCHD Sampling of
Anchor/Lith Kem-Ko
500 W. John Street, Hicksville, New York

A. Results of Soil Analyses* - September 13, 1982 Samples

Parameter	Well #1 Depth of Sample=50'	Well #1 Depth of Sample=65'
(1)	(2)	(3)
Methylene Chloride	490	410
1,1,1-Trichloroethane	< 20	22
Trichloroethylene	< 20	< 20
Tetrachloroethylene	< 20	< 20

* All results in parts per billion

B. Results of Groundwater Analyses**

Parameter	Well #1 9-21-82	Well #1 6-8-83	Well #2 9-21-82	Well #2 12-14-82	Well #2 6-8-83	Well #3 9-21-82	Well #3 12-14-82	Well #3 6-8-[illegible]
(1)	(2)		(3)			(4)		
Methylene Chloride	31	NR	41	< 5	NR	7	NR	[illegible]
Trichlorofluoromethane	< 1	< 1	< 1	< 1	< 1	< 1	1	< [illegible]
1,1-Dichloroethylene	5	< 1	5	< 1	< 1	270	NR	[illegible]
1,1-Dichloroethane	27	11	27	< 4	< 6	220	230	[illegible]
c&t-1,2-Dichloroethylene	< 7	< 4	< 7	< 1	< 4	28	64	[illegible]
Chloroform	1	< 1	1	< 1	< 1	7	10	
1,2-Dichloroethane	< 5	< 12	< 5	< 4	< 12	25	28	< [illegible]
1,1,1-Trichloroethane	440	160	440	5	< 1	11000	11000	[illegible]
Trichloroethylene	17	8	18	< 1	< 1	39	43	[illegible]
c-1,3-Dichloropropene) dibromochloromethane) 1,1,2-Trichloroethane)	< 1	< 1	1	< 1	< 1	2	< 1	< [illegible]
Tetrachloroethylene	43	7	42	< 1	< 1	470	470	[illegible]

** All results in parts per billion

NR - No result due to technical reasons - Resample suggested

3

301407

A2. UST Correspondence

Klein. W.T. 1981. The Franklin Company Contractors, Inc. Letter to D. Larsen, Anchor/Lith Kem-Ko. 8/20/81. (Source: Rosenman & Colin Files)

THE FRANKLIN COMPANY CONTRACTORS, INC.

52-09 58TH STREET
WOODSIDE, N.Y. 11377

GASOLINE TANK AND PUMP INSTALLATIONS

INDUSTRIAL LIQUID STORAGE SYSTEMS

Mr. Duane Larsen
Anchor/Lith Chemco
46 Harriet Place
Lynbrook, N.Y. 11563

Aug. 20, 1981

Re: 500 West John Street
Hicksville, N.Y.

Dear Mr. Larsen:

Responding to our recent telephone conversation and a search of our files we have found and copied our record of the final invoice to Anchor Chemical for the tank installation.

Apparently the tanks were purchased by Anchor as we have no record of being invoiced for them. We did receive and set the tanks.

There is no record of a building permit in our files

We have also located a drawing used during installation. My recollection is that changes were made during construction to suite the conditions and desires of the customer.

We have attached the items mentioned above and hope they prove helpful.

Very truly yours,

The Franklin Comp. Cont. Inc.

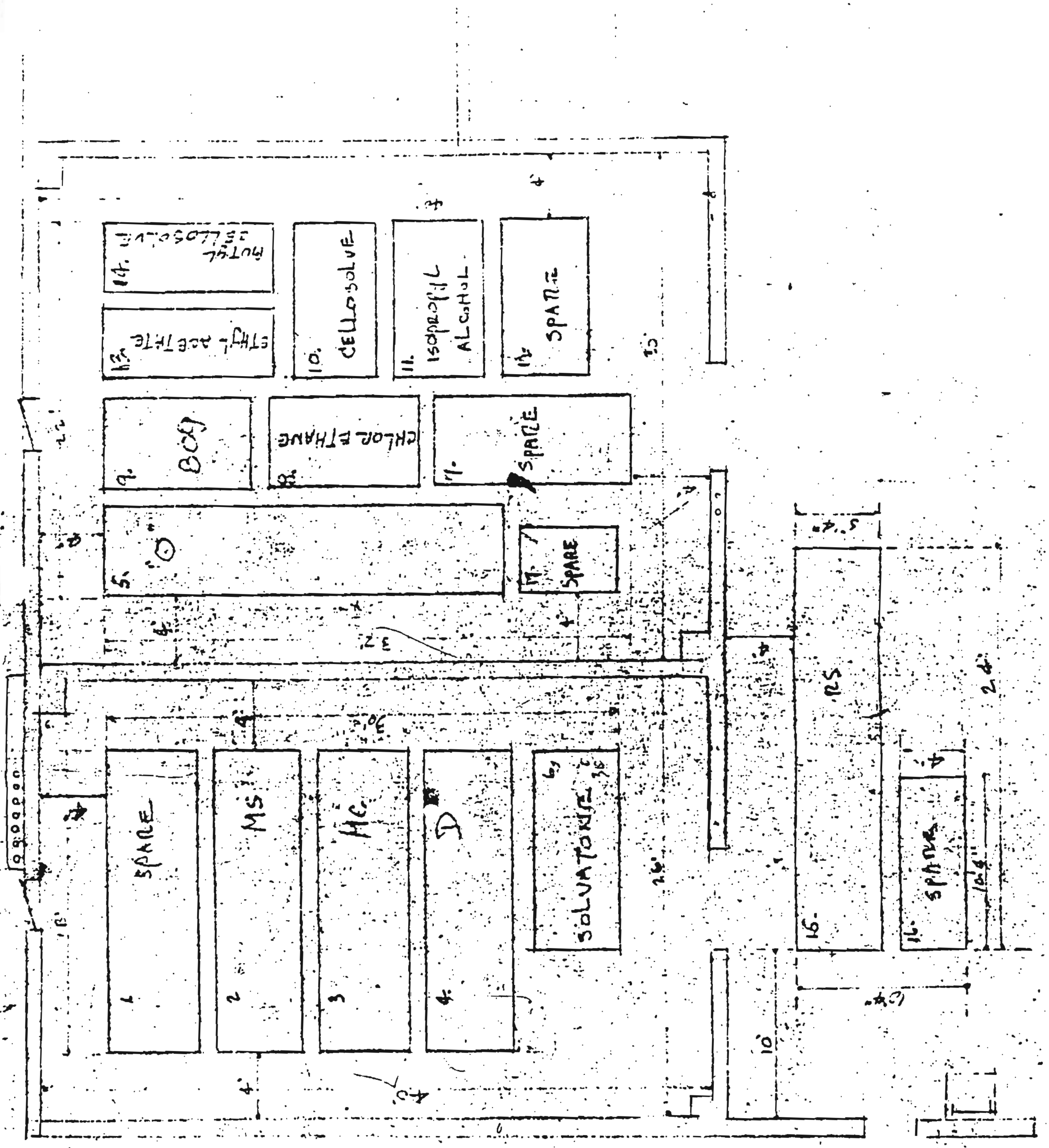
William T Klein, Pres.

WTK:cd
Enc.(3) 2 drawings,
1 copy of our billing record.

C

301410

WEST V N ST.


BUTYL CELLOSOLVE
ETHYL ACETATE
CELLOSOLVE
ISOPROPYL ALCOHOL
SPARE
BCY
CHLOR ETHANE
SPARE
SPARE
SPARE
MS
MC
SOLVATONE
RS
SPARE

Nassau County Fire Commission Office of the Fire Marshall, 1984. Letter to R. Pelino, Lockwood, Kessler & Bartlett dated January, 19, 1984. (Source: Rosenman & Colin Files)

FRANCIS T. PURCELL
COUNTY EXECUTIVE

JOSEPH G. BOSLET, JR.
FIRE MARSHAL

BUREAU OF FIRE PREVENTION
SCHOOL 663-5824
INDUSTRIAL 663-5815
INSTITUTIONAL 663-5820
GENERAL INSPECTION 663-5826

NASSAU COUNTY FIRE COMMISSION
OFFICE OF FIRE MARSHAL
899 JERUSALEM AVENUE
P.O.BOX 128
UNIONDALE, NEW YORK 11553

January 19, 1984
Inspection #GS-93-26

Ms. Rose Pelino
LKB Engineers
1 Aerial Way
Syosset, N. Y. 11791

Dear Ms. Pelino:

In answer to your request, this letter is to confirm that this office is in receipt of a statement submitted to this office by the Barlo Equipment Co. attesting to work performed in order to permanently abandon five(s) underground flammable liquid storage tanks at Anchor Lith Kem-Ko, 500 W. John Street, Hicksville. There were reportedly, two, 1,5000 gallon tanks abandoned in place by filling the tanks with a concrete slurry (NOTE: one, 1,500 gallon tank could only be filled to 65% capacity, the remaining tanks were filled to 100% capacity). This method of abandonment was done in accordance with the method previous approved by this office.

Very truly yours,

Richard J. Kelner
Fire Inspector
Industrial Division

David M. Bartow
Supervising Fire Inspector

RJK:emf

BARLO EQUIPMENT CORPORATION

31 COMMERCIAL AVENUE
GARDEN CITY
LONG ISLAND, N.Y. 11533
PHONE 516-248-8484

October 14th, 1983

Office of the Fire Marshal
899 Jerusalem Avenue
P.O. Box 128
Uniondale, New York 11553

Attention: Mr. Dave Bartow

Dear Sir:

This is to inform you that the Tanks at Anchor Lith Kem-Ko have been filled with concrete Slurry as in accordance with your recommendations.

All tanks have been filled to 100% capacity. Only one tank; a 4,000 gallon, has been filled to 65% capacity due to a piping of check valve arrangement in tank.

Hoping this meets with your approval; I remain

Very Truly Yours,

John B. LoRusso

JBL/gl

301414

NASSAU COUNTY FIRE COMMISSION

OFFICE OF FIRE MARSHAL

Bureau of Fire Prevention
Industrial 516-292-4826
Institutional 516-292-4829
General Inspection 516-292-4824 & 4831

JOSEPH G. BOSLET, JR.
FIRE MARSHAL

899 JERUSALEM AVENUE
P.O. BOX 128
UNIONDALE, NEW YORK 11553

TO: NASSAU COUNTY FIRE MARSHAL

INSP. NO. ____________

FROM: BARLO EQUIPMENT CORPORATION
91 COMMERCIAL AVENUE
GARDEN CITY, NEW YORK 11530

RE: ANCHOR-LITH KEM-KO
500 WEST JOHN STREET
HICKSVILLE, NEW YORK 11801

The following underground bulk storage tanks, at the above-named location, have been: (CHECK THE ONE THAT APPLIES)

______ A - Placed Temporarily out-of-service (filled with water)

X B - Abandoned in place (filled with an inert solid material)

______ c - Removed from the premises

NO.	SIZE	CONST.	P	DATE	NO.	SIZE	CONST.	P	DATE
1	4,000 Gal	#15 Steel		10/12/83	5	#11 1,500 Gal	Steel		10/13/8[illegible]
2	4,000 Gal	#3 Steel		10/12/83	6				
3	2,000 Gal	#6 Steel		10/13/83	7				
4	1,500 Gal	#8 Steel		10/13/83	8				

All work has been done in accordance with the Nassau County Fire Prevention Ordinance, and Appendix C, of the National Fire Protection Association - N.F.P.A. - 30-1977.

JOHN B. LORUSSO
Name

[signature]
Signature

HELEN M. SULLIVAN
NOTARY PUBLIC, State of New York
No. 01SU4757295
Qualified in Nassau County
Commission Expires March 30, 1984

Notary Stamp

County of NASSAU,

State of NEW YORK,

personally appeared before me this 14th day of October 1983.

Helen M Sullivan
Notary Signature

301415

NCDH, 1982a. Letter from L. Sama to K. Leeds, Chessco Industries, Inc. dated January 26, 1982. (Source: USEPA Region II Files)

NASSAU COUNTY DEPARTMENT OF HEALTH

240 OLD COUNTRY ROAD, MINEOLA, N.Y. 11501

JOHN J. DOWLING, M.D., M.P.H.
Commissioner

FRANCIS V. PADAR, P.E., M.C.E.
Deputy Commissioner
Division of Environmental Health

FRANCIS T. PURCELL
County Executive

January 26, 1982

Mr. Kenneth W. Leeds, V.P.
Chessco Industries, Inc.
2425 Post Road
Southport, Conn. 06490

Re: Anchor/Lith-Kem-Ko
Hicksville, N.Y.

Dear Mr. Leeds:

This is in response to your letter of January 13, 1982 to our Mr. H. Welch regarding the status of the underground chemical storage tanks at your above-referenced facility. You should be made aware that the leaking tanks referenced in your letter and in the order from the Nassau County Fire Marshal's office of July 22, 1981, constitute point discharges of chemicals and may be in violation of the Environmental Conservation Law, Article 17, Section 17-0501.

The primary requirements of this office are to: (1) determine the extent of any contamination of the environment as a consequence of the discharges from the leaking tanks and (2) clean up the contamination.

Accordingly, please submit to this office by February 28, 1982, a plan to meet the foregoing requirements. We would strongly suggest you obtain the services of a professional engineer, licensed by the State of New York, to assist you with the plan submission. He should also be helpful to you in determining approximate costs.

This office will cooperate with you and your representatives in preparing your plans. Perhaps it would be of help to you to meet with us here to further discuss the situation. Please let met know.

Meanwhile, answers to the following questions would be helpful:

(1) What products were formerly stored in the tanks which did not pass the hydrostatic tests?

(2) Was tank #2 repaired? The Fire Marshal's order of July 22, 1981 indicates it failed, but it is registered as being in use.

If you have any questions, please call this office at 516-535-2406.

Very truly yours,

L. Sama
Public Health Engineer
Bureau of Land Resources Management

LS:ceg
cc: Gerald Robin, NYSDEC

NASSAU COUNTY DEPARTMENT OF HEALTH

TABLE I

Summary of Results of NCHD Sampling of
Anchor/Lith Kem-Ko
500 W. John Street, Hicksville, New York

A. Results of Soil Analyses* - September 13, 1982 Samples

Parameter (1)	Well #1 Depth of Sample=50' (2)	Well #2 Depth of Sample=65' (3)
Methylene Chloride	490	410
1,1,1-Trichloroethane	<20	22
Trichloroethylene	<20	<20
Tetrachloroethylene	<20	<20

* All results in parts per billion

B. Results of Groundwater Analyses**

Parameter (1)	Well #1 9-21-82 (2)	Well #2 9-21-82/12-14-82 (3)	Well #3 9-21-82/12-14-82 (4)
Methylene Chloride	31	41/ < 5	7/NR***
Trichlorofluoromethane	< 1	< 1/ < 1	<1/ 1
1,1-Dichloroethylene	5	5/ < 1	270/NR
1,1-Dichloroethane	27	27/ < 4	220/230
c&t-1,2-Dichloroethylene	< 7	< 7/ < 1	28/64
Chloroform	1	1/ < 1	7/10
1,2-Dichloroethane	< 5	< 5/ < 4	25/28
1,1,1-Trichloroethane	440	440/ 5	11000/11000
Trichloroethylene	17	18/ < 1	39/43
c-1,3-Dichloropropene dibromochloromethane 1,1,2-Trichloroethane	< 1	1/ < 1	2/
Tetrachloroethylene	43	42/ < 1	470/470

** All results in parts per billion
*** No Result due to technical reasons - Resample Suggested

301418

JS:sp
1-26-83

NCDH, 1982c. Letter to A. Angiola of Lockwood, Kessler & Bartlett dated November 16, 1982 (Source: USEPA Region II Files)

NASSAU COUNTY DEPARTMENT OF HEALTH

240 OLD COUNTRY ROAD, MINEOLA, N.Y. 11501

FRANCIS T. PURCELL
County Executive

[illegible]
Commissioner

[illegible]
Deputy Commissioner
Division of Environmental Health

November 16, 1982

Mr. Alfred Angiola
Lockwood, Kessler & Bartlett, Inc.
One Aerial Way
Syosset, N.Y. 11791

Re: Groundwater Monitoring Program
at Anchor/Lith Kem Ko in Hicksville

Dear Mr. Angiola:

This is in reference to the water samples we collected from the three monitoring wells at the above referenced facility on September 21, 1982. Copies of the results of these analyses are enclosed. Also enclosed are analytical results for the soil samples taken from well #1 at two depths during the well-boring operation.

All three well water samples appear to be contaminated with halogenated hydrocarbons, the most significant of which is 1,1,1 trichloroethane. The downstream well #3 in particular, has very high levels of this contaminant. The 50 ft. deep soil sample was found to be contaminated with methylene chloride only, whereas the 65 foot deep soil sample also contained 1,1,1 trichloroethane in addition to methylene chloride.

Your listing of the storage tanks and chemicals for the above facility dated May 27, 1982, indicates that methylene chloride is stored in tank #3 and 1,1,1 trichloroethane is stored in tank #12. Records at the Nassau County Fire Marshal's office indicate these tanks were not tested at the time testing was done and where other tanks were noted to be leaking. Consequently, it is imperative that leak tests be conducted immediately on the tanks containing methylene chloride and 1,1,1 trichloroethane.

If the tanks do not pass the tests, verify then the chemical products must be removed from them and the tanks taken out of service or replaced.

Since the groundwater appears to be heavily contaminated, as noted with Well #3 in particular, it will be necessary for you to isolate and remove all the sources of the contamination and provide a means for removing the contaminants from the groundwater. Accordingly, we will expect to receive an approvable plan from you by December 1, 1982 for performing the above-mentioned cleanup.

301420

NCDH, 1983b. Memorandum from L. Sama to G.E. Donohue (Source: USEPA Region II files)

MEMORANDUM

NASSAU COUNTY DEPARTMENT OF HEALTH
240 Old Country Road - Mineola, New York 11501

To : G.E. Donohue Date April 26, 1983

From : L. Sama

Subject : Information on Anchor/Lith-Kem-Ko, Hicksville requested by J. Scherb in letter to you of April 5, 1983

J.Scherb's Item #	Our Comments
1.	Information has been requested of the Fire Marshal's office 4/26/83.
2.	See attachments A & B for diagrams of property.

A. Properties in area, including Anchor.
B. Anchor property showing well locations.

3. Proof of leaking tanks is contained in following attachments (C, D, E, F):

C. Letter of January 13, 1982 from Chessco Industries, owner of Anchor/Lith-Kem-Ko, with enclosures from Fire Marshal's office. Shows tanks 3, 5, 6, 8 and 11 & 15 to be leaking.

D. Letter of April 14, 1983 from Barlo Equip. Corp. to NCDH shows tank #3 to be leaking.

E. Internal memo at NCDH of February 10, 1983 regarding a meeting here on January 21, 1983 with Anchor/Lith-Kem-Ko and LKB. Reference was

F. made to a schematic diagram provided by LKB representing tank storage conditions in 1965 and showed 111 Trichloroethane stored in tank #8, which later was shown to be leaking.

In summary, the following tanks were shown to be leaking or defective:

Tank #	Contents**
3	Methylene Chloride
5	Napthol Spirits
6	Acetone
8*	Mineral Spirits
11	Isopropyl Alcohol
15	Textile Spirits

* 1965 Diagram shows 111 Trichloroethane storage. Noted as Chlorothene Nu.
** Presently empty. Not used because of leaks.

301422

HD54 6/82 M 7/2 7/0

J. Scherb's Item # Our Comments

4. The contents of leaking tank were confirmed by Attachment G as follows:

G. Internal file memo of meeting at NCDH of June 4, 1982 with admission by Anchor and LKB that leaking tanks 5, 6, 8, 11 and 15 contained chemicals listed in 3E above. Tank registration of October 6, 1981 from Fire Marshal's office (see 3C above) shows tank #5 to contain Methylene chloride. Table of May 27, 1982 by LKB also shows Methylene chloride, 3F listed for tank 3. Schematic diagram referred to in 3E above shows 111 Trichloroethane to have been stored in tank #5 at one time.

5. Groundwater Sampling - An affidavit has been forwarded to J. Scherb to obtain a warrant.

6. Tank registration copies are attached in 3C above, having been forwarded by Chessco with their letter of January 13, 1983 to NCDH.

7. Tanks 5, 6, 8, 11 and 15 are shown to be empty on the October 6, 1981 registration listing. Counsel for Anchor at a meeting at NCDH on January 21, 1983 reported that product was being removed from Tank 3 and it was capped (to prevent refilling). See February 10, 1983 memo referenced in 3E above. No other verification has been made of status of Tank 3.

8. Methylene chloride was listed in Tank 3 in a 1965 listing provided by LKB as referenced in 3E above and as referenced in 4G above.

9. The owners of the property and principal officer are:

Owner: Bancroft Construction Corp.
P.O. Box 6
Hicksville, N.Y. 11801

Principal Officer: Jerry Spiegel, Pres.

As per our telephone conversation with Mr. Grayson of Jerry Spiegel Associates. County records show Pence Construction Corp. as last owner with Jerry Spiegel, President and also that Jerry Spiegel paid the 1982 taxes on the property.

10. Upstream well data are presented in attachment H. There are three drinking water wells from approximately 1 mile N-NE and NW of the site. They are all deep wells, 419 to 535 ft. The only organic contaminant detected was 111 trichloroethane in one well, N3878, at a concentration of 3 ppb.

A shallow monitoring well N1195, 116 ft. deep is 0.5 miles N-NW and contained only 1 ppb trichloroethylene.

Item #10 Attach. H — Well Sampling Upstream (North of Anchor site

3 Public Water Wells

Well N7030 located approximately one mile NW at the intersection of Cantiague Rock Road and Saratoga Drive, Jericho Water District. Depth 535 ft. Last sampled 7/82, no organics noted. The well has a history of no organics in sample.

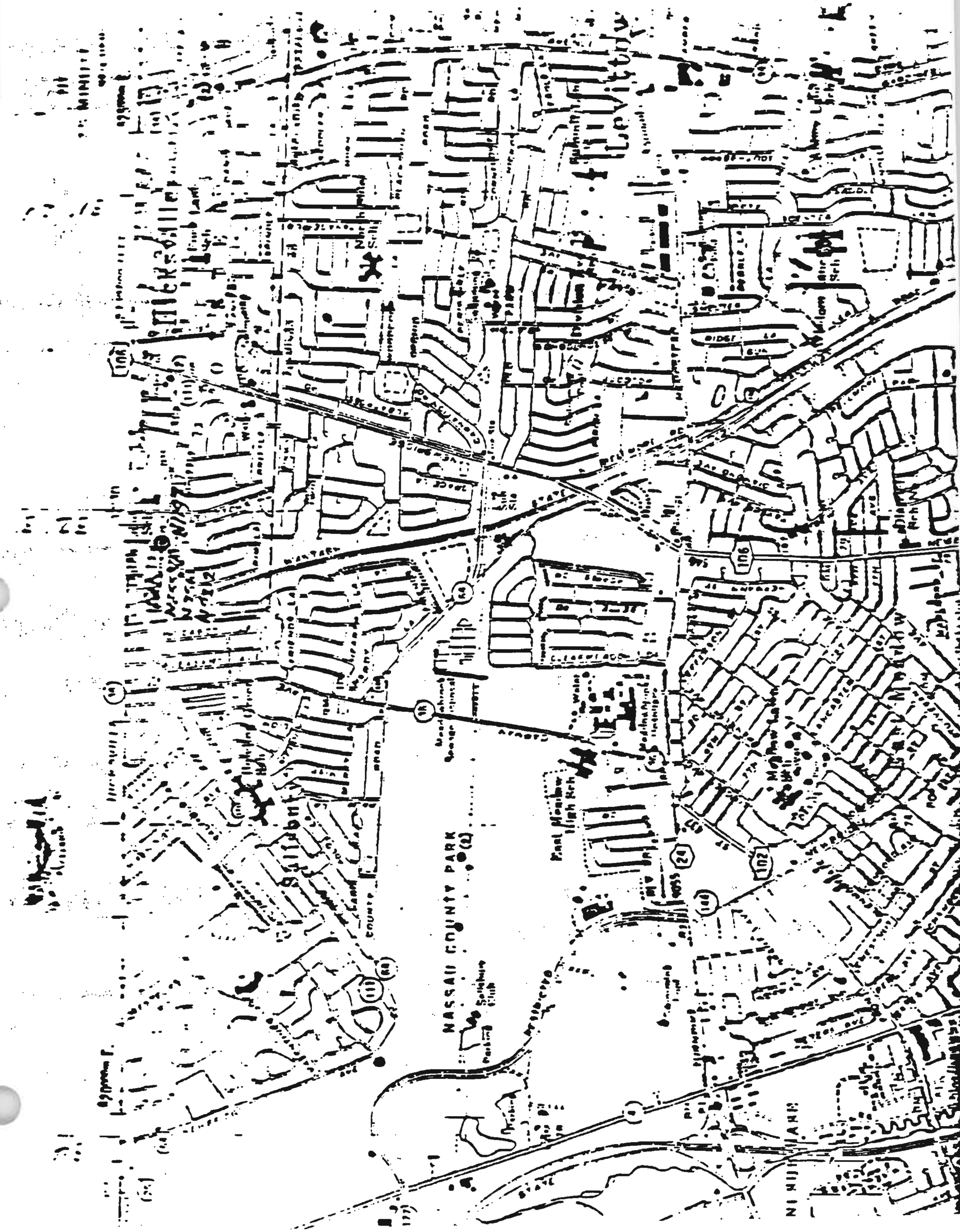
Two wells located approximately 0.8 miles north east West of Wehl Ave. and Ohio Ave. intersection. Well N3953 (6-1) is located north of N3876 (6-2). Both Hicksville Water District. Well 6-1 last sampled 6/82. Depth 419 ft. 3 ppb of 1,1,1 trichloroethane noted. Well 6-2 last sampled 3/83. No organics noted. depth 428 ft.

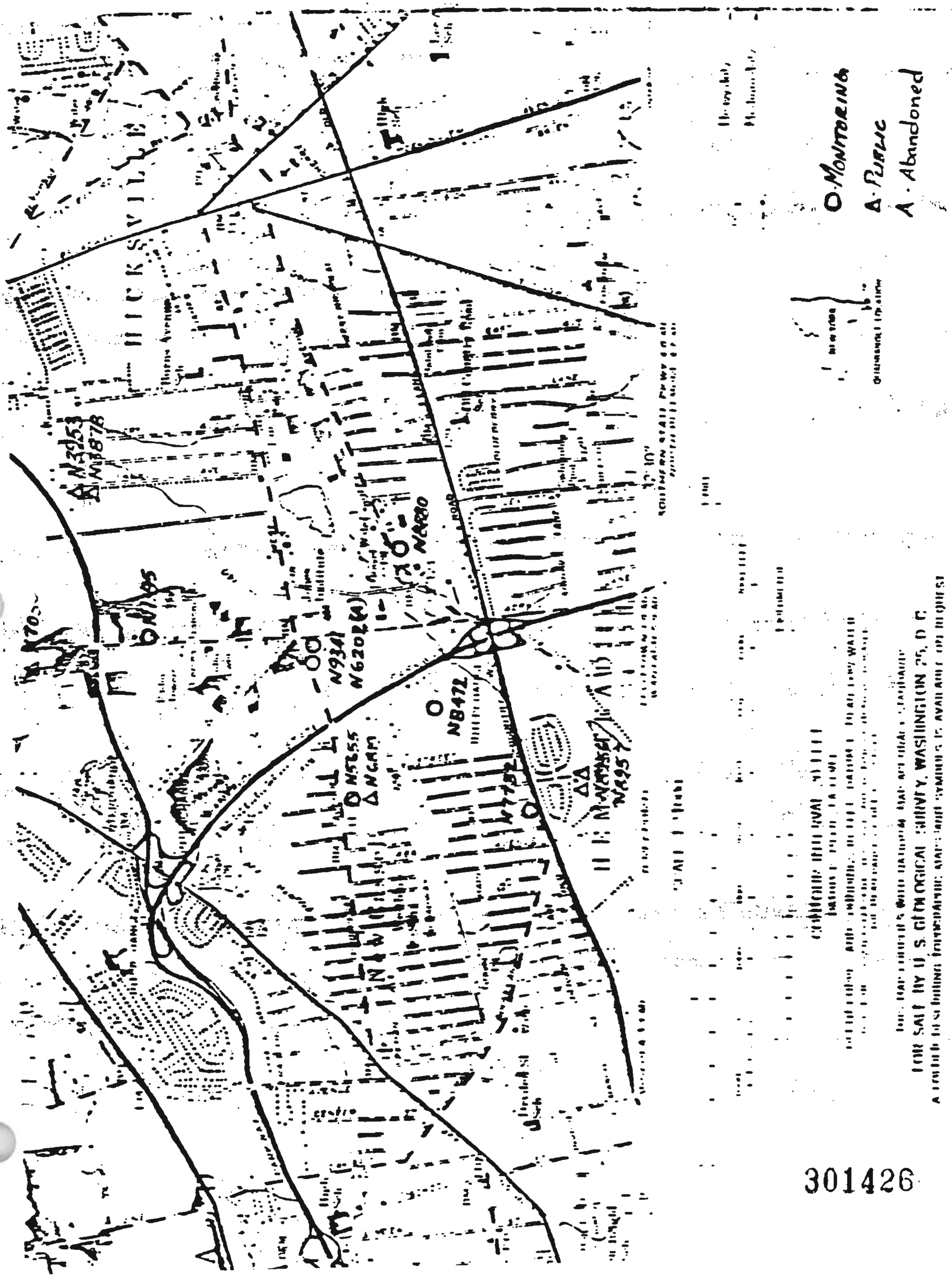
2 Monitoring Wells

One well (N1195) located approximately 0.5 mile north-northwest. East of Barry Drive and Cantiague Rock Road intersection. Last sampled 11-82. 1 ppb Trichloroethylene noted, depth 116 ft.

A groundwater sample was obtained by the Nassau County Department of Health on September 9 1982 from a well at 530 W. John Street, Hicksville approximately 280 ft. west of Anchor site. The well depth is 70.36 feet. The sample was taken at a depth of 64 ft. 11 in. Analysis of the sample by the Nassau County Department of Health Division of Laboratories and Research showed it to contain 13 ppb of tetrachloroethylene, 3 ppb of trichloroethylene and greater than 100 ppm of Methyl Ethyl Ketone. No 111 trichloroethane or methylene chloride were detected.

LS:ceg


NASSAU COUNTY PARK


O-Monitoring
A-Public
A-Abandoned
HICKSVILLE
N3953
N3878
N9341
N6208(A)
N8472
N5855
SOUTHERN STATE PKWY
FOR SALE BY U.S. GEOLOGICAL SURVEY, WASHINGTON 25, D.C.

301426

NCDH, 1985. Environmental Health Continuation Sheet (Source: NCDH files).

ENVIRONMENTAL HEALTH Continuation Sheet Nassau County Health Department	Owner or Agent : Anchor/LITHKEMKO Address: Hicksville	Inspector

DATE	COMMENTS
8-26-85	On 8-26-85 at 9:00 Am Brian Henevelt of LKB phoned This office. He advised me That on Friday 8-23-85 The 4" concrete floor had been broken up + The vent line to Tank #1 had been exposed. IT was filled with concrete. The Tank shell was exposed at The vent line, but showed no signs of a break. The Tank did show signs of stress + appeared to have been filled with concrete. Near The Tank wall was a puddle of concrete slurry which had risen to The Top of The sand fill. The origin of This ~~slur~~ concrete was not visible and is surmised To come from a break in The Tank wall That is not exposed. I agreed to meet Mr. Henevelt at 10:00 Am To inspect The excavation.
	AT 9:50AM I met with Mr. Henevelt at The site. The door was locked + The gates To The rear of The site were also locked. Mr. Henevelt was surprised as it was expected That The contractor would be present To break The concrete floor To expose The remaining Tanks so They could be filled with concrete slurry by cutting a hole in The shell. (The fill lines are blocked). Mr Henevelt agreed To call when he discovered what The problem was. He also confirmed The LITHKEMKO was moving Their operation but still had chemicals stored in The building. A sign in front of The property indicated The site was for rent.

ENVIRONMENTAL HEALTH
Continuation Sheet
Nassau County Health Department

Owner or Agent: Anchor / LiTHKonko	Inspector
Address: Hicksville	

DATE	COMMENTS
8-24-85	AT [illegible] Brian [illegible] phoned To inform me That LiTHKonko had been evicted by Jerry Spiegel Associates. He does not expect work To continue for at least a month on The filling of The Tanks. He will notify The N.C. Fire Marshal's office.

[signature]

301429

Office of the Fire Marshall, 1981a. Notice of Violation (Source: Rosenman & Colin Files)

OFFICE OF FIRE MARSHAL

899 JERUSALEM AVENUE
P.O. BOX 128
UNIONDALE, NEW YORK 11553

NOTICE OF VIOLATION

BUREAU OF FIRE PREVENTION

#2,3,4

Insp. No. GS-93-26

May 21, 1981
(Date)

TO Mr. Walter Lesser

Anchor/Lithkemko

NOTICE is hereby given of certain violations of the Nassau County Fire Prevention Ordinance existing on the premises located at:

500 West John Street

Hicksville, New York 11801

Request is hereby made that said violations consisting of:

UNDERGROUND FLAMMABLE AND COMBUSTIBLE LIQUID TANKS

1. THE TANKS ARE NOT REGISTERED WITH THIS OFFICE. Flammable and combustible tanks shall be registered with the Fire Marshal, on forms provided.

2. OUR RECORDS INDICATE THAT THE UNDERGROUND BULK STORAGE TANKS HAVE NEVER BEEN HYDROSTATICALLY TESTED. Perform a hydrostatic test on all underground tanks in accordance with the requirements of this office. A FIRE MARSHAL MUST BE PRESENT WHEN THE TEST IS CONDUCTE

3. THE VENT PIPES ARE EQUIPPED WITH THE WRONG TYPE OF VENT CAPS. Vent pipes shall be equipped with updraft type vent caps, or they shall be left open and uncapped.

be corrected or removed forthwith. Failure to do so may subject you to the penalties as provided in the Nassau County Fire Prevention Ordinance.

David M. Bartow
Supervising Fire Inspector

JOSEPH G. BOSLET, JR.
FIRE MARSHAL
COUNTY OF NASSAU

Michael J. Affrunti
Michael J. Affrunti,
By Fire Inspector

FP-104 11/68 Rev 3/79

0023

301431

Office of the Fire Marshall, 1981b. Order to Remove Violations Forthwith (Source: Rosenman & Colin Files)

P.O. Box 128
Uniondale, New York 11553

ORDER TO REMOVE VIOLATIONS FORTHWITH JULY 22, 1981
(Date)

Insp. No. GS-93-26

TO MR. JAMES MEISTER, V.P.
ANCHOR/LITHKEMKO

Inspection of the premises at: 500 WEST JOHN ST. HICKSVILLE NY

discloses the existance of certain violations of Article III of the Nassau County Fire Prevention Ordinances, No. 56-1962. As Amended November 19, 1979, consisting of the following.

* Tank No. 15 (4,000 gal.) failed a hydrostatic test THIS DATE THE PRODUCT IN THIS TANK WILL BE ALLOWED TO BE USED UNTIL TUESDAY 7/28/81 OR UNTIL THE TANK IS EMPTY. THIS TANK IS NOT TO BE REFILLED UNTIL THE SYSTEM HAS BEEN REPAIRED AND RETESTED

Tank No. 6 (2,000 gal.) failed a hydrostatic test this date All product is to be removed from this tank forthwith and this system is not to be used until the system has been repaired and RETESTED

Tanks No. 2 & No. 5 failed a hydrostatic test this date All product is to be removed from the tanks and these systems Are not to be used until they have been repaired and retested

Received by [signature]

10 - [illegible]
7 - [illegible] > [illegible]

Pursant to the authority given the undersigned under the provisions of the Nassau County Fire Prevention Ordinance, #56-1962, as Amended November 19, 1979.

YOU ARE HEREBY ORDERED TO REMOVE SAID VIOLATIONS FORTHWITH.

Failure to obey this written order may result in punishment as provided in Article III, Section 3.11 of the Nassau County Fire Prevention Ordinance # 56-1962 which is as follows:

Any person, firm or corporation violating any provisions of this Article, or failing to comply with any order or regulation made thereunder, shall upon conviction be guilty of a misdemeanor punishable by a fine not exceeding five thousand dollars ($5,000) or, by imprisonment for not more than thirty (30) days, or both, for each and every such violation. The imposition of the penalty for any violation of this Article shall not excuse the violation or permit it to continue, and each fifteen (15) days that the prohibition conditions are maintained shall constitute a separate offense.

7/22/81
Date

[signature] #45

FPB 4-79 Rev. 5/80

cc: LR, JFM, PSI. T. [illegible]
[illegible]

301433

Office of the Fire Marshall, 1981c. Application for Underground Flammable/Combustible Liquid Tank Registration (Source: Rosenman & Colin Files)

JOSEPH G BOSLET
FIRE MARSHAL

OFFICE OF THE FIRE MARSHAL

399 JERUSALEM AVENUE
P.O. BOX 128
UNIONDALE, NEW YORK 11553
516 292-4826

APPLICATION FOR UNDERGROUND FLAMMABLE/COMBUSTIBLE LIQUID TANK REGISTRATION

DATE ISSUED 10-7-81 PERMIT NO. ______ INSP.NO. 65-93-2

NAME OF APPLICANT Anchor/Lith-Kem-Ko, Inc.

ADDRESS 500 West John Street, Hicksville, N.Y. 11801 TEL.NO. (516) 433-0800

TANK LOCATION 500 West John Street, Hicksville, N.Y. 11801

D/B/A: NAME ______

ADDRESS ______ TEL.NO. ______

TANK NO.	SIZE	PRODUCT	DATE INSTALLED	DATE TESTED	CONSTRUCTION
1	3000	Naphthol Spirits	1964	7/22/81	~~Milled~~ Steel
2	3000	Aromatic 100	1964	8/6/81	~~Milled~~ Steel
3	3000	Methylene Chloride	1964	NO TEST	~~Milled~~ Steel
4	3000	Textile Spirits	1964	7/22/81	~~Milled~~ Steel
5	4000	EMPTY	1964	8/6/81	~~Milled~~ Steel
6	2000	EMPTY	1964	7/22/81	~~Milled~~ Steel
7	2000	Cellosolve	1964	7/22/81	~~Milled~~ Steel
8	1500	EMPTY	1964	8/6/81	~~Milled~~ Steel
9	1500	Diethylene Glycol	1964	NO TEST	~~Milled~~ Steel
10	1500	Mineral Spirits 66	1964	7/22/81	~~Milled~~ Steel

ANCHOR/LITH-KEM-KO, INC.
NAME OF APPLICANT

Kenneth W. Leeds, Vice Pres., Adm.
TITLE

SIGNATURE OF APPLICANT ______

ROBERT W. CAMPBELL
NOTARY PUBLIC State of New York
No. 30-0549231
Qualified in Nassau County
Commission Expires March 30, 1983

NOTARY

DATE 9-10-81

FC-3329. 2/80 Rev. 7/80

301435

JOSEPH G. BOSLE[illegible]
FIRE MARSHAL

OFFICE OF THE FIRE MARSHAL
899 JERUSALEM AVENUE
P.O. BOX 128
UNIONDALE, NEW YORK 11553
516 292-4826

APPLICATION FOR UNDERGROUND FLAMMABLE/COMBUSTIBLE LIQUID TANK REGISTRATION

DATE ISSUED 10-7-81 PERMIT NO. ________ INSP.NO. 05-93-26

NAME OF APPLICANT Anchor/Lith-Kem-Ko, Inc.

ADDRESS 500 West John Street, Hicksville, N.Y. 11801 TEL.NO. (516) 433-0800

TANK LOCATION 500 West John Street, Hicksville, N.Y. 11801

D/B/A: NAME ________

ADDRESS ________ TEL.NO. ________

TANK NO.	SIZE	PRODUCT	DATE INSTALLED	DATE TESTED	CONSTRUCTION
11	1500	EMPTY	1964	7/22/81	~~Milled~~ Steel
12	1500	1,1,1 Trichloro-ethane	1964	NO TEST	~~Milled~~ Steel
13	1500	Isopropanol	1964	7/22/81	~~Milled~~ Steel
14	1000	Butyl Cellosolve	1964	7/22/81	~~Milled~~ Steel
15	4000	EMPTY	1964	7/22/81	~~Milled~~ Steel
16	1000	VM&P Naphtha	1964	7/22/81	~~Milled~~ Steel
17	550	Acetone	1964	7/22/81	~~Milled~~ Steel

[redacted]

[redacted]

[redacted]

ROBERT W. CAM 1
NOTARY PUBLIC tate of New York
No. 30-0549231
Qualified in Nassau County
Commission Expires March 30, 1983

ANCHOR/LITH-KEM-KO, INC.
NAME OF APPLICANT

Kenneth W. Leeds, Vice Pres., Adm.
TITLE

NOTARY

SIGNATURE OF APPLICANT ________ DATE 9-10-81

FC-3329. 2/80 Rev. 7/80

301436

A3. Data Supporting Request for Legal Action

Jasser, A.A., 1977, Letter to M. Mangino, NCDH. (Source: Rosenman & Colin Files)

ANCHOR
CHEMICAL CO., INC.

October 5, 1977

Mr. Michael Mangino,
Abatement Officer
Nassau County Department of Health
Water Pollution Division
240 Old Country Road
Mineola, New York 11501

Dear Mr. Mangino:

This will confirm our conversation of Wednesday, September 28, held in my office. Mr. Sama of your office was present.

After an inspection of the premises, a discussion was held as to the suggested means of preventing run-off of solvent from the tank wagons making a delivery to us and a means of sealing the surface of the drains in each of our mixing rooms. After you left, I took the following steps to comply with your suggestions:

1) I arranged for a contractor to be hired to seal the surface of each of the drains - one in our combustible mixing room and the other in the flammable mixing room. We expect that the work will be completed before the end of October.

2) I talked to our staff to caution them about spillage and how to avoid it. They are to see that any drainage from hoses is caught into pails and then put into drums. Very small spillage will be picked-up with an oil-absorbant.

3) Our Production Manager is to talk to each of the drivers who make deliveries to point out to them the danger of spillage and to set up a program of avoidance each time a delivery is made.

This means that a pail will be placed on each connection point so that any drops that fall from the connection will be caught in a container and not allowed to run on the ground. Mr. Stein, our Production Manager, intends to talk to the drivers every time there is a delivery.

EXECUTIVE OFFICES. 500 W. JOHN ST., HICKSVILLE, N.Y. 11801, U.S.A. ■ TELEPHONE: (516) 433-0800

ANCHOR
CHEMICAL CO., INC.

Mr. Michael Mangino,
Abatement Officer
Nassau County Department of Health October 5, 1977

I want to assure you, Mr. Mangino, that we at Anchor are aware of the water pollution problems that the County has endured and that we shall do everything in our power to prevent any occurrence at Anchor which could contribute to this water pollution. I appreciated your coming in and discussing the matter with me in an objective manner. You can be sure that the steps I have outlined above will be completed before the end of this month.

Yours very truly,

ANCHOR CHEMICAL CO., INC.

Alfred A. Jasser
President

AAJ/lo

NCDH, 1983a. Data Supporting Request for Legal Action August 29, 1983 (Source: Rosenman & Colin files)

Nassau County Department of Health
Data Supporting Request for Legal Action
Office of Industrial & Hazardous Wastes Management

Date of Request August 29, 1983 Regulatory Personnel: J. Schechter
L. Sama

Owner's Name Kobar Construction Corporation

Owner's Address: 270 North Broadway, Hicksville, N.Y.

Facility Name: Anchor/Lith Kem Ko, Inc.

Facility Address: 500 West John Street, Hicksville, N.Y.

Responsible Officer: J. Spiegel, Box 6, Hicksville, N.Y. 11801

1. Specific Violations: ECL Article 27, Section 0913 - Operating a hazardous waste disposal site without a permit.

2. Background Information: On February 2, 1983, a request for legal action against Anchor/Lith Kem-Ko was referred to Albert Machlin, P.E. Regional Engineer for Environmental Quality of the NYSDEC by F. V. Padar, P.E., M.C.E., Deputy Commissioner of the Division of Environmental Health of the Nassau County Department of Health.

   Background information is provided below concerning the history of ownership of the property, previous operations at the site and summary of all sampling at the site.

3. History of Ownership: Records of this department indicate that the owner of site since September 31, 1964 (copy of deed enclosed) has been:

   Kobar Construction Corporation
   270 North Broadway
   Hicksville, New York

   The 1982 taxes for the site were paid by J. Spiegel, Box 6, Hicksville, New York 11801.

4. History of Operations at the site: Records of this department indicate that from 1964 through 1977, the operator at the site was Anchor Chemical Co., Inc. In 1977, the president of the company was Alfred A. Jasser.

Anchor Chemical Co., Inc. blended and packed chemical specialties for the graphic arts industries. In 1964, seventeen underground storage tanks were purchased by Anchor Chemical Company and installed by the Franklin Company Contractors, Inc., 52-09 58th Street, Woodside, New York 11377. These tanks were used to store mineral spirits, methylene-chloride, solvent D (120°F), napthol spirits, alcohol and acetone mixture, chlorothene (1,1,1-trichloroethane), petroleum solvent, cellosolve, isopropyl alcohol, ethylacetate and butyl acetate.

Industrial chemical surveys provided by the facility in 1977 (copies enclosed) revealed that the company purchased and used 50,000 gallons of methylene chloride per year, 13,000 gallons of 1,1,1-trichloroethane, 13,000 gallons of ethylbenzene, 270 gallons of petroleum tars, 40 gallons of dyes and organic pigments, 50,000 gallons of petroleum napthas, 20,000 gallons of ethylene glycol monoethylether, 2,000 gallons of glycerine glycols and 10,000 gallons of nonionic ethoxylated linear alcohol.

In June 1977, this department determined that floor drains in the combustible and flammable mixing rooms were connected to a stormwater drywell in the parking area north of the facility. Water from washing of spills in these rooms entered the drains and discharged into the drywell.

A sample of water in the drywell was obtained by this department on July 26, 1977 and analyzed by the New York State Department of Health, Division of Laboratories and Research. The results (copy enclosed) revealed the following chemicals present:

Parameter	Results (ug/l)
1,1,1-trichloroethane	2500
Trichloroethylene	> 15000
Tetrachloroethylene	> 20000

After meeting with representatives of this department in September 1977, the facility implemented a spill prevention plan and by November 1977 had sealed all lines leading from the building to the drywell (see attached letter of October 5, 1977 A.A. Jasser to M. Mangino).

In 1978, Anchor Chemical Co., Inc. was purchased by Anchor/Lith Kem Ko, Inc. who is the present operator at the site.

Anchor/Lith Kem Ko's involvement in this matter has already been detailed in the case report submitted February 2, 1983 as mentioned above.

A summary of this department's sampling of Anchor/Lith Kem Ko as provided in the February 2, 1983 case report is attached and includes the most recent samples obtained from monitoring wells on site on June 8, 1983. (see Table I)

5. Listing as a Hazardous Waste Site This site has been listed as a hazardous waste site in Region I. First notification of inclusion of this site in the list of hazardous waste sites in Nassau County was given in the attached letter of January 4, 1983 from T.M. Sanford, P.E., Senior Sanitary Engineer, Solid Waste Program, NYSDEC-Region I to R. Olzagasti, Division of Solid Waste, Site Investigation Section, NYSDEC-Central Office. The individual scoring sheet for this site is included with the letter and indicates a total score of 58 under the Superfund Ranking System.

   A January 5, 1983 letter (copy enclosed) from F.V. Padar, Deputy Commissioner of NCDH to A. Machlin, NYSDEC confirms this department's request to include this site in the list of hazardous sites in Nassau County.

   Enclosed is an article from the February 16, 1983 issue of Newsday that indicates this site was named as one of thirteen hazardous waste sites on Long Island that will be investigated under the State's special funding project (Superfund).

6. Additional Information - This site is located over the primary recharge area of Nassau County. Groundwater is located approximately sixty-five feet below grade and is contaminated with chlorinated hydrocarbons above New York State drinking water guidelines.

   Spilled chlorinated hydrocarbons, such as those found contaminating the groundwater below this site (i.e. 1,1,1-trichloroethane, tetrachloroethylene, 1,1-dichloroethylene, and 1,1-dichloroethane) are categorized by the United States Environmental Protection Agency and the New York State Department of Environmental Conservation as hazardous wastes.

   There are four public drinking water wells belonging to the Hicksville Water District located approximately one and one half miles in the direction of groundwater flow from this site.

   Therefore this site represents a substantial present and potential hazard to the public health and the environment.

7. Recommendations

   As required by Article 27, Section 1313, the owner of the site should develop and implement an inactive hazardous waste site remedial program to detail the extent of contamination at the site, and to provide a plan for cleanup and implementation schedule for the cleanup.

Table I

Nassau County Department of Health
Summary of Results of NCHD Sampling of
Anchor/Lith Kem-Ko
500 W. John Street, Hicksville, New York

A. Results of Soil Analyses* - September 13, 1982 Samples

Parameter	Well #1 Depth of Sample=50'	Well #1 Depth of Sample=65'
(1)	(2)	(3)
Methylene Chloride	490	410
1,1,1-Trichloroethane	< 20	22
Trichloroethylene	< 20	< 20
Tetrachloroethylene	< 20	< 20

* All results in parts per billion

B. Results of Groundwater Analyses**

Parameter	Well #1 9-21-82	Well #1 6-8-83	Well #2 9-21-82	Well #2 12-14-82	Well #2 6-8-83	Well #3 9-21-82	Well #3 12-14-82	Well #3 6-8-
(1)	(2)		(3)			(4)		
Methylene Chloride	31	NR	41	< 5	NR	7	NR	N
Trichlorofluoromethane	< 1	< 1	< 1	< 1	< 1	< 1	1	<
1,1-Dichloroethylene	5	< 1	5	< 1	< 1	270	NR	18
1,1-Dichloroethane	27	11	27	< 4	< 6	220	230	10
c&t-1,2-Dichloroethylene	< 7	< 4	< 7	< 1	< 4	28	64	1
Chloroform	1	< 1	1	< 1	< 1	7	10	[illegible]
1,2-Dichloroethane	< 5	< 12	< 5	< 4	< 12	25	28	< 1
1,1,1-Trichloroethane	440	160	440	5	< 1	11000	11000	150
Trichloroethylene	17	8	18	< 1	< 1	39	43	1
c-1,3-Dichloropropene) dibromochloromethane) 1,1,2-Trichloroethane)	< 1	< 1	1	< 1	< 1	2	< 1	<
Tetrachloroethylene	43	7	42	< 1	< 1	470	470	28

** All results in parts per billion

NR - No result due to technical reasons - Resample suggested

NCDH, 1983c. Data Supporting Request for Legal Action, January 26, 1983. (Source: Rosenman & Colin Files)

NASSAU COUNTY DEPARTMENT OF HEALTH

240 OLD COUNTRY ROAD, MINEOLA, N.Y. 11501

FRANCIS T. PURCELL
County Executive

JOHN J. DOWLING, M.D., M.P.H.
Commissioner

FRANCIS V. PADAR, P.E., M.C.E.
Deputy Commissioner
Division of Environmental Health

Data Supporting Request for Legal Action
Office of Industrial & Hazardous Wastes Management

Date of Request: January 26, 1983

Regulatory Personnel:
L. Sama
J. Schechter

Owner's Name : Chessco Industries, Inc.

Owner's Address: 2425 Post Road, Southport, Conn. 06490

Facility Name : Anchor/Lith Kem-Ko

Facility Address: 500 West John Street, Hicksville, N.Y. 11801

Responsible Officer: Walter C. Lesser, Director of Manufacturing

1. Specific Violations:

ECL 17-0501 - Leaks from underground storage tanks containing halogenated and non-halogenated hydrocarbons have contaminated the groundwater below the facility which is located at 500 W. John Street, Hicksville, New York.

The groundwater is contaminated with methylene chloride, 1,1,1-trichloroethane, tetrachloroethylene, and various other chlorinated hydrocarbons in contravention of the New York State Department of Enviornmental Conservation (NYSDEC) Standards.

2. Background Information:

The facility blends and packs chemicals for graphic arts industries. Seventeen underground storage tanks are located below the concrete floor of the building.

In August 1981, NYSDEC notified the Nassau County Department of Health NCHD) that the Nassau County Fire Marshal's (NCFM) office had conducted tank tests at the facility in July and August of 1981. The results of the "air over product" tests indicated five tanks were leaking. These were taken out of service by the facility. They contained napthol spirits (C_8-C_{11}), acetone, mineral spirits (C_7-C_{12}), isopropyl alcohol, and textile spirits (C_6,C_7). Nine other tanks passed the tests.

Three other tanks containing methylene chloride, diethylene glycol, and 1,1,1-trichloroethane were not tested because they are not flammable and thus do not fall under the jurisdiction of the NCFM.

On January 16, 1982 the facility informed the NCHD of the results of the tank testing and their subsequent actions. On January 26, 1982 the NCHD notified the facility of a possible violation of the Environmental Conservation Laws and requested they provide plans for an investigation of the extent of contamination and to clean up any contamination of the environment. The plan was to have been submitted by February 28, 1982 (See attached letter of January 26, 1982).

In March 1982, the attorney for the facility, John F. Bogut of Saltzman, Bogut and Chetkof, 120 West Old Country Road, Hicksville, N.Y., notified NCHD that a consulting engineering firm had been retained by the facility.

On June 4, 1982 the consulting engineer, Lockwood, Kessler and Bartlett (LKB), Inc. of Syosset, New York met with NCHD and agreed to submit a plan for investigating the extent of contamination within two weeks.

On July 8, 1982 a groundwater monitoring plan was submitted by LKB and subsequently disapproved by NCHD on July 13, 1982.

On August 16, 1982 LKB submitted an approvable plan for a groundwater monitoring program, and subsequently installed three monitoring wells on September 13-15, 1982. Soil samples were taken by NCHD from one well on September 13, 1982. Samples of groundwater were obtained from the monitoring wells on September 21, 1982 by LKB, NCHD and the Hicksville Water District. Results of testing by NCHD indicated soil samples and groundwater samples to be contaminated with chlorinated hydrocarbons at levels up to 11 mg/l (ppm). The primary contaminants were 1,1,1 Trichloroethane, methylene chloride, and tetrachloroethylene (See attached letters of November 16, 1982 and January 11, 1983).

Since 1,1,1-Trichloroethene and methylene chloride are stored in underground storage tanks by the facility, NCHD requested on November 16, 1982 that the facility leak test the three storage tanks not previously tested by the NCFM (See Attached Letter). NCHD also requested that the facility provide a plan for cleaning up the groundwater by December 1, 1982. On November 24, 1982 the facility requested time to retest the wells, and agreed to test the tanks. On December 14, 1982 the wells were resampled. Analyses by NCHD confirmed the previous testing results (See Table I).

On December 12 and 14, 1982 the three tanks in question were tested for leaks by an "air over product" procedure. The methylene chloride tank was found to be leaking. The facility was requested and agreed to take the leaking tank out of service.

On January 21, 1983 a meeting was held with the facility to discuss the results of their consultant's monitoring program. Although the consultant agreed that the results of testing were essentially the same as NCHD's, the attorney for the facility refused to release the results to NCHD.

The attorney advised NCHD that the facility was not convinced that they were responsible for the groundwater contamination, and requested additional time to pursue the investigation of the sources of contamination. The consultant agreed to provide a schedule and plan for the continued investigation by January 28, 1983.

3. Facts Describing Respondent's Cooperation or Lack Thereof:

The respondent has been cooperative in that they hired a consulting engineer to determine the extent of contamination, installed three monitoring wells for sampling groundwater, and leak tested three underground storage tanks at the request of this department. However, they have failed to submit the results of their investigation to this department as requested on December 3, 1982 (see attached letter), on January 5, 1983 (see response dated January 6, 1983), and at the meeting of January 21, 1983.

4. Other Proceedings, If Any, Involving Respondent:

None

5. Recommendations

It is recommended that the facility be required to provide an engineering report detailing the extent of contamination at the site, including a plan for cleanup and an implementation schedule for the cleanup.

Attempts to gain voluntary compliance have failed, therefore we recommend you go directly to a hearing with a high priority, since this is adjacent to the MEK spill in Hicksville. It is further recommended that this matter be brought to the attention of the EPA. Since there may be significant contamination of the groundwater we request an expeditious remedy.

A4. General Property Information

301450

Kunz, A. 1990. Long Island Regional Planning Board. Telephone conversation with E. Beacon, Roux Associates, Inc. January 5, 1990

ROUX

TELEPHONE CONVERSATION RECORD

DATE: 1/5/90 TIME: 11:30 PROJECT: 11603Y

FROM: Ellen Beacon TO: Arthur Kunz

COMPANY: Roux Associates, Inc. COMPANY: LI Regional Planning Board

TEL. NO: 673-7200 TEL. NO: 360-5190

RE: 500 W. John Street, Hicksville (Y11603)

I asked Mr. Kunz if he knew when the industrial park was built and what previously occupied the site. Mr. Kunz explained that the land was owned privately until 1960-196 when the town was deeded the land for Cantique Park. At this time the remaining land was rezoned for industrial use. Prior to the erection of the facility in 1964, the land was farmland that was left fallow.

301452

Lesser, W.C. Anchor/LithKemKo, 1990, Meeting with Roux Associates, Inc. April 19, 1990.

FRANCIS T. PURCELL
COUNTY EXECUTIVE

THOMAS J. VARELAS
SHERIFF

JOSEPH J. SANTACROCE
UNDER SHERIFF

NASSAU COUNTY STATE OF NEW YORK

COUNTY OF NASSAU
SHERIFF'S DEPARTMENT
240 OLD COUNTRY ROAD
MINEOLA, N. Y. 11501
TELEPHONE 516 535-2186

DISTRICT COURT - COUNTY OF NASSAU

KOBAR CONSTRUCTION CORP

File No. 8560899

Petitioner,

-against-

CHESSCO INDUSTRIES INC

Respondent,

ANCHOR/LITHKEMKO

Respondent Undertenant

NOTICE TO VACATE

TAKE NOTICE that a final judgment has been entered in the above proceeding awarding the Petitioner possession of the real property which you now occupy, and that a warrant has been issued directing that the Petitioner be put in possession. Please be advised that if you have not vacated the premises after seventy-two hours have elapsed from the date of the service of this notice, your possessions will be removed to the curb in compliance with the Court Order.

Thomas J. Varelas
Sheriff of Nassau County

DATED: Aug 27 1985
MINEOLA, N.Y.

By [signature]
Deputy Sheriff

301454

SF-4399. 11/82 Rev. 11/83

T 1408—WARRANT, Non-Payment. Blank District Court. 10-83

62 WHITE STREET, NEW YORK, N. Y. 10013

DISTRICT COURT OF THE COUNTY OF NASSAU
State of New York, FIRST *District* MINEOLA *Part*

Index No. L & T
SP3162/85

KOBAR CONSTRUCTION CORP.
270 North Broadway
Hicksville, NY 11802 — Petitioner Landlord Address

against

CHESSCO INDUSTRIES, INC.
500 W. John Street, Hicksville, NY — *Respondent Tenant Address*

ANCHOR/LITHKEMKO
500 W. John Street, Hicksville, NY — *Respondent Undertenant Address*

First name of Tenant and/or Undertenant being fictitious and unknown to petitioner, Person intended being in possession of the premises herein described

WARRANT
Non-Payment

TO THE SHERIFF OF THE ABOVE DISTRICT COURT, GREETING:

WHEREAS a petition in the above entitled proceeding was presented to this court on behalf of KOBAR CONSTRUCTION CORP. landlord of the premises described herein, for a final judgment to recover possession of said premises and for a warrant to remove CHESSCO INDUSTRIES, INC. respondent tenant, and ANCHOR/LITHKEMKO respondent undertenant from the building [redacted] [redacted] and premises known as No. 500 West John Street, Hicksville, New York, county of Nassau, upon the ground that the rent of said premises was then past due and although duly demanded remained unpaid in violation of the agreement under which the premises were held and that said respondents did hold over and continue in possession of said premises after default in payment of said rent and without the permission of the landlord or the petitioner and a notice of petition was duly issued out of this court directed to the respondents specifying the time and place of the hearing of the petition, and proof of service of the notice of petition and petition was presented, and the respondents having failed to interpose or establish any defense, the court did thereupon render final judgment awarding to the petitioner landlord, among other things, the delivery of the possession of the said property,

THEREFORE, in the name of the People of the State of New York you are hereby commanded to remove said respondent tenant

and all other persons from said premises and put petitioner landlord in said petition named in full possession thereof.

WITNESS, Hon. JOSEPH C. CALABRESE one of the judges of our said court at the county of Nassau dated the 19 day of August 1985.

[signature]
J. D. C.

Salvatore Benisatto
935-1903

1985 AUG 22 AM 11:56

301455

8560899

301456

Index No. L & T SP3162/85

District Court of the County of Nassau

State of New York, First Mineola *District Part*

KOBAR CONSTRUCTION CORP.,

PETITIONER
LANDLORD

against

CHESSCO INDUSTRIES, INC.

RESPONDENT
TENANT

ANCHOR/LITHKEMKO,

RESPONDENT
UNDERTENANT

Warrant-Non-Payment

Issued 19

RETURN

Pursuant to the command of the within warrant, I have this day put the petitioner landlord in said petition named into full possession of the premises within mentioned.

.................................19........

....
Sheriff

NOTICE

This warrant can only be executed between the hours of sunrise and sunset.

Myott, D. 1990. Meeting with E. Beacon of Roux Associates, Inc. on April 5, 1990.

Consulting Ground-Water Geologists
ROUX ASSOCIATES INC

MEETING NOTES

PROJECT NAME/NUMBER: ANCHOR CHEMICAL 11603Y

SUBJECT: Water Supply and domestic Well locations Near the Site

SHEET 1 OF 1

DATE: 4/5/90

INITIALS:

LOCATION: Nassau County Department of Health

ATTENDANCE:

NAME	AFFILIATION	TELEPHONE NO.
Ellen Beacon	Roux Associates, Inc.	673-7200
Donald Myott	NCOH	535-2201

TOPICS DISCUSSED	ACTION REQUIRED
Mr. Myott said there are no domestic wells near the site. He provided copies of maps showing the locations of public supply wells. I requested water quality data and well construction data for several wells. He said he should be able to get it together in two weeks.	

301458

NYSDEC, 1983a. Certificate to Operate an Air Contamination Source (Source: NCDH Files)

N.Y.S. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NASSAU COUNTY DEPARTMENT OF HEALTH

02/0

282400 0172 00002 W I
LOCATION FAC EP

CERTIFICATE TO OPERATE AN AIR CONTAMINATION SOURCE
PROCESS, EXHAUST OR VENTILATION SYSTEM UNIT
RENEWAL APPLICATION

OWNER LITHKEMKO	FACILITY LITHKEMKO	
(1) ANCHOR/~~CHEMICAL CO INC~~	(6) ANCHOR/~~CHEMICAL CO INC~~	(11) CONFIDENTIAL STATUS NON-CONFI
(2) 500 W JOHN ST	(7) 500 W JOHN ST	(12) COMPLIANCE STATUS IN COMPLI
(3) HICKSVILLE (4) NY	(8) HICKSVILLE (9) 11801	DATE OF LAST CHANGE 07/19/8
(5) 11801	(10) REP: A ~~JASSER~~ 433-0800	(13) PRIOR CO ISSUE DATE 05/28/8
		(14) PRIOR CO EXPIRATION DATE 05/27/8

EMISSION POINT 00002
(41)UTM-E: 622.7 KM. (42)STACK HEIGHT: 28 FT. (43)EXIT VELOCITY: 37.00 FT/SEC (44)SIC: 2842 (45)AGENCY-CODE-1: C (COL
(46)UTM-N: 513.6 KM. (47)HT ABV STRUC: 10 FT. (48)EXIT FLOW: 1500.00 ACFM (49)CO FEE: (50)AGENCY-CODE-2: C (COL
(51)GRND ELEV: 30 FT. (52)STK DIAM: 9X11 IN. (53)EXIT TEMP: 0 DEGR F (54)CO CONDITIONS: 1

UNIT I
(55)HOURS/DAY: 4.0 (56)DAYS/YEAR: 250 (57)% OP BY SEASON: 25 25 25 25 (58)SOURCE CODE: A2101 MIXING OR BLENDING -
(59)BLDG: (60)FLOOR NAME: (61)RULE 1: 205.00 (62)RULE 2:

PROCESS/UNIT DESCRIPTION (72)DESCRIPTION 1. BLENDING IN SEALED TANKS &
2. FILL SMALL CONTAINERS FROM TANK

CONTROL EQUIPMENT (73)TYPE: 001 FAN (74)MFG: UNKNOWN (75)ID: 01 (76)DATE INSTALLED: 09/64
(77)DISPOSAL METHOD: (78)USEFUL LIFE: 30 YEARS

AIR CONTAMINANTS	CAS NUMBER	ENV RATING	EMISSIONS ACTUAL	UNIT	HOW DET	PERMISSIBLE	% CONTROL EFFICIENCY	HRLY ACTUAL LBS/HOUR	ANNUAL EMISSIONS (LBS/YEAR) ACTUAL	10X	PERMISS
ORGANIC SOLVENTS	(085) NY930-00-0	(086) D	(087) .090	(088) 01	(089) 06	(090) .090	(091)	(092) .090	(093) 90.000	(094) 0	(095) 90

(15)PRIOR COMMENTS (16)BY (17)DATE	(18)CURRENT COMMENTS (19)BY XLI MT (20)DATE 04/21/85	
1.	1. SATIS (010) R CAMPBELL 433-0800	(21)COMPLIANCE 5
2.	2. (053) 70	(22)DATE OF NEXT ACTION / /
3.	3. (001) ANCHOR/LITHKEMKO	CERTIFICATE TO OPERATE
4.	4. (006) ANCHOR/LITHKEMKO	(23)ISSUE DATE 05/28/
5.	5. (051) 140	(24)EXPIRATION DATE 05/15/
	(511) AGI Compliance	(25)CO FEE 215

301460

FIRM REP'S SIGNATURE: [signature] DATE: 4-21-83
~~ISSUING~~ OFFICER'S SIGNATURE: [signature] DATE: 5-5-83

NYSDEC, 1983b. Letter to R. Olazagasti NYSDEC Division of Solid Waste dated January 4, 1983. (Source: Rosenman & Colin Files)

New York State Department of Environmental Conservation
Building 40
State University of New York
Stony Brook, NY 11794
(516) 751-7900

File → MF
LS
JS
Return to Marvin for filing

Robert F. Flacke
Commissioner

January 4, 1983

Mr. Robert Olazagasti
Site Investigation Section
Division of Solid Waste
New York State Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233

Dear Bob:

As a result of the public meeting of December 7, 1982 and subsequent discussions with Stan Juczak and Joe Schechter of the Nassau County Department of Health, we have revised and expanded the Region I hazardous waste sites which are located in Nassau County. Revisions resulting from the on-going discussions with James Pim of the Suffolk County Department of Health Services will be sent before the January 7, 1983 deadline.

NAME	CODE NO.	SCORE
Hooker Chemicals & Plastics	1-30004	90
Claremont Polychemical	NEW	90
*Old Bethpage Landfill	-------	86
Purex-Mitchel Field Area	1-30014	80
*Syosset Landfill	1-30011	78.5
Pasley Solvents	NEW	68
Mattiace Petrochemicals Glen Cove	NEW	68
Mattiace Petrochemicals (MEK) Hicksville	NEW	68
Applied Environmental Services	NEW	63
Liberty Industrial	1-30005	62
Genzale Plating	NEW	62
Simkins Industries	NEW	59
General Instrument Corp.	NEW	58
Anchor Chemical Corp.	NEW	58
Cerro Wire & Cable	1-30002	44.5
Denton Avenue Landfill	1-30008	29.5
Servo Corp. of America	1-30010	(DELETE)

*ON FEDERAL SUPERFUND

301462

Mr. Robert Olazagasti
January 4, 1983
Page Two

The individual scoring sheets for these sites will be forwarded to Albany via regular mail.

In addition to the above sites, there are two other major areas of environmental concern which have not been addressed in this evaluation. These two areas impact our sole source aquifer. The first category includes gasoline and oil spills, of which we have documented over 50 in Nassau County. The second category includes known existing contaminated leachate plumes emanating from unknown sources. There are approximately a half dozen of these plumes in Nassau County alone. Please indicate how these sites are to be factored into the State Superfund methodology.

I hope that this submittal satisfies your requirements relative to a comprehensive list of known hazardous waste sites within Nassau County. Similar information on Suffolk County will be forthcoming shortly.

Very truly yours,

Theodore M. Sanford

THEODORE M. SANFORD, P.E.
Senior Sanitary Engineer
Solid Waste Program

TMS:ebp
cc: A. Machlin
S. Juczak, NCDH ✓

APPENDIX B

Analytical Results of Sampling Done
by Lockwood, Kessler and Bartlett, Inc.

R.

EcoTest LABORATORIES, INC.

170 CENTRAL AVE. • UNIT 1 • FARMINGDALE, N.Y. 11735 • (516) 752-9055

Lockwood, Kessler & Bartlett, Inc.
RECEIVED
NOV 15 1982

NOV 15 1982

Nov. 10, 1982

Lockwood Kessler & Bartlett, Inc.
1 Aerial Ways
Syosset, New York

SOURCE OF SAMPLE Same

COLLECTED BY: Client, 11/1/82 RECEIVED: 11/1/82

SAMPLE#1: Well# 1 Anchor/Lith Kem Rd. LAB# C321469/1
SAMPLE#2: Well# 2 Anchor/Lith Kem Rd. LAB# C321469/2

ANALYTICAL PARAMETERS	#1	#2
Total Hydrocarbons (Aliphatic, C5 to C10) µg/L	<10	<10
Benzene, µg/L	<1	<1
Toluene, µg/L	<2	<2
Ethyl Benzene, µg/L	<2	<2
P-xylene, µg/L	<2	<2
M-xylene, µg/L	<2	<2
O-xylene, µg/L	<2	<2

REMARKS Sample #1 had 3 unknown peaks, possibly volatile halogenated hydrocarbons in the ppb range. Sample #2 had 1 unknown peak, possibly a volatile halogenated hydrocarbon in the low ppb range.

DIRECTOR [signature]

301465

ECOTEST LABORATORIES, INC.
170 CENTRAL AVE. • UNIT 1 • FARMINGDALE, N.Y. 11735 • (516) 752-9055

Jan. 3, 1983

Lockwood Kessler & Bartlett
1 Aerial Ways
Syosset, New York

SOURCE OF SAMPLE: Anchor/Lith Kemco
COLLECTED BY: Client RECEIVED: 12/14/82

SAMPLE#1: Well #1 LAB# C821684

ANALYTICAL PARAMETERS	#1
1,1,2-Trichloro-1,2,2 Trifluoroethane, µg/L	<1
Methylene Chloride, µg/L	9
1,1-Dichloroethene, µg/L	<5
1,1-Dichloroethane, µg/L	12
1,2-Dichloroethene, µg/L	<5
Chloroform, µg/L	<1
1,1,1-Trichloroethane, µg/L	800
Carbon Tetrachloride, µg/L	<1
1,2-Dichloroethane, µg/L	<5
Trichloroethylene, µg/L	19
1,2-Dichloropropane, µg/L	<5
Bromodichloromethane, µg/L	<1
Tetrachloroethylene, µg/L	48.
Chlorodibromomethane, µg/L	<1
Bromoform, µg/L	<2

REMARKS:

DIRECTOR Thomas R. [signature]

301466

ECOTEST LABORATORIES, INC.

170 CENTRAL AVE. • UNIT 1 • FARMINGDALE, N.Y. 11735 • (516) 752-9055

Jan. 3, 1983

Lockwood Kessler & Bartlett
1 Aerial Ways
Syosset, New York

SOURCE OF SAMPLE: Anchor/Lith Kem Co.
COLLECTED BY: Client RECEIVED: 12/14/82

SAMPLE#1: Well #2 LAB# C821675/1
SAMPLE#2: Well #3 LAB# C821675/2

ANALYTICAL PARAMETERS	#1	#2
1,1,2-Trichloro-1,2,2 Trifluoroethane, µg/L	<1	<2
Methylene Chloride, µg/L	<5	<5
1,1-Dichloroethene, µg/L	<5	800
1,1-Dichloroethane, µg/L	<5	350
1,2-Dichloroethene, µg/L	<5	100
Chloroform, µg/L	<1	12
1,1,1-Trichloroethane, µg/L	6	24000
Carbon Tetrachloride, µg/L	<1	<20
1,2-Dichloroethane, µg/L	<5	31
Trichloroethylene, µg/L	<1	55
1,2-Dichloropropane, µg/L	<5	<5
Bromodichloromethane, µg/L	<1	<20
Tetrachloroethylene, µg/L	<1	1100
Chlorodibromomethane, µg/L	<1	170
Bromoform, µg/L	<1	<5

REMARKS:

DIRECTOR [signature]

301467

EcoTest LABORATORIES, INC.
170 CENTRAL AVE. • UNIT T • FARMINGDALE, N.Y. 11735 • (516) 752-9055

Lockwood, Kessler & B[illegible]
RECEIVED
JUN 27 198[illegible]

June 23, 1983

Lockwood, Kessler & Bartlett
1 Aerial Ways
Syosset, NY 11791

COLLECTED BY: Client RECEIVED: 6/15/83

SAMPLE#1: Well #1 LAB#C830890/1
SAMPLE#2: Well #2 LAB#C830890/2
SAMPLE#3: WEll #3 LAB#C830890/3

ANALYTICAL PARAMETERS	#1	#2	#3
1,1,2-Trichloro-1,2,2 Trifluoroethane, µg/L	<1	<1	<1
Methylene Chloride, µg/L	<5	<5	<5
1,1-Dichloroethene, µg/L	<5	<5	250
1,1-Dichloroethane, µg/L	<5	<5	50
1,2-Dichloroethene, µg/L	<5	<5	17
Chloroform, µg/L	<1	<1	2
1,1,1-Trichloroethane, µg/L	180	<1	7000
Carbon Tetrachloride, µg/L	<1	<1	<1
1,2-Dichloroethane, µg/L	<5	<5	<5
Trichloroethylene, µg/L	2	<1	10
1,2-Dichloropropane, µg/L	<5	<5	<5
Bromodichloromethane, µg/L	<1	<1	<1
Tetrachloroethylene, µg/L	5	<1	410
Chlorodibromomethane, µg/L	<1	<1	9
Bromoform, µg/L	<2	<2	<2
Benzene, µg/L	<1	<1	3
Toluene, µg/L	<2	<2	2
Ethyl Benzene, µg/L	<1	<1	<1
m-xylene, µg/L	<2	<2	<2
o+p-xylene, µg/L	<4	<4	<4
m-Dichlorobenzene, µg/L	<2	<2	<2
o-Dichlorobenzene, µg/L	<2	<2	<2
p-Dichlorobenzene, µg/L	<2	<2	<2
Acetone, µg/L	<50	<50	110
Methyl Ethyl Ketone, µg/L	<20	<20	<20
Methyl Isobutyl Ketone, µg/L	<20	<20	<20
Pentane, µg/L	<2	<2	<2
Hexane, µg/L	<2	<2	<2
Heptane, µg/L	<2	<2	<2
Octane, µg/L	<2	<2	<2
Nonane, µg/L	<2	<2	<2
Decane, µg/L	<2	<2	<2

DIRECTOR [signature]

301468

ECOTEST LABORATORIES, INC.

170 CENTRAL AVE. • UNIT 1 • FARMINGDALE, N.Y. 11735 • (516) 752-9055

Feb. 15, 1984

Lockwood, Kessler & Bartlett
1 Aerial Way
Syosset, NY 11791

SOURCE OF SAMPLE: Anchor/Lith Kem-Ko, Hicksville
COLLECTED: 1/30/84 BY: Client RECEIVED: 1/30/84

SAMPLE#1: Well #1 LAB#C840140/1
SAMPLE#2: Well #2 LAB#C840140/2
SAMPLE#3: Well #3 LAB#C840140/3

ANALYTICAL PARAMETERS	#1	#2	#3
Vinyl Chloride, μg/L	<1	<1	<1
1,1,2-Trichloro-1,2,2 Trifluoroethane, μg/L	<1	<1	<1
Methylene Chloride, μg/L	<5	<5	<5
1,1-Dichloroethane, μg/L	8	<5	5
1,2-dichloroethene, μg/L	<5	<5	<5
Chloroform, μg/L	<1	<1	<1
1,1,1-Trichloroethane, μg/L	1000	3	80
Carbon Tetrachloride, μg/L	<1	<1	<1
1,2-Dichloroethane, μg/L	<5	<5	<5
Trichloroethylene, μg/L	3	<1	<1
1,2-Dichloropropane, μg/L	<5	<5	<5
Bromodichloromethane, μg/L	<1	<1	<1
Tetrachloroethylene, μg/L	2	<1	3
Chlorodibromomethane, μg/L	<1	<1	<1
Bromoform, μg/L	<2	<2	<2
Benzene, μg/L	<1	<1	<1
Toluene, μg/L	<2	<2	<2
Ethyl Benzene, μg/L	<1	<1	<1
m-xylene, μg/L	<2	<2	<2
o+p-xylene, μg/L	<4	<4	<4
m-Dichlorobenzene, μg/L	<2	<2	<2
o-Dichlorobenzene, μg/L	<2	<2	<2
p-Dichlorobenzene, μg/L	<2	<2	<2
Acetone, μg/L	<20	<20	<20
Methyl Ethyl Ketone, μg/L	<20	<20	<20
Methyl Iso Butyl Ketone, μg/L	<20	<20	<20

DIRECTOR ____________

301469

ECOTEST LABORATORIES, INC.

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777

July 18, 1984

Lockwood, Kessler & Bartlett
One Aerial Ways
Syosset, NY 11791

SOURCE OF SAMPLE: Anchor/Lith kem-ko
COLLECTED: 7/10/84 BY: RP/LKB RECEIVED: 7/10/84

SAMPLE#1: Well #1 LAB#C841139/1
SAMPLE#2: Well #2 LAB#C841139/2
SAMPLE#3: Well #3 LAB#C841139/3

ANALYTICAL PARAMETERS	#1	#2	#3
Vinyl Chloride, µg/L	<1	<1	<1
1,1,2-Trichloro-1,2,2 Trifluoroethane, µg/L	<1	<1	<1
Methylene Chloride, µg/L	<5	<5	<5
1,1-Dichloroethane, µg/L	<5	<5	<5
1,2-dichloroethene, µg/L	<5	<5	<5
Chloroform, µg/L	10	<1	<1
1,1,1-Trichloroethane, µg/L	400	<1	60
Carbon Tetrachloride, µg/L	<1	<1	<1
1,2-Dichloroethane, µg/L	<5	<5	<5
Trichloroethylene, µg/L	<1	<1	<1
1,2-Dichloropropane, µg/L	<5	<5	<5
Bromodichloromethane, µg/L	<1	<1	<1
Tetrachloroethylene, µg/L	<1	<1	<1
Chlorodibromomethane, µg/L	<1	<1	<1
Bromoform, µg/L	<2	<2	<2
Benzene, µg/L	<1	<1	<1
Toluene, µg/L	<2	<2	<2
Ethyl Benzene, µg/L	<1	<1	<1
m-xylene, µg/L	<2	<2	<2
o+p-xylene, µg/L	<4	<4	<4
m-Dichlorobenzene, µg/L	<2	<2	<2
o-Dichlorobenzene, µg/L	<2	<2	<2
p-Dichlorobenzene, µg/L	<2	<2	<2
Acetone, µg/L	<10	<10	<10
Methyl Ethyl Ketone, µg/L	<10	<10	<10
Methyl Iso Butyl Ketone, µg/L	<10	<10	<10

DIRECTOR ____________

KT

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TEST

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777

Lockwood, Kessler & Bartlett, RECEIVED NOV 20 1984

Nov. 15, 1984

Lockwood, Kessler & Bartlett
1 Aerial Ways
Syosset, NY 11791

SOURCE OF SAMPLE: Anchlor/Lith
COLLECTED: 11/1/84 BY: RP/LKB RECEIVED: 11/1/84

SAMPLE#1: Well #1 LAB#C842148/1
SAMPLE#2: Well #2 LAB#C842148/2
SAMPLE#3: Well #3 LAB#C842148/3

ANALYTICAL PARAMETERS	#1	#2	#3
Vinyl Chloride, µg/L	<1	<1	<1
1,1,2-Trichloro-1,2,2 Tri-fluoroethane, µg/L	<1	<1	<1
Methylene Chloride, µg/L	<2	<2	<2
1,1-Dichloroethane, µg/L	4	<2	<2
1,2-dichloroethene, µg/L	<2	<2	<2
Chloroform, µg/L	<1	<1	<1
1,1,1-Trichloroethane, µg/L	65	<1	7
Carbon Tetrachloride, µg/L	<1	<1	<1
1,2-Dichloroethane, µg/L	<2	<2	<2
Trichloroethylene, µg/L	<1	<1	<1
1,2-Dichloropropane, µg/L	<2	<2	<2
Bromodichloromethane, µg/L	<1	<1	<1
Tetrachloroethylene, µg/L	<1	<1	<1
Chlorodibromomethane, µg/L	<1	<1	<1
Bromoform, µg/L	<2	<2	<2
Benzene, µg/L	<1	<1	<1
Toluene, µg/L	<2	<2	<2
Ethyl Benzene, µg/L	<1	<1	<1
m-Xylene, µg/L	<2	<2	<2
o+p-Xyene, µg/L	<4	<4	<4
m-Dichlorobenzene, µg/L	<2	<2	<2
o-Dichlorobenzene, µg/L	<2	<2	<2
p-Dichlorobenzene, µg/L	<2	<2	<2
Acetone, µg/L	<10	<10	<10
Methyl Ethyl Ketone, µg/L	<10	<10	<10
Methyl Iso Buthyl Ketone, µg/L	<10	<10	<10

DIRECTOR ____________

301471

EcoTest LABORATORIES, INC. ENVIRONMENTAL TESTI

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777

March 18, 1985

Lockwood, Kessler and Bartlett
1 Aerial Ways
Syosset, NY 11791

SOURCE OF SAMPLE: Anchor/Lith Wells
COLLECTED: 2/28/85 BY: Client RECEIVED: 2/28/85

SAMPLE#1: Well #1 LAB#C850456/1
SAMPLE#2: Well #2 LAB#C850456/2
SAMPLE#3: Well #3 LAB#C850456/3

ANALYTICAL PARAMETERS	#1	#2	#3
Vinyl Chloride, μg/L	<1	<1	<1
1,1,2-Trichloro-1,2,2 Trifluoroethane, μg/L	<1	<1	<1
Methylene Chloride, μg/L	<2	<2	<2
1,1-Dichloroethane, μg/L	<2	<2	<2
1,2-dichloroethene, μg/L	<2	<2	<2
Chloroform, μg/L	<1	<1	<1
1,1,1-Trichloroethane, μg/L	26	<1	4
Carbon Tetrachloride, μg/L	<1	<1	<1
1,2-Dichloroethane, μg/L	<2	<2	<2
Trichloroethylene, μg/L	<1	<1	<1
1,2-Dichloropropane, μg/L	<2	<2	<2
Bromodichloromethane, μg/L	<1	<1	<1
Tetrachloroethylene, μg/L	<1	<1	<1
Chlorodibromomethane, μg/L	<1	<1	<1
Bromoform, μg/L	<2	<2	<2
Benzene, μg/L	<1	<1	<1
Toluene, μg/L	<2	<2	<2
Ethyl Benzene, μg/L	<1	<1	<1
m-xylene, μg/L	<2	<2	<2
o+p-xylene, μg/L	<4	<4	<4
m-dichlorobenzene, μg/L	<2	<2	<2
o-dichlorobenzene, μg/L	<2	<2	<2
p-dichlorobenzene, μg/L	<2	<2	<2
Acetone, μg/L	<10	<10	<10
Methyl Ethyl Ketone, μg/L	<10	<10	<10
Methyl Iso Butyl Ketone, μg/L	<10	<10	<10

DIRECTOR ____________

301472

APPENDIX C

Analytical Results of Sampling Done
by Roux Associates, Inc.

PEDNEAULT ASSOCIATES, INC. TESTING LABORATORIES
1615 NINTH AVENUE P O BOX 205 · BOHEMIA, N Y 11716 (516) 467-8477
AFTER 5 P.M (516) 567-5579

November 18, 1987

TO: Roux Associates
11 Stewart Avenue
Huntington, NY 11743

Date: Collected 10/28/87 **Analyzed** 10/28-11/17/87 **Report** 11/18/87

Sampling Point

1. Anchor/Litho - Well #1
2. Anchor/Litho - Well #2
3.
4.
5.

Parameters		1	2	3	4	5
Trifluorotrichloroethane	ug/l	< 1.0	< 1.0			
Chloroform	ug/l	< 1.0	< 1.0			
1,1,1 Trichloroethane	ug/l	21.2	1.5			
Carbon Tetrachloride	ug/l	< 1.0	< 1.0			
1,1,2 Trichloroethylene	ug/l	< 1.0	< 1.0			
Bromodichloromethane	ug/l	< 5.0	< 5.0			
Dibromochloromethane	ug/l	< 5.0	< 5.0			
Tetrachloroethylene	ug/l	< 1.0	< 1.0			
Bromoform	ug/l	< 10	< 10			
Acetone	mg/l	< 1.0	< 1.0			
Methyl Ethyl Ketone	mg/l	< 1.0	< 1.0			
Methyl Isobutyl Ketone	mg/l	< 1.0	< 1.0			

301474

JOHN PEDNEAULT
Lab Director

Lab Number 43481

PEDNEAULT ASSOCIATES, INC. TESTING LABORATORIES
1615 NINTH AVENUE P O BOX 205 BOHEMIA, N.Y. 11716 (516) 467-8477
AFTER 5 P.M. (516) 567-5579

November 18, 1987

TO: Roux Associates
11 Stewart Avenue
Huntington, NY 11743

Date: Collected 10/28/87 Analyzed 10/28-11/17/87 Report 11/18/87

Sampling Point

1. Anchor/Litho - Well #1
2. Anchor/Litho - Well #2
3.
4.
5.

Parameters		1	2	3	4	5
Benzene	ug/l	<1.0	<1.0			
Toluene	ug/l	<1.0	<1.0			
Xulene	ug/l	<1.0	1.5			
Ethylbenzene	ug/l	<1.0	<1.0			
Chlorobenzene	ug/l	<1.0	<1.0			
Dichlorobenzene	ug/l	<1.0	<1.0			

JOHN PEDNEAULT
Lab Director

301475

Lab Number 43481

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTIN

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777

LAB NO.C891828/1 06/26/89

Roux Associates, Inc.
775 Park Ave., Suite 255
Huntington, NY 11743
ATTN: Paul Roux

SOURCE OF SAMPLE: 500 W. St. John Street, Project #14001
COLLECTED BY: Client DATE COL'D:06/22/89 RECEIVED:06/22/89

SAMPLE: Water sample, MW-1, 1300

ANALYTICAL PARAMETERS		
Chloromethane	ug/L	<1
Bromomethane	ug/L	<1
Dichlordifluomethane	ug/L	<1
Vinyl Chloride	ug/L	<1
Chloroethane	ug/L	<1
Methylene Chloride	ug/L	<2
Trichlorofluomethane	ug/L	<2
11 Dichloroethene	ug/L	<2
11 Dichloroethane	ug/L	4
12 Dichloroethene	ug/L	<2
Chloroform	ug/L	<1
12 Dichloroethane	ug/L	<2
111 Trichloroethane	ug/L	59
Carbon Tetrachloride	ug/L	<1
Bromodichloromethane	ug/L	<1
12 Dichloropropane	ug/L	<2
t 13 Dichloropropene	ug/L	<2
Trichloroethylene	ug/L	<1
Chlorodibromomethane	ug/L	<1
112 Trichloroethane	ug/L	<2
c 13 Dichloropropene	ug/L	<2
2chloroethvinylether	ug/L	<2
Bromoform	ug/L	<2
1122Tetrachloroethan	ug/L	<2
Tetrachloroethene	ug/L	<1

ANALYTICAL PARAMETERS		
Chlorobenzene	ug/L	<1
13 Dichlorobenzene	ug/L	<2
12 Dichlorobenzene	ug/L	<2
14 Dichlorobenzene	ug/L	<2
Benzene	ug/L	<1
Toluene	ug/L	<2
Ethyl Benzene	ug/L	<1
m Xylene	ug/L	<2
o+p Xylene	ug/L	<4

cc:

REMARKS:

301476

DIRECTOR__________________

rn= 7942

ECOTEST LABORATORIES, INC. *ENVIRONMENTAL TESTING*

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777

LAB NO. C891828/2 06/26/89

Roux Associates, Inc.
775 Park Ave., Suite 255
Huntington, NY 11743
ATTN: Paul Roux

SOURCE OF SAMPLE: 500 W. St. John Street, Project #14001
COLLECTED BY: Client DATE COL'D:06/22/89 RECEIVED:06/22/89

SAMPLE: Water sample, MW-2, 1200

ANALYTICAL PARAMETERS		
Chloromethane	ug/L	<1
Bromomethane	ug/L	<1
Dichlordifluomethane	ug/L	<1
Vinyl Chloride	ug/L	<1
Chloroethane	ug/L	<1
Methylene Chloride	ug/L	<2
Trichlorofluomethane	ug/L	<2
11 Dichloroethene	ug/L	<2
11 Dichloroethane	ug/L	<2
12 Dichloroethene	ug/L	<2
Chloroform	ug/L	<1
12 Dichloroethane	ug/L	<2
111 Trichloroethane	ug/L	<1
Carbon Tetrachloride	ug/L	<1
Bromodichloromethane	ug/L	<1
12 Dichloropropane	ug/L	<2
t 13 Dichloropropene	ug/L	<2
Trichloroethylene	ug/L	<1
Chlorodibromomethane	ug/L	<1
112 Trichloroethane	ug/L	<2
c 13 Dichloropropene	ug/L	<2
2chloroethvinylether	ug/L	<2
Bromoform	ug/L	<2
1122Tetrachloroethan	ug/L	<2
Tetrachloroethene	ug/L	<1

ANALYTICAL PARAMETERS		
Chlorobenzene	ug/L	<1
13 Dichlorobenzene	ug/L	<2
12 Dichlorobenzene	ug/L	<2
14 Dichlorobenzene	ug/L	<2
Benzene	ug/L	<1
Toluene	ug/L	<2
Ethyl Benzene	ug/L	<1
m Xylene	ug/L	<2
o+p Xylene	ug/L	<4

cc:

REMARKS:

301477

DIRECTOR ____________________

rn= 7943

ECOTEST LABORATORIES, INC. *ENVIRONMENTAL TESTING*

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777

LAB NO.C891828/3 06/26/89

Roux Associates, Inc.
775 Park Ave., Suite 255
Huntington, NY 11743
ATTN: Paul Roux

SOURCE OF SAMPLE: 500 W. St. John Street, Project #14001
COLLECTED BY: Client DATE COL'D:06/22/89 RECEIVED:06/22/89

SAMPLE: Water sample, MW-3, 1205

ANALYTICAL PARAMETERS		
Chloromethane	ug/L	<1
Bromomethane	ug/L	<1
Dichlordifluomethane	ug/L	<1
Vinyl Chloride	ug/L	<1
Chloroethane	ug/L	<1
Methylene Chloride	ug/L	<2
Trichlorofluomethane	ug/L	<2
11 Dichloroethene	ug/L	<2
11 Dichloroethane	ug/L	<2
12 Dichloroethene	ug/L	<2
Chloroform	ug/L	<1
12 Dichloroethane	ug/L	<2
111 Trichloroethane	ug/L	8
Carbon Tetrachloride	ug/L	<1
Bromodichloromethane	ug/L	<1
12 Dichloropropane	ug/L	<2
t 13 Dichloropropene	ug/L	<2
Trichloroethylene	ug/L	<1
Chlorodibromomethane	ug/L	<1
112 Trichloroethane	ug/L	<2
c 13 Dichloropropene	ug/L	<2
2chloroethvinylether	ug/L	<2
Bromoform	ug/L	<2
1122Tetrachloroethan	ug/L	<2
Tetrachloroethene	ug/L	<1

ANALYTICAL PARAMETERS		
Chlorobenzene	ug/L	<1
13 Dichlorobenzene	ug/L	<2
12 Dichlorobenzene	ug/L	<2
14 Dichlorobenzene	ug/L	<2
Benzene	ug/L	<1
Toluene	ug/L	<2
Ethyl Benzene	ug/L	<1
m Xylene	ug/L	<2
o+p Xylene	ug/L	<4

cc:

REMARKS:

301478

DIRECTOR ____________

rn= 7944

ECOTEST LABORATORIES, INC. *ENVIRONMENTAL TESTING*

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777 • FAX (516) 422-5770

LAB NO. C910410/1 02/07/91

Roux Associates, Inc.
775 Park Ave., Suite 255
Huntington, NY 11743
ATTN: John Sheehan

SOURCE OF SAMPLE: Speigel Assoc., 500 West John St.*
COLLECTED BY: Client DATE COL'D:02/01/91 RECEIVED:02/01/91

SAMPLE: Water sample, MW-1, 1:45 pm

ANALYTICAL PARAMETERS		
Chloromethane	ug/L	<1
Bromomethane	ug/L	<1
Dichlordifluomethane	ug/L	<2
Vinyl Chloride	ug/L	<1
Chloroethane	ug/L	<1
Methylene Chloride	ug/L	<1
Trichlorofluomethane	ug/L	<2
11 Dichloroethene	ug/L	<1
11 Dichloroethane	ug/L	<1
12 Dichloroethene	ug/L	<1
Chloroform	ug/L	<1
12 Dichloroethane	ug/L	<1
111 Trichloroethane	ug/L	<1
Carbon Tetrachloride	ug/L	<1
Bromodichloromethane	ug/L	<1
12 Dichloropropane	ug/L	<1
t 13 Dichloropropene	ug/L	<2
Trichloroethylene	ug/L	<1
Chlorodibromomethane	ug/L	<2
112 Trichloroethane	ug/L	<2
c 13 Dichloropropene	ug/L	<2
2chloroethvinylether	ug/L	<2
Bromoform	ug/L	<2
1122Tetrachloroethan	ug/L	<2
Tetrachloroethene	ug/L	<1

ANALYTICAL PARAMETERS		
Chlorobenzene	ug/L	<2
13 Dichlorobenzene	ug/L	<2
12 Dichlorobenzene	ug/L	<2
14 Dichlorobenzene	ug/L	<2
Benzene	ug/L	<1
Toluene	ug/L	<2
Ethyl Benzene	ug/L	<1
m Xylene	ug/L	<2
o+p Xylene	ug/L	<4

cc:

REMARKS:

* Hicksville.

301479

DIRECTOR ____________

rn= 1661 NYSDOH ID# 10320

ECOTEST LABORATORIES, INC. ENVIRONMENTAL TESTING

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777 • FAX (516) 422-5770

LAB NO. C910410/2 02/07/91

Roux Associates, Inc.
775 Park Ave., Suite 255
Huntington, NY 11743
ATTN: John Sheehan

SOURCE OF SAMPLE: Speigel Assoc., 500 West John St.*
COLLECTED BY: Client DATE COL'D:02/01/91 RECEIVED:02/01/91

SAMPLE: Water sample, MW-2, 2:30 pm

ANALYTICAL PARAMETERS		
Chloromethane	ug/L	<1
Bromomethane	ug/L	<1
Dichlordifluomethane	ug/L	<2
Vinyl Chloride	ug/L	<1
Chloroethane	ug/L	<1
Methylene Chloride	ug/L	<1
Trichlorofluomethane	ug/L	<2
11 Dichloroethene	ug/L	<1
11 Dichloroethane	ug/L	<1
12 Dichloroethene	ug/L	<1
Chloroform	ug/L	<1
12 Dichloroethane	ug/L	<1
111 Trichloroethane	ug/L	<1
Carbon Tetrachloride	ug/L	<1
Bromodichloromethane	ug/L	<1
12 Dichloropropane	ug/L	<1
t 13 Dichloropropene	ug/L	<2
Trichloroethylene	ug/L	<1
Chlorodibromomethane	ug/L	<2
112 Trichloroethane	ug/L	<2
c 13 Dichloropropene	ug/L	<2
2chloroethvinylether	ug/L	<2
Bromoform	ug/L	<2
1122Tetrachloroethan	ug/L	<2
Tetrachloroethene	ug/L	<1

ANALYTICAL PARAMETERS		
Chlorobenzene	ug/L	<2
13 Dichlorobenzene	ug/L	<2
12 Dichlorobenzene	ug/L	<2
14 Dichlorobenzene	ug/L	<2
Benzene	ug/L	<1
Toluene	ug/L	<2
Ethyl Benzene	ug/L	<1
m Xylene	ug/L	<2
o+p Xylene	ug/L	<4

cc:

REMARKS:

* Hicksville.

301480

DIRECTOR____________________

rn= 1662 NYSDOH ID# 10320

ECOTEST LABORATORIES, INC. *ENVIRONMENTAL TESTING*

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777 • FAX (516) 422-5770

LAB NO. C910410/3 02/07/91

Roux Associates, Inc.
775 Park Ave., Suite 255
Huntington, NY 11743
ATTN: John Sheehan

SOURCE OF SAMPLE: Speigel Assoc., 500 West John St.*
COLLECTED BY: Client DATE COL'D:02/01/91 RECEIVED:02/01/91

SAMPLE: Water sample, MW-3, 3:00 pm

ANALYTICAL PARAMETERS		
Chloromethane	ug/L	<1
Bromomethane	ug/L	<1
Dichlordifluomethane	ug/L	<2
Vinyl Chloride	ug/L	<1
Chloroethane	ug/L	<1
Methylene Chloride	ug/L	<1
Trichlorofluomethane	ug/L	<2
11 Dichloroethene	ug/L	<1
11 Dichloroethane	ug/L	<1
12 Dichloroethene	ug/L	<1
Chloroform	ug/L	<1
12 Dichloroethane	ug/L	<1
111 Trichloroethane	ug/L	9
Carbon Tetrachloride	ug/L	<1
Bromodichloromethane	ug/L	<1
12 Dichloropropane	ug/L	<1
t 13 Dichloropropene	ug/L	<2
Trichloroethylene	ug/L	<1
Chlorodibromomethane	ug/L	<2
112 Trichloroethane	ug/L	<2
c 13 Dichloropropene	ug/L	<2
2chloroethvinylether	ug/L	<2
Bromoform	ug/L	<2
1122Tetrachloroethan	ug/L	<2
Tetrachloroethene	ug/L	<1

ANALYTICAL PARAMETERS		
Chlorobenzene	ug/L	<2
13 Dichlorobenzene	ug/L	<2
12 Dichlorobenzene	ug/L	<2
14 Dichlorobenzene	ug/L	<2
Benzene	ug/L	<1
Toluene	ug/L	<2
Ethyl Benzene	ug/L	<1
m Xylene	ug/L	<2
o+p Xylene	ug/L	<4

cc:

REMARKS:

* Hicksville.

DIRECTOR________________________ 301481

rn= 1663 NYSDOH ID# 10320

ECOTEST LABORATORIES, INC. *ENVIRONMENTAL TESTING*

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777 • FAX (516) 422-5770

LAB NO.C910410/4 02/07/91

Roux Associates, Inc.
775 Park Ave., Suite 255
Huntington, NY 11743
ATTN: John Sheehan

SOURCE OF SAMPLE: Speigel Assoc., 500 West John St.*
COLLECTED BY: Client DATE COL'D:02/01/91 RECEIVED:02/01/91

SAMPLE: Water sample, Field Blank, 1:00 pm

ANALYTICAL PARAMETERS		
Chloromethane	ug/L	<1
Bromomethane	ug/L	<1
Dichlordifluomethane	ug/L	<2
Vinyl Chloride	ug/L	<1
Chloroethane	ug/L	<1
Methylene Chloride	ug/L	<1
Trichlorofluomethane	ug/L	<2
11 Dichloroethene	ug/L	<1
11 Dichloroethane	ug/L	<1
12 Dichloroethene	ug/L	<1
Chloroform	ug/L	<1
12 Dichloroethane	ug/L	<1
111 Trichloroethane	ug/L	<1
Carbon Tetrachloride	ug/L	<1
Bromodichloromethane	ug/L	<1
12 Dichloropropane	ug/L	<1
t 13 Dichloropropene	ug/L	<2
Trichloroethylene	ug/L	<1
Chlorodibromomethane	ug/L	<2
112 Trichloroethane	ug/L	<2
c 13 Dichloropropene	ug/L	<2
2chloroethvinylether	ug/L	<2
Bromoform	ug/L	<2
1122Tetrachloroethan	ug/L	<2
Tetrachloroethene	ug/L	<1

ANALYTICAL PARAMETERS		
Chlorobenzene	ug/L	<2
13 Dichlorobenzene	ug/L	<2
12 Dichlorobenzene	ug/L	<2
14 Dichlorobenzene	ug/L	<2
Benzene	ug/L	<1
Toluene	ug/L	<2
Ethyl Benzene	ug/L	<1
m Xylene	ug/L	<2
o+p Xylene	ug/L	<4

cc:

REMARKS:

* Hicksville.

301482

DIRECTOR________________________

rn= 1664 NYSDOH ID# 10320

ECOTEST LABORATORIES, INC. *ENVIRONMENTAL TESTING*

377 SHEFFIELD AVE. • N. BABYLON, N.Y. 11703 • (516) 422-5777 • FAX (516) 422-5770

LAB NO. C910410/5 02/07/91

Roux Associates, Inc.
775 Park Ave., Suite 255
Huntington, NY 11743
ATTN: John Sheehan

SOURCE OF SAMPLE: Speigel Assoc., 500 West John St.*
COLLECTED BY: Client DATE COL'D:02/01/91 RECEIVED:02/01/91

SAMPLE: Water sample, Trip Blank, 12:00 pm

ANALYTICAL PARAMETERS		
Chloromethane	ug/L	<1
Bromomethane	ug/L	<1
Dichlordifluomethane	ug/L	<2
Vinyl Chloride	ug/L	<1
Chloroethane	ug/L	<1
Methylene Chloride	ug/L	<1
Trichlorofluomethane	ug/L	<2
11 Dichloroethene	ug/L	<1
11 Dichloroethane	ug/L	<1
12 Dichloroethene	ug/L	<1
Chloroform	ug/L	<1
12 Dichloroethane	ug/L	<1
111 Trichloroethane	ug/L	<1
Carbon Tetrachloride	ug/L	<1
Bromodichloromethane	ug/L	<1
12 Dichloropropane	ug/L	<1
t 13 Dichloropropene	ug/L	<2
Trichloroethylene	ug/L	<1
Chlorodibromomethane	ug/L	<2
112 Trichloroethane	ug/L	<2
c 13 Dichloropropene	ug/L	<2
2chloroethvinylether	ug/L	<2
Bromoform	ug/L	<2
1122Tetrachloroethan	ug/L	<2
Tetrachloroethene	ug/L	<1

ANALYTICAL PARAMETERS		
Chlorobenzene	ug/L	<2
13 Dichlorobenzene	ug/L	<2
12 Dichlorobenzene	ug/L	<2
14 Dichlorobenzene	ug/L	<2
Benzene	ug/L	<1
Toluene	ug/L	<2
Ethyl Benzene	ug/L	<1
m Xylene	ug/L	<2
o+p Xylene	ug/L	<4

cc:

REMARKS:

* Hicksville.

DIRECTOR______________________ 301483

rn= 1665 NYSDOH ID# 10320

APPENDIX D

Resumes of Key Personnel

301484

Paul Roux
President

Technical Specialties:
Ground-water/soil contamination investigation and remediation. Environmental site assessment. Water resources management.

Experience Summary:
18 years of experience: President of Roux Associates, Senior Hydrogeologist at Stauffer Chemical Co., and various hydrogeological positions at Geraghty & Miller. Directed and participated in RI/FS studies, environmental impact statements, water quality and contaminant mobility studies, ground-water assessments, technical support for legal counsel, expert witness, regulatory agency negotiations.

Credentials:
M.A. Geology, Queens College, City University of New York, 1978.
B.S. Engineering Science, C.W. Post College, Long Island University, 1968.

Certified Professional Hydrogeologist, A.I.H.
Certified Professional Geologist, A.I.P.G.
Certified Professional Geologist, Indiana, North Carolina, Florida, Delaware, Arkansas, and Tennessee.

Professional Affiliations:
National Water Well Association
American Institute of Professional Geologists (Northeast Executive Committee, '80-82)
American Institute of Hydrology

Publications:
14 papers for GSA, Ground Water, US EPA, Pollution Equipment News, Various Seminars (Columbia University, National Water Well Association, Hazpro Conference). Topics include ground-water contamination and monitoring, leachate migration, aquifer decontamination, waste disposal impacts on ground-water, resistivity and conductivity surveys, procedures manuals, site assessments, in-situ remediation, sensitivity analysis for pesticides.

Key Projects:
- Principal-in-charge of remedial investigation feasibility studies for several hazardous waste sites listed on the National Priorities List, and for several state Superfund sites.
- Principal-in-charge of several studies to define areas vulnerable to ground water contamination from pesticide application. Planned and supervised a major herbicide leaching study in eight states, and testified on the results to the EPA Science Advisory Panel.
- Principal-in-charge of a large-scale well sampling program to determine the potential for pesticide leaching under various soil and hydrogeologic conditions.
- Evaluated ground-water conditions at over 100 industrial plant sites throughout the U.S. to determine existing and potential problems.
- Developed ground-water contamination abatement systems and monitoring programs at numerous industrial sites.
- Advised client management on corporate responses to ground-water portions of RCRA, SDWA (UIC), and CERCLA.
- Negotiated ground-water and hazardous waste matters with EPA and state regulatory personnel in ten states.
- Served on Chemical Manufacturers Association's Ground-water Management and Superfund Task Groups.
- Determined the effectiveness of an emergency cleanup of a 7,000 gal. PCB spill near a NJ public supply well field.
- For US EPA, evaluated impact of waste disposal facilities on ground-water resources of Gloucester and Camden counties, New Jersey. Conducted a similar project for Westchester County, New York.
- Implemented numerous water supply development projects. Clients included Shell Oil, Union Carbide, Puerto Rico Water Resources Authority, East Orange and Fairlawn townships in New Jersey, and Middletown and Weston townships in Connecticut.
- Designed ground-water removal and re-injection system for in-situ bioreclamation programs at several locations.

Joanne Yeary
Project Hydrogeologist

Technical Specialties:

Ground-water/surface-water investigation of hazardous materials and agricultural chemical residues in the environment. Oversee Quality Assurance for compliance with Good Laboratory Practices.

Experience Summary

3 years of experience: Project Hydrogeologist and Geologist with Roux Associates. Participated in several ground-water, soil and surface-water sampling programs. Quality Assurance Officer for several pesticide projects.

Credentials:

B.S. Geology, State University of New York at Stony Brook, 1986.

Professional Affiliations:

National Water Well Association

Key Projects:

- Supervised well installations, ground-water sampling, soil sampling and surface-water sampling at a CERCLA hazardous waste site in Massachusetts which is ranked #5 on the NPL.
- Participated in a ground-water sampling program for pesticides in domestic ground-water sources.
- Participated in a surface-water sampling program for pesticides in rivers and streams.
- Participated in a research program to evaluate the findings of state monitoring programs for pesticides in ground water.
- Supervised soil borings and well installations at several sites in New York and New Jersey.
- Purged and sampled monitoring wells at sites in New York, Massachusetts and Wisconsin.
- Logged soil borings and assisted in supervision of well installation at a site in Massachusetts. Developed, purged and sampled wells for organic compounds.
- Assisted in vapor probe installation at a hazardous waste site in New York.
- Conducted pumping test at hazardous waste site in Massachusetts as part of a program to evaluate an in site remedial program.
- Quality Assurance Officer for several pesticide projects. Assure that data, reports and archives adhere to EPA Good Laboratory Practice standards.
- Edited pesticide surface-water and ground-water sampling final reports following EPA Good Laboratory Practice standards and report format.
- Evaluated several hazardous waste sites for potential impact to the environment, calculated HRS scores and prepared Phase I reports for NYSDEC.
- Participated in slug tests at a hazardous waste site as part of a Phase II investigation for the NYSDEC.
- Assisted in writing summary report of environmental studies at a hazardous waste site in Massachusetts.
- Supervised soil borings at a site in Massachusetts and defined extent of buried hazardous waste.
- Installed piezometers and defined extent of a free product plume at a site in New York.
- Participated in follow-up investigations of farms with pesticide detections in on-site wells.
- Installed and sampled lysimeters at a site in Wisconsin as part of a pesticide follow-up study.
- Sampled 26 irrigation wells in Wisconsin as part of a pesticide follow-up study.

Michael A. DeCillis

Corporate Director of Ground-Water Modeling/Principal Hydrogeologist

Technical Specialties:

Quantitative analyses of hydrogeologic systems. Modeling of hydrogeologic environments. Investigation and remediation of ground-water and soil contamination. Management of water resources.

Experience Summary

14 years of experience: Corporate Director, Ground-Water Modeling Group of Roux Associates; previously Corporate QA/QC Officer of Roux Associates; Associate/Principal Hydrogeologist with Geraghty & Miller; Hydrogeologist with Environmental Associates. Modeling of ground-water flow and solute transport in unconsolidated and consolidated flow systems. Participated in resource development and soil/ground-water projects. Provided technical support for legal counsel. Involved in negotiations with regulatory agencies.

Credentials:

M.S. Hydrogeology and Earth Science,
Adelphi University, 1980
B.S. Earth Science and Biology,
Adelphi University, 1976

Certified Professional Geologist: A.I.P.G.
Certified Professional Geologist: TN, AK

Prepared and presented modeling section at Geraghty & Miller's Ground-Water Contamination seminars.
Assisted in preparation of Dr. Robert Cleary's IBM PC Applications in Ground Water Pollution and Hydrology course.

Professional Affiliations:

American Geophysical Union
Assoc. of Ground Water Scientists and Engineers
American Assoc. for the Advancement of Science
The New York Academy of Sciences

Publications:

EOS and Master Thesis on ground-water flow and solute transport models.

Key Projects:

- Principal Modeler, ground-water flow and solute transport modeling at Superfund, industrial, muncipal, and federal sites in numerous states and Puerto Rico for litigation and compliance issues (e.g., development of remediation programs, formulation of monitoring programs, support and representation of PRPs concerning COs, development of RI/FS Work Plans). Modeling also used for directing field investigations, and resource management and development.

- Quality Assurance/Quality Control (QA/QC) officer, providing technical oversight and guidance in hydrogeologic investigations involving resource development, hazardous waste contamination, pesticides, modeling, proposal and work plan preparation.

- Project Manager, hydrogeologic field investigations of landfills in New York to develop flow-system and water-quality data in support of NYS Part 360 permit application for site closure. Models were also used to evaluate potential migration pathways for contaminants and capture zones for hypothetical remedial wells.

- Project Manager, ground-water flow modeling of a coastal plain aquifer at a NJ RCRA investigation site. Modeling helped to identify the most effective remedial alternative to control off-site migration of contaminated ground water following closure of a series of waste-water lagoons and provide direction to additional field investigations.

- Designed, implemented, and analyzed aquifer tests for numerous sites throughout the United States and Puerto Rico.

- Principal Developer and Modeler, ground-water solute transport modeling for "generic" and area-specific hydrogeologic environments as in-house guidance tools to evaluate potential migration and plume configurations for organic and inorganic compounds in various hydrogeologic systems. Most often, modeling was undertaken to evaluate impacts on potential downgradient receptors.

- Principal Modeler, ground-water flow model of a fractured bedrock aquifer at a NJ industrial site. The model was part of a consent decree with state regulatory agencies to establish a buffer zone to exclude additional pumpage around the site and surrounding area to maintain a hydraulic barrier to the flow of contaminated ground water.

- Principal Modeler, ground-water flow and solute transport modeling at numerous industrial sites impacted by organics, hydrocarbons, PCBs, and metals. Strategies were developed to contain and/or clean-up aquifers, protect water supply wells, and prohibit impact on surface-water bodies.

- Principal Modeler, ground-water flow modeling for resource development in several states. Projects prompted by site contamination, expansion of water supply needs, nearby well field impacts, aquifer yield, artificial recharge and recovery.

James V. Worrall

Manager of Danbury Office/Principal Engineer

Technical Specialties:
Hazardous materials management. Waste treatment and disposal. In-situ remediation. Underground storage tank management. Plant closures and decontamination. Regulatory compliance strategies.

Experience Summary:
35 years in the chemical industry, 12 years exclusively in environmental work: Environmental and technical management positions at Roux Associates, Stauffer Chemical Company and Allied Corporation. Managed and participated in RI/FS and remediation projects, corporate disposal and UST programs, regulatory agency negotiations and technical support for legal counsel.

Credentials:
B.S. Chemical Engineering, Purdue University

Certified Hazardous Materials Manager - Master Level, No. 984, IHMM.
OSHA - 40 Hour Health & Safety Operations at Hazardous Materials Sites.

Professional Affiliations:
American Assoc. of Ground-Water Scientists and Engineers
American Institute of Chemical Engineers

Presentations:
New Jersey Environmental Exposition, 1986: "Underground Storage Tank Management Program for Industry".
Water and Wastewater Operations Center, Westford, MA: "Management of Underground Tanks".

Key Projects:

- Managed several remedial investigations, feasibility studies, and remediation projects for hazardous waste sites on the National Priorities List and state Superfund sites.
- Managed in-situ chemical and biological remediation of a coal tar impoundment site. Responsible for design, procurement, construction, operation and training.
- Managed or directed projects for plant closures, decontamination, waste disposal, PCB-transformer disposal, dismantlement and demolition at five chemical plants.
- Directed RI/FS, remedial design, installation, and start-up of a project to protect a metropolitan drinking water supply from ground-water contamination. Remediation included the installation of a 2,000 ft. wide interception barrier, precipitation and clarification of silica compounds, air stripping, and downgradient re-infiltration. System was designed to treat 180 gpm.
- Designed and established a program for the management of risks, costs and RCRA compliance associated with underground storage tanks (UST) for a major chemical company.
- Managed several environmental site assessments and remediation projects for property transfers under state Superlien laws.
- Negotiated environmental investigations, remedial measures and waste disposal alternatives with state and federal agencies in CA, CT, DE, MA, NV, NJ, NY, PA and VA.
- Established and directed a hazardous waste treatment and disposal program for a chemical company with 70-plants. Audited all major commercial facilities nationwide and negotiated contracts to ensure compliance with RCRA and DOT regulations.
- Chaired technical committee and coordinated consultants for industry-sponsored remedial investigations/feasibility studies at NPL Superfund-listed site and related state-listed abandoned waste site: Proposed multi-level ground-water intercept, air stripping column and reinfiltration/soil flushing system.
- Conducted a plant decontamination survey for a major chemical company in preparation for possible sale of buildings and facilities. The survey covered six plants across the country, and required inspections of all buildings and facilities to provide company management with decontamination methods and costs of decontamination and hazardous waste disposal.
- Directed PCB-waste impoundment removal and closure in compliance with RCRA and TSCA. Researched PCB treatment options.

Harrison Gregory

Staff Geologist

Technical Specialties:

Collection of environmental samples including: ground-water, surface water, soil pore water and soil. Preparation for field investigation.

Experience Summary

1 year practical experience in preparation for the collection of environmental samples at field studies in Georgia, Illinois, Iowa, Wisconsin, and New York.

Credentials:

A.A.S. in Animal Science, SUNY Farmingdale, 1965.
B.S. in Geology expected in August 1990.

Water Resources and Contamination Evaluation Workshop, Ohio University, June 1990.,

Professional Affiliations:

National Water Well Association

Key Projects:

- Field technician on small-scale prospective ground-water study for newly formulated insecticide. Collected, preserved, and shipped ground water, soil pore water, and soil samples.
- Maintain automated data logging equipment for climetological and hydrological data.
- Maintain and calibrate field meters for measurement of pH, conductivity, and temperature.
- Tabulate and enter data into computerized data base system.

Linda M. Wilson
Project Scientist

Technical Specialties:

Audits for compliance with Good Laboratory Practices; quality assurance; industrial hygiene & asbestos abatement programs.

Experience Summary:

4 years of experience: Project Scientist with Roux Associates; Senior Environmental Scientist with TRC Environmental Consultants; Operations Manager with Hygienetics.

Credentials:

M.S. Toxicology, St. John's University, 1984.
B.S. Environmental Science, Cornell University, 1978.

Certifications:

NYC Department of Environmental Protection Asbestos Investigator
NIOSH 582 Airborne Asbestos Sampling and Evaluation Techniques

Key Projects:

Quality Assurance

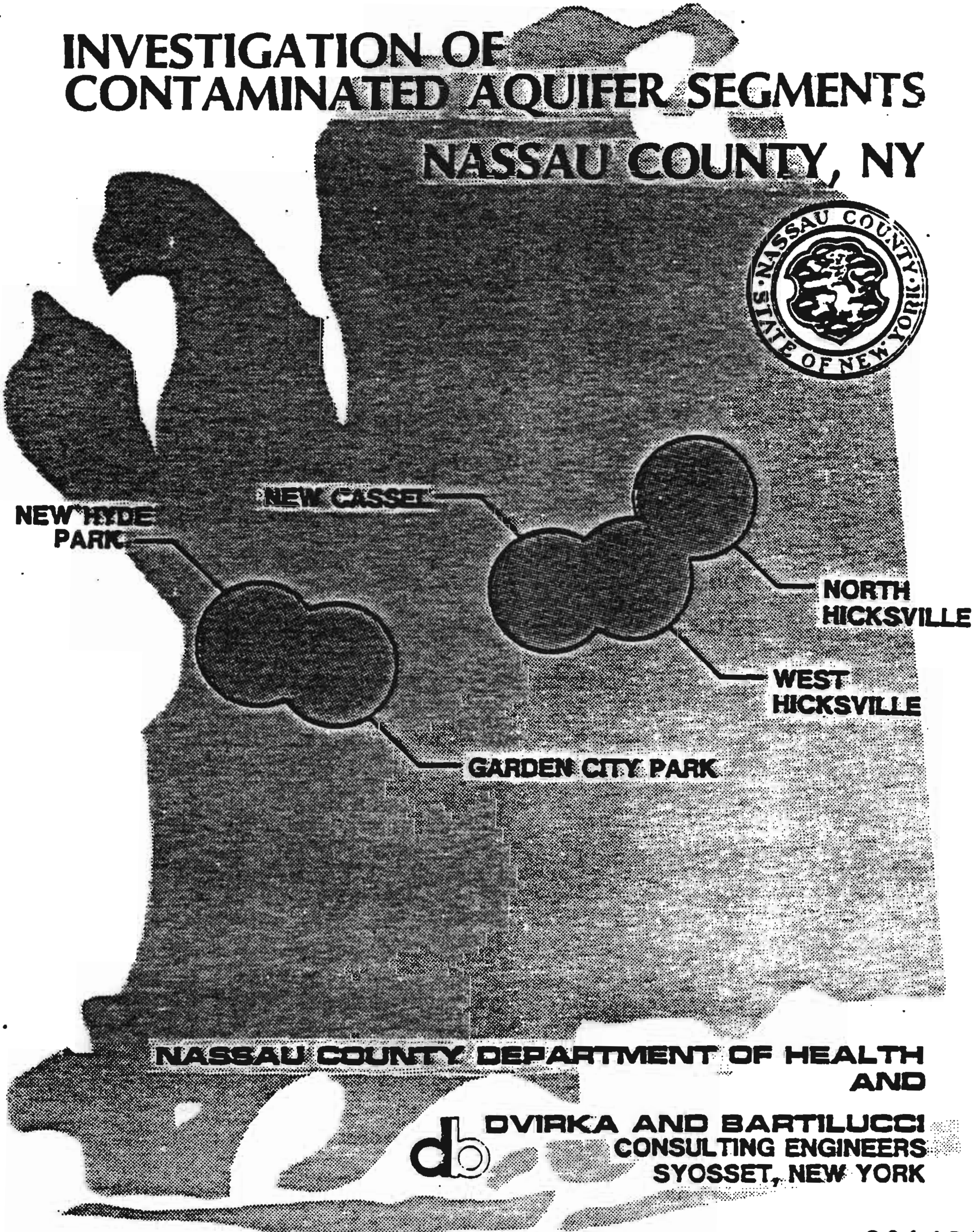
- Conducted audits for compliance with Good Laboratory Practice (GLP) standards for USEPA, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and Toxic Substance Control Act (TOSCA).
- Project manager responsible for quality assurance for asbestos investigations within 800 NYC Transit Authority facilities.
- Conducted in-house training seminars on NYC Local Law 76/85 and NYS Industrial Code 56.

Project Management

- Managed industrial hygiene and asbestos abatement projects from contract administration through design, technical specifications, field work, and final reports.
- Performed research to update Material Safety Data Sheets to ensure compliance with OSHA regulations for an industrial client.
- Conducted tenant awareness meetings sponsored by real estate management agents. Meetings answered tenant's questions and concerns regarding asbestos removal in their building.
- Implemented operations and maintenance programs for high-rise buildings in NYC, in response to Public Law 76/85.

INVESTIGATION OF CONTAMINATED AQUIFER SEGMENTS

NASSAU COUNTY, NY



NASSAU COUNTY DEPARTMENT OF HEALTH
AND
DVIRKA AND BARTILUCCI
CONSULTING ENGINEERS
SYOSSET, NEW YORK

301491

June 1986

INVESTIGATION OF CONTAMINATED AQUIFER SEGMENTS

NASSAU COUNTY, NEW YORK

JUNE 1986

NASSAU COUNTY DEPARTMENT OF HEALTH

AND

DVIRKA AND BARTILUCCI, CONSULTING ENGINEERS
SYOSSET, NEW YORK

INVESTIGATION OF CONTAMINATED AQUIFER SEGMENTS
NASSAU COUNTY, NEW YORK

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NASSAU COUNTY, NEW YORK

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Special recognition goes to Mr. Ricky Chenenko, Department of Health and Mr. Rick Liebe, Department of Public Works for their assistance and cooperation in performance of this project and preparation of this report.

SUMMARY

As part of an overall effort to identify and mitigate groundwater contamination by synthetic organic chemicals, the New York State Legislature, through the New York State Health Department (NYSHD) appropriated special funding to conduct groundwater investigation programs on Long Island. Under contract with NYSHD, the Nassau County Department of Health (NCDH) has undertaken six special groundwater projects. The sixth of these projects, which is the investigation of sites of groundwater contamination by synthetic organic chemicals in Nassau County is the subject of this report.

To assist NCDH in the performance of this investigation, the County retained Dvirka and Bartilucci, Consulting Engineers, Syosset, New York, to provide environmental engineering and geohydrological services.

The purpose of this Investigation of Contaminated Aquifer Segments in Nassau County is to identify the most significant sites of groundwater contaminated by organic chemicals in the County, and to determine the extent, source and alternative methods for management of the contamination.

Based on a comprehensive assessment of organic chemical contamination of groundwater and water supply conducted under this investigation, and consideration of other current or planned

investigations, five sites were selected for this project. These sites center about industrial areas located in New Cassel; North Hicksville; West Hicksville; Garden City Park; and New Hyde Park.

As part of this study, 59 monitoring wells were installed. The locations of the wells drilled during Phase I of the project (29) were selected based upon a survey of industries in each of the areas, that according to NCDH records, handled synthetic organic chemicals. The locations of the Phase II wells (30) were selected to establish groundwater quality upgradient of the sites and to better define the extent of contamination, as well as to begin to identify possible contaminant sources.

In addition to the new wells installed as part of this project, data from 19 existing Nassau County monitoring wells and 18 public water supply wells were used in the investigation.

Based upon the results of data obtained from these wells, evaluation of site specific and regional hydrogeology, and assessment of information concerning possible contaminant sources, the findings in each area are summarized below. The order in which the sites are discussed reflects the severity of groundwater contamination and threat to water supply.

- New Cassel - Extensive and substantial contamination of groundwater is found in this area. Six wells have levels of total volatile organic chemicals above 1000 ug/l, with a maximum concentration of nearly 10,000 ug/l. Results of upgradient monitoring wells appear to isolate the industrial area south of the Long Island Railroad and north of Old Country Road as the source.

Downgradient wells indicate that contamination in concentration of a maximum of 1,000 ug/l total organics has migrated at least 1,600 feet from the industrial area. Other further downgradient wells show that contamination has migrated at least 3,000 feet in concentrations of about 100 ug/l. Deeper wells in and downgradient of the industrial area also indicate that contamination has migrated into the Magothy aquifer to at least 260 feet below the ground surface and in significant concentrations (2,700 ug/l) at about 100 feet.

Although at the present time this contamination does not impact public water supply wells in the area, there is a potential threat to water supply, particularly to the Bowling Green Water District, because of the high levels of organic chemicals found and the apparent absence of an aquaclude below and downgradient of the industrial site.

- Garden City Park - Substantial contamination of groundwater (concentrations of 51,000 ug/l were detected in one well and 2,600 ug/l in a second well) is found in this area. Based on existing information, however, the contamination is not as widespread as in New Cassel comparing suites of compounds detected as well as areal extent.

It is probable that the majority of groundwater contamination in Garden City Park originates from an industrial area along and west of Herricks Road and north of the Long Island Railroad. Although upgradient wells do not isolate the area source of contamination, downgradient wells essentially all exhibit contamination (greater than 100 ug/l total volatile organics). Other sources located in industrial areas along the railroad, however, may also be contributing factors.

The one existing water supply well in the immediate vicinity of the study area is slightly contaminated with organic compounds (10 ug/l). Although data is limited with regard to deep monitoring wells in this area, one monitoring well 100 feet below the surface indicates that the upper Magothy shows significant contamination (up to nearly 200 ug/l total organic compounds). Since Garden City Park is part of the Magothy recharge area, there is the potential for further contamination of water supply in the future.

- <u>West Hicksville</u> - Some significant (maximum of 6,800 ug/l) and extensive contamination of groundwater was found in the area of West Hicksville. Although there are no upgradient monitoring wells, it appears based on land use that contamination is originating from the industrial area along West John Street and Duffy Avenue parallel to the Long Island Railroad. A number of waste disposal violations and spills have been reported in this area. Based on data obtained from deep monitoring wells in the area, contamination (approximately 2,700 ug/l total volatile organics) has migrated into the Magothy aquifer up to 265 feet below the surface. Although no water supply wells within and downgradient of the study area are presently contaminated with organic chemicals, there is a potential threat to water supply wells in the Bowling Green Water District. Clay layers that would impede contaminant migration are identified in deeper wells in West Hicksville, however, the stratigraphic continuity is unknown.

- New Hyde Park - Significant, but limited contamination of groundwater has been reported for existing wells in this area (maximum of 3,600 ug/l). Wells installed as part of this project detected little or no contamination. There is substantial industrial land use in New Hyde Park that could be contributing to groundwater contamination. Additional information is needed at this site to determine sources and extent of the contamination.

  There were no deep monitoring wells installed as part of this investigation in the New Hyde Park area; therefore, there is limited data with regard to vertical contaminant migration and contamination of the upper Magothy aquifer. However, because New Hyde Park is part of the regional Magothy recharge area flow regime, and continuous confining clays in the Magothy are not known to exist in this area, there is the potential for deep contamination of groundwater. Two public water supply wells located about 2,000 feet downgradient of the most significant contamination in the Jamaica Water Supply District are contaminated with total volatile organics up to about 70 ug/l. These wells are treated before distribution of water supply.

o North Hicksville - Limited degree of groundwater contamination (maximum of about 1,000 ug/l) has been detected in North Hicksville. Upgradient wells indicate that the probable sources of contamination are within the industrial areas located along the Long Island Railroad. However, since North Hicksville was sewered only recently, contamination may also be the result of household chemical waste disposal. The extent of downgradient contamination is unknown.

Based on the results of deep monitoring and water supply wells, there is evidence of contamination in the Magothy aquifer up to 575 feet below the surface. Two Hicksville Water District wells in the study area are being treated for the removal of volatile organic chemicals. Although the data is limited, and there is impairment of the two water supply wells, it does not appear that groundwater contamination is gross or widespread.

There was only preliminary study in each of these five areas, and therefore additional monitoring wells (shallow and deep) need to be installed to define the extent and sources of contamination, as well as detailed facility surveys in the site specific industrial areas to verify the sources and to develop appropriate remedial measures.

In order to accomplish this objective, the Nassau County Department of Health should either undertake further investigation as part of a County remedial program, or seek to have these sites placed on the Federal and/or New York State Superfund List for additional preliminary study or Remedial Investigation and Feasibility Study.

Detailed locations for additional wells cannot be provided at this time based on limitations of existing information. Well locations should be defined only after additional, more detailed facility surveys and inspections have been conducted to determine possible sources of contamination. Wells should be placed both upgradient and downgradient of suspected facilities to isolate contamination sources. Additional wells should also be installed downgradient of the study areas to define the horizontal and vertical extent of groundwater contamination and threat to sources of water supply.

For each of the study sites, recommendations for specific remedial action cannot be provided based on the limited data gathered in this study. Site specific mitigation measures can only be developed after the extent and source of contamination has been defined. The most applicable mitigation measures in these study areas, based on a preliminary screening of technological alternatives, are the following:

- o Excavation and off-site removal of contaminated water, sludges and soils
- o Impermeable surface seals (capping) to minimize contaminant leaching
- o Subsurface contaminant barriers (such as slurry walls, grout curtains and vibrating beams), with pumping wells to control and recover contaminated groundwater
- o Soil flushing systems with subsurface barriers and recovery systems to clean contaminated soils
- o Onsite Treatment (air or steam stripping and carbon adsorption), with groundwater discharge, or pretreatment with discharge to a municipal treatment facility.

In addition to continued investigation in the five sites selected as part of this study, similar investigation should be undertaken in other areas of Nassau County identified as overlying contaminated aquifer segments. These areas include Lake

Success and Glen Cove. (Other areas of groundwater contamination in the Roosevelt Field and Bethpage-Hicksville areas are being studied.) Monitoring wells should also be installed in industrial areas of the County which are presently not monitored for groundwater contamination. This is particularly important in the unsewered areas which are in the deep water supply recharge zone.

1.0 INTRODUCTION

1.1 Project Background

Since 1975, when signficant concentrations of vinyl chloride, tetrachloroethylene and trichloroethylene were discovered in water supply wells within an industrial complex in the southeastern part of the County, the Nassau County Department of Health (NCDH) has undertaken an extensive program to determine the extent and sources of organic chemical contamination in the aquifer system underlying Nassau County. Initially, the management approaches employed by the Health Department involved sampling and restricting the use of public water supply wells to protect public health, and surveying industrial and commercial establishments to identify and abate sources of organic chemicals.

As a result of these surveillance programs, 420 public water supply wells are sampled routinely at least once each year for synthetic organic chemicals, and over 4,000 industrial/-commercial establishments have been surveyed since 1976. Based on these programs, 15 public water supply wells are currently restricted because levels of organic contaminants exceed New York State Guidelines for drinking water, and wastewater discharges from 40 establishments are controlled by permits issued as part of the New York State Pollutant Discharge Elimination System (SPDES). In addition, 200 facilities which store and dispose of organic chemical products and wastes (including fuel oil and gasoline storage tanks) are regulated under Article Eleven of the Nassau County Sanitary Code, and 35 petroleum discharge permits have been issued in the county.

In addition to industrial and commercial waste disposal, an extensive investigation into the uses of toxic household products determined that unsewered residential areas may also be a significant source of organic chemical contamination of groundwater. As as result of this determination, sales of organic chemical cesspool and drain cleaners were banned on Long Island in 1980 by State law.

With the successful implementation of organic chemical monitoring in groundwater and source control programs, Nassau County has initiated a third management approach which entails the mitigation of existing groundwater contamination. This approach involves defining the extent of contamination, determining sources (if possible), and identifying the need for remedial programs. Remedial actions that have been undertaken by either County, State or Federal agencies at selected sites to date include: excavation and removal of contaminated soils and sludges; containment of contaminated groundwater and soil with subsurface barriers and surface seals; aquifer restoration by pumping and treatment; installation of water supply monitoring systems; and provision of contingencies for water supply treatment or alternate supplies.

As part of this overall effort to identify and mitigate groundwater contamination by organic chemicals, the New York State Legislature, through the New York State Health Department (NYSHD) appropriated special funding to conduct Groundwater Investigation Programs on Long Island. Under contract with NYSHD, the Nassau County Department of Health (NCDH) has undertaken six special groundwater projects. These projects comprise:

1. Broad Spectrum Organic Chemical Testing
2. Comprehensive Glacial Aquifer Monitoring
3. Automated Data Processing
4. Investigation of a Contaminated Aquifer Segment (Roosevelt Field)
5. Investigation of Landfill Impact on Groundwater Quality (Syosset and Denton Avenue Landfills)

The sixth of these special projects, which is the subject of this report, is the investigation of sites of groundwater contaminated by synthetic organic chemicals. To assist in the performance of this investigation, NCDH retained Dvirka and Bartilucci, Consulting Engineers of Syosset, New York, to provide environmental engineering and geohydrological technical services.

1.2 Purpose and Scope

The purpose of this study is to identify the most significant sites of groundwater contaminated by organic chemicals in

Nassau County which have not already been investigated. Primary emphasis is given to those sites which pose the greatest threat to public water supply sources.

The scope of this investigation consists of the following tasks:

1. Review data available from NCDH's groundwater quality monitoring network and hydrogeologic information at the site of significant areas of contamination, as well as available records and data concerning past and present potential sources of contamination including industrial, commercial, residential and municipal facility discharges.
2. Rank and select areas for subsurface investigation on the basis of potential threat to sources of public water supply within the budget constraints of this project.
3. Design and implement procedures and specifications for subsurface investigation.
4. Evaluate the results of soil and water quality testing to determine the extent and source of groundwater contamination at each of the sites studied, and prepare a report on the methodology followed and findings of the study, including recommendations for legal, administrative and technical procedures for management of the contaminated aquifer and soil segments.

Tasks 1 and 2 were conducted jointly by NCDH and Dvirka and Bartilucci, Consulting Engineers. Task 3 was performed by NCDH, and Task 4 was performed by Dvirka and Bartilucci, with substantial assistance from NCDH.

1.3 Study Approach

Prior to this study, the most recent comprehensive assessment of organic chemical groundwater contamination in Nassau County was undertaken in 1978. In order to provide an updated assessment of groundwater quality in the County to determine the most critical areas of groundwater contamination and to select specific sites for subsurface investigation, maps of Nassau County were prepared showing the locations and depths of all water supply and monitoring wells. Superimposed on these maps was the most recent data for organic chemicals. Except for public water supply wells, analytical data for organic compounds were compared to New York State Drinking Water Guidelines for total volatile organic chemicals. For water supply wells, the chemicals were also compared to New York State Drinking Water Guidelines for individual chemicals. Based on this method of assessment, wells were classified into four contamination categories for total volatile organics and individual chemicals as tabulated below. The maps illustrating this information are provided in Appendix D of this report.

CONTAMINATION CATEGORIES FOR ORGANIC CHEMICALS

Category	Total Volatile Organics* (ug/l)	Individual Chemicals* (ug/l)
Ambient/Near Ambient	ND-10	ND-5
Contaminated	10-100	5-50
Significant Contamination	100-1000	50-500
Gross Contamination	>1000	>500

*Drinking Water Guideline (100 ug/l for total volatile organics and 50 ug/l for an individual compound except for benzene and vinyl chloride for which the guideline is 5 ug/l)

As a result of this evaluation and chemical inventory information obtained from industrial surveys conducted by NCDH, [redacted] in Nassau County. These areas are:

1. Mitchel Field
2. Roosevelt Field
3. Glen Cove

[redacted]

5. Lake Success

[redacted]

8. New Cassel
9. New Hyde Park
10. Garden City Park

Locations of these areas are shown in Figure 1-1.

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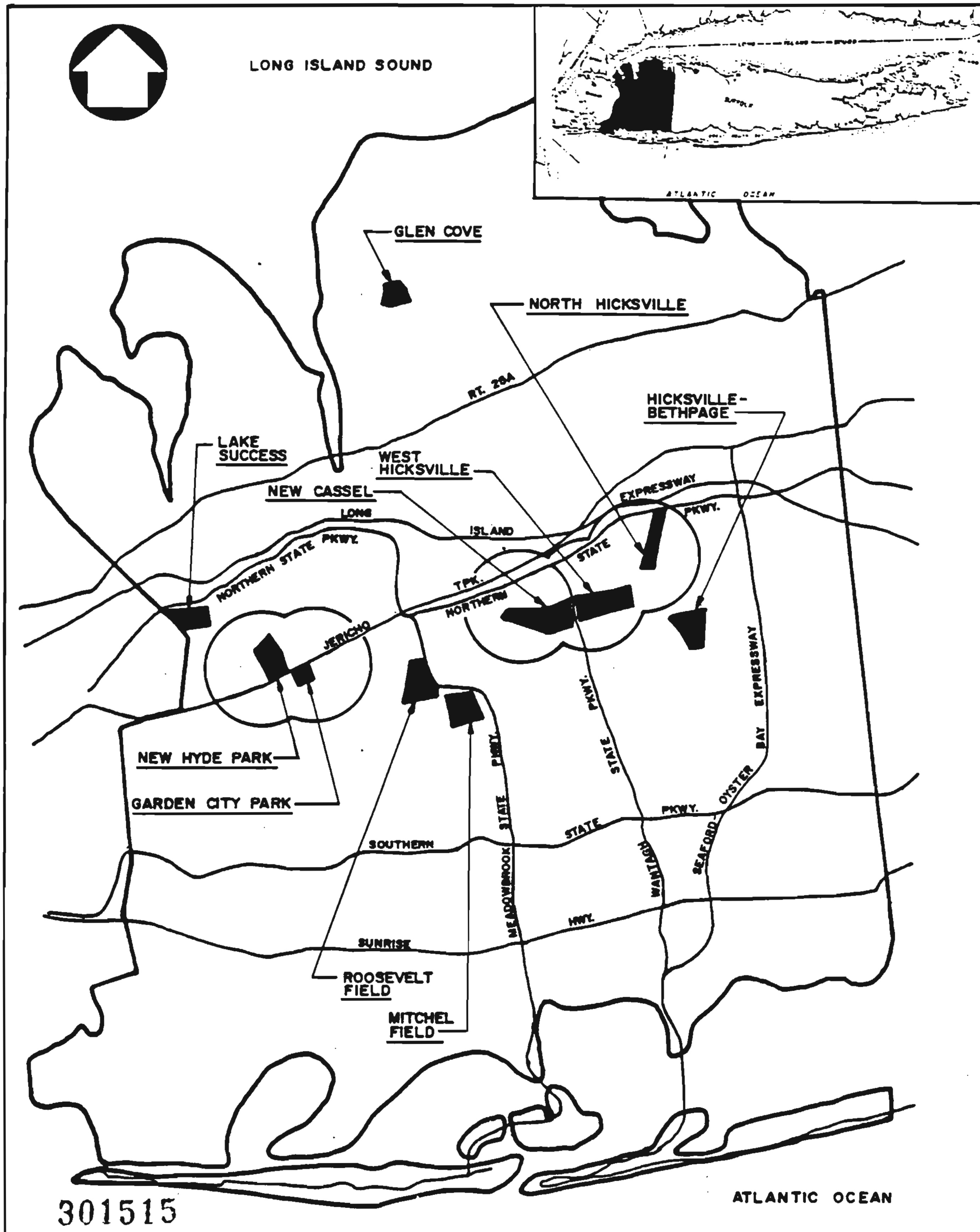

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LOCATION OF SITES OVERLYING CONTAMINATED AQUIFER SEGMENTS IN NASSAU COUNTY

FIGURE NO. 1-1

The areas of Mitchel Field, Roosevelt Field and Hicksville-Bethpage were excluded from investigation in this project because other studies were ongoing or planned for these sites. Glen Cove and Lake Success were excluded primarily because the depth to groundwater was too great (over 100 feet) and subsurface investigation of these areas would have been too costly given the limited funds for this project. Glen Cove was also excluded since it is not located in the Magothy recharge area. As a result of these determinations the sites selected for groundwater investigation as part of this project were: North Hicksville; West Hicksville; New Cassel; New Hyde Park; and Garden City Park.

A two phase approach was then taken in the design of the monitoring network in the five study areas. Initially, a survey of each of the sites to identify users of synthetic organic chemicals was performed in conjunction with the Department of Health. In Phase I, wells were installed within and downgradient of the industrial areas with special attention given to the facilities identified which handled substantial amounts of these chemicals. The data obtained from these wells was used to determine which monitoring networks would be expanded during Phase II.

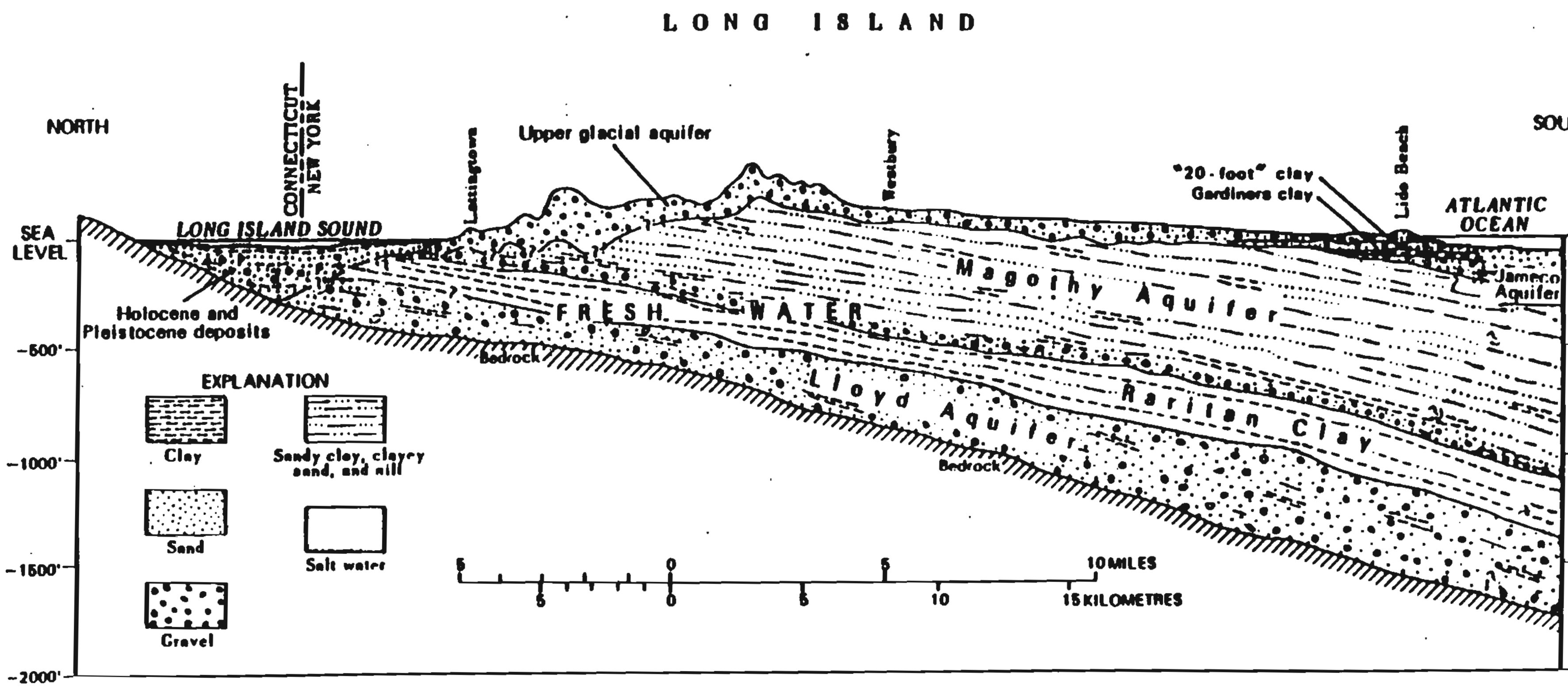
Based on the degree of contamination found in Phase I, only well networks in New Cassel and Garden City Park were expanded during Phase II. New Hyde Park well NHP-3, however, was raised 12 feet in order to sample a higher portion of the aquifer immediately below the water table. It was felt that this well, which was contiguous and downstream of an auto wrecking yard, may have been screened too deep and missed picking up contamination.

Phase II well locations were chosen within the industrial areas where more information was needed in view of the Phase I results and potential sources. In addition, wells were placed further downgradient in an attempt to define the extent of contamination, as well as upgradient of the areas under study to obtain background information.

All wells were located on public land or municipal water supply property because of the potential legal and time constraints inherent in attempting to gain access to private property.

1.4 Regional Hydrogeologic Setting

The aquifer system underlying Nassau County (Figure 1-2) is composed of three main water bearing units: the glacial, Magothy and Lloyd formations. These aquifers are hydraulically connected throughout, and the glacial and Magothy aquifers act as recharge for underlying units. The upper glacial aquifer, although not generally used for drinking water due to widespread contamination, is important because it serves as recharge for all underlying aquifers in the central portion of the County.



Generalized section in central Nassau County showing principal aquifers and confining units (after Perlmutter and Geraghty, 1963, fig. 3).

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Dvirka and Bartilucci CONSULTING ENGINEERS

NASSAU COUNTY
HYDROGEOLOGIC CROSS SECTION

FIGURE NO. 1-2

The oldest rocks in the area are weathered and crystalline bedrock of Lower Paleozoic and (or) Precambrian age that form a virtually impermeable base for the groundwater reservoir.

Upper Cretaceous coastal plain deposits of continental and marine origin overlay the bedrock. These deposits have been subdivided into three hydrogeologic units which are, from oldest to youngest, the Lloyd aquifer, the Raritan clay and the Magothy aquifer. These units are present throughout most of the County and are recognized as distinct hydrogeologic units. The deposits dip and thicken to the southeast with the maximum thickness being about 1,500 feet.

The Lloyd aquifer is the oldest and deepest water bearing unit. It rests upon bedrock and consists of lenticular deposits of clay, silt, sandy clay, sand and gravel. The top of the aquifer dips southeast from about 500 feet below sea level in the northern part of the study area to more than 1,400 feet below sea level at the southern tip of Nassau County. The Lloyd aquifer is about 200-300 feet in thickness in the study area. Although there are a few Lloyd wells in central Nassau County, this aquifer is used as a primary source of water supply only along the north shore of the County where the Magothy aquifer does not exist and in the Long Beach-Lido Beach area (extreme southern portion of Nassau County) when the Magothy is salted. Water in the Lloyd aquifer is confined beneath the Raritan clay. The aquifer is believed to be hydraulically continuous with the Magothy in Nassau County.

The Raritan clay, which overlies the Lloyd formation, is a significant confining unit that consists mainly of clay and silty clay, and some sandy clay and sand in the upper portion. The clay has a very low hydraulic conductivity but does not totally prevent movement of water between the Magothy and the underlying Lloyd aquifer. The clay ranges from 0 to about 200 feet in thickness.

The Magothy aquifer is the principal source of water supply underlying Nassau County. It consists mainly of lenticular beds of very fine to medium sand that are interbedded with clay and sandy clay, silt, and some sand and gravel. Most of the clay is in the upper half of the unit. Beds of coarse sand with gravel are found in most, but not all, locations in the lower 100 to 150 feet of the unit. The aquifer is non-existent in many areas along the north shore and reaches maximum thickness in the southern part of Nassau County where its extent is about 1,000 feet.

The upper glacial aquifer consists of deposits of late Pleistocene and recent (Holocene) age that overlie the Magothy aquifer. The top of the upper Pleistocene deposits is the present land surface, except where they are locally overlain by thin deposits of Holocene age. The deposits in Nassau County are generally highly permeable glacial outwash consisting of stratified sand and gravel and occasional thin clay beds. The saturated upper glacial aquifer is about 100 feet thick in the study area. Depth of the vadose or unsaturated zone in the County ranges from about 125 feet in the northern portion to about 20 feet along the south shore.

Water table contours and shallow groundwater flow in the study area are shown in Figure 1-3. The flow direction in the eastern Nassau County is northeast in the area north of the groundwater divide and almost due south, south of the divide. Towards the western part of the County the groundwater follows a general northwest and southwest flow pattern north and south of the groundwater divide respectively.

Groundwater flow in the Magothy aquifer (Figure 1-4) is similar to the shallower flow regime.

Groundwater in the Lloyd aquifer in eastern Nassau County flows in a northern direction, north of the groundwater divide and south of the divide in a more westward direction with less southerly components than the shallower flow regimes (Figure 1-5). In the western portion of the County, groundwater flow is in a westerly direction, both north and south of the divide.

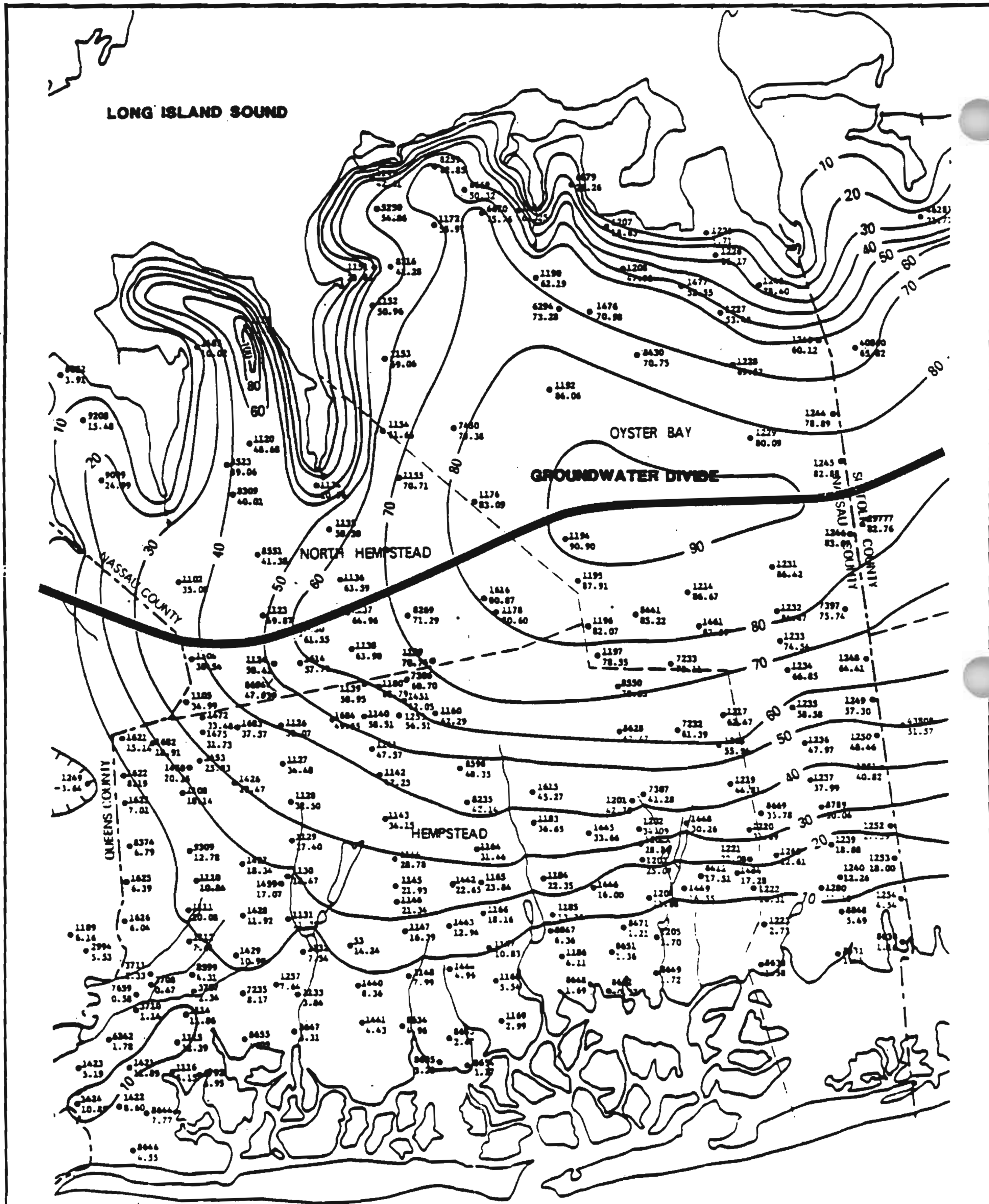
Because this groundwater system is the only source of drinking water for Nassau County (as well as Suffolk County), it has been designated a Sole Source Aquifer by the United States Environmental Protection Agency (USEPA).

1.5 Regional Groundwater Quality

In Nassau County there are four groundwater contaminants of concern, these being nitrate, chloride, heavy metals and synthetic organic chemicals. (A fifth is iron; however, this is a naturally occurring contaminant and is not included in this discussion.)

Nitrate contamination of the glacial aquifer in Nassau County is widespread geographically and extends into the Magothy formation. Levels in many locations of the glacial aquifer, except for the extreme south shore and limited areas on the north shore, exceed the drinking water standard of 10 milligrams per liter (mg/l). Nitrate contamination of groundwater is caused primarily by onsite sewage disposal, lawn fertilizer application and past agricultural practices.

In the Magothy aquifer, elevated concentrations of nitrates are found in the central portion of the County where there is natural recharge of the Magothy from the overlying glacial aquifer, which is enhanced by heavy water supply pumpage by Magothy wells. Areas with elevated concentrations are in the



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WATER TABLE ELEVATIONS IN NASSAU COUNTY

MARCH 1979

FIGURE 1-3

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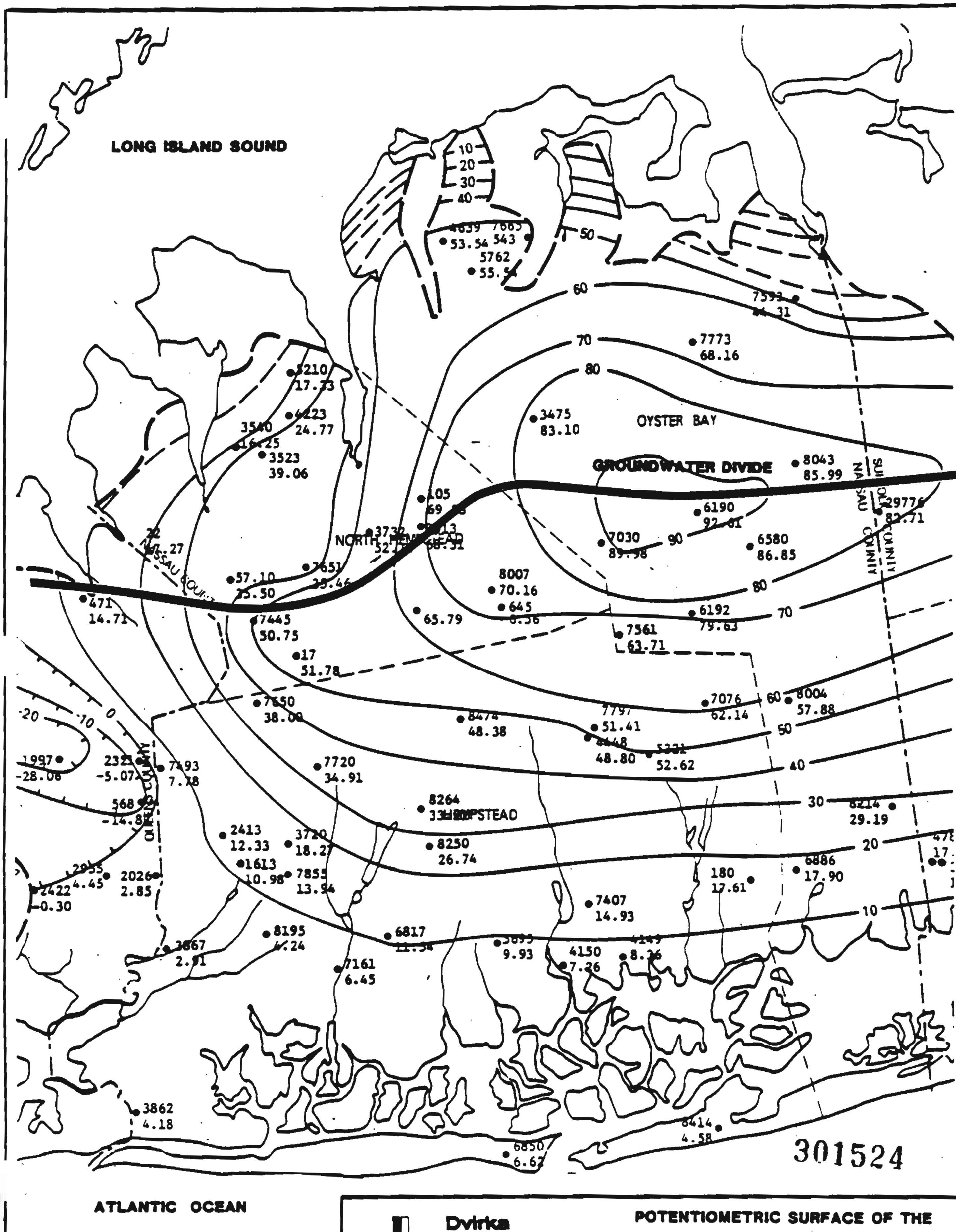
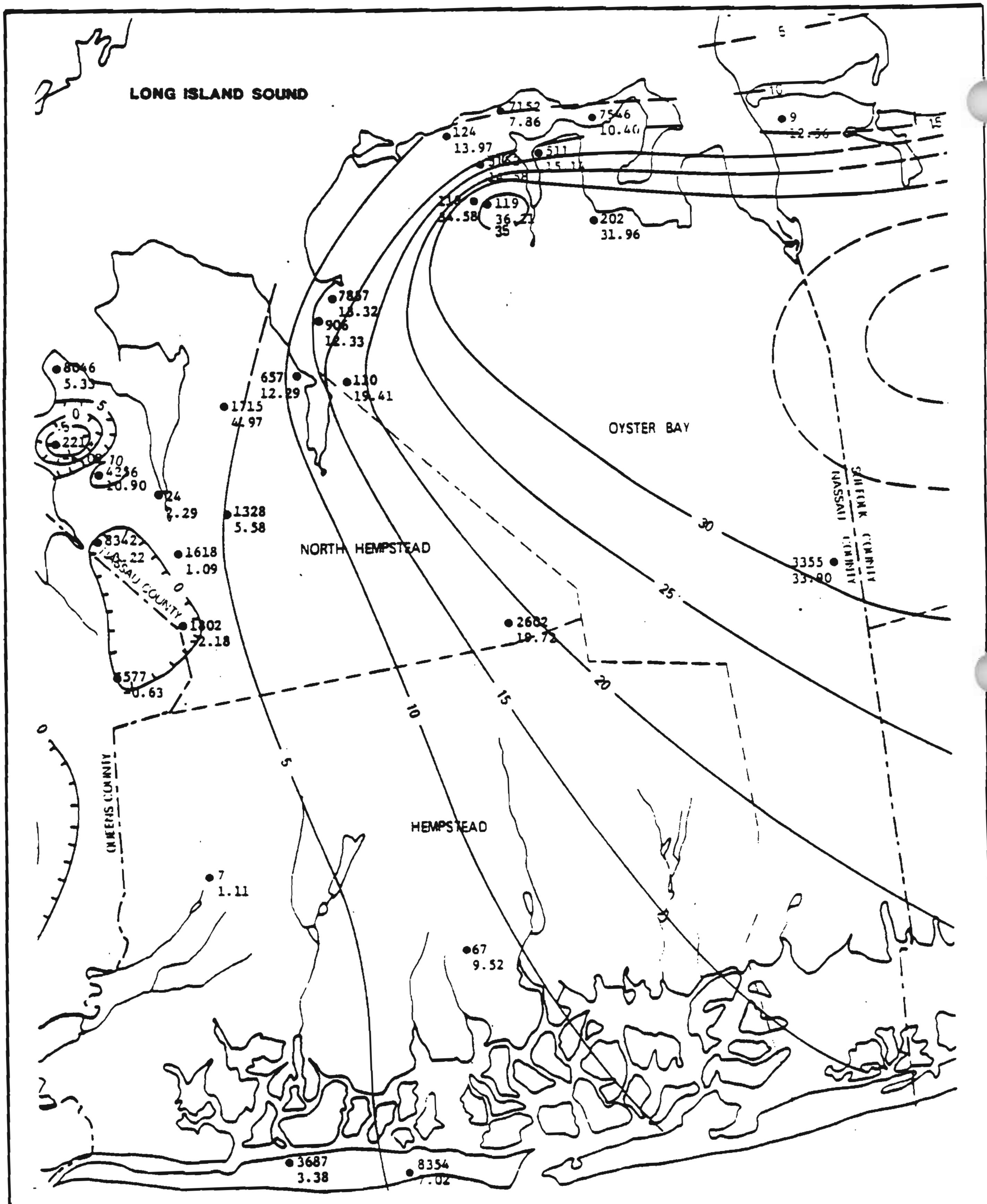


Dvirka and Bartilucci Consulting Engineers

POTENTIOMETRIC SURFACE OF THE MAGOTHY AQUIFER IN NASSAU COUNTY

MARCH 1979

FIGURE 1-4



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POTENTIOMETRIC SURFACE OF THE LLOYD AQUIFER IN NASSAU COUNTY

JANUARY 1979

FIGURE 1-5

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areas of Munsey Park, Garden City Park, East Meadow, Syosset, Bethpage and Levittown. Areas above 10 mg/l exist in both the northern and southern portions of Hicksville.

The Lloyd aquifer exhibits very little nitrate contamination.

Significant chloride contamination of groundwater in Nassau County is localized and confined to the areas of Kings Point and Long Beach-Lido Beach caused by saltwater intrusion, and in Port Washington due to sand mining (washing) operations. Levels above the drinking water standard of 250 mg/l are found in Mineola and Valley Stream which are attributable to leaching from road salt storage facilities.

Groundwater contamination caused by heavy metals is very limited in the County. Areas where concentrations of metals are elevated are in Syosset and North Hicksville. Two public water supply wells in North Hicksville have shown elevated levels of copper and heavy metals have been detected in monitoring wells at the Syosset Landfill. This contamination is most likely due to industrial waste disposal.

The fourth contaminant of significance in Nassau County is synthetic organic chemicals. Because these chemicals are fairly widespread and are considered public health significant in trace concentrations (many are known or suspected carcinogens), organic chemical contamination of groundwater is currently the major threat to water supply in the County.

The overall extent of contamination of drinking water sources by synthetic organic chemicals is demonstrated by the percentage of water supply wells at various ranges of concentration. Based on a comparison to current drinking water guidelines which are 50 ug/l for single compound (except for benzene and vinyl chloride which are 5 ug/l) data from 1976 to 1984 representing 434 public wells; 69% have non-detected (ND) levels; 21% are between ND and 10 ug/l; 8% are between 10 ug/l and 50 ug/l; and 3% exceed the guideline. In addition to the 14 public water supply wells which exceed the guideline because a single chemical is in excess of 50 ug/l, one well is currently restricted because the total of volatile organics is in excess of 100 ug/l, which is also the drinking water guideline. This contamination includes gasoline constituents (benzene, toluene and xylenes) and volatile halogenated organic chemicals. Illustrations of this contamination distribution is contained in Appendix D.

The most common organic compounds detected in water supply wells in Nassau County are trichloroethylene, tetrachloroethylene, and 1,1,1 trichloroethane detected in 24%, 22% and 17% of all wells tested respectively. Groundwater contamination caused by these compounds results primarily from the improper disposal of industrial wastes (solvents and degreasers); commercial wastes (e.g. dry cleaning fluids); use of cesspool and drain cleaners; and spills of chemicals, including gasoline.

Wells in the glacial aquifer exhibit a greater variety of synthetic organic chemicals detected in significantly higher concentrations compared to wells in the Magothy aquifer. This is because many of the glacial wells are in and immediately down-gradient of industrial areas, and are thus in closer proximity to contamination sources.

A comparison of organic chemical contamination in monitoring wells illustrates this widespread and often substantial contamination of the glacial aquifer in Nassau County by synthetic organic chemicals. Of the approximately 283 observation wells monitored in the County between 1976 and 1984, only 29% are non-detectable for any single organic chemical; 31% are between ND and 10 ug/l; 24% are between 10 and 50 ug/l; and 15% are above 50 ug/l. An overall summary of recent and historical organic chemical contamination in Nassau County by type of well and aquifer monitored is provided in Tables 1-1 and 1-2.

In some areas of the County such as Roosevelt Field and Garden City Park, levels ranging from 30,000 to 50,000 ug/l have been reported, and in Mitchel Field, concentrations of greater than 1,000,000 ug/l have been found near significant chemical spills.

Although there is widespread contamination of groundwater by organic chemicals in Nassau County, at the present time only

15 public water supply wells are restricted, and two of these are employing treatment. Based on this fact and current water quality guidelines, drinking water supply in general is of an acceptable quality in the County. Downward migration of contaminants from the glacial to the Magothy aquifer, however, may cause additional wells to be restricted in the future. In addition, promulgation of more stringent Federal standards for organic chemicals in groundwater (which is scheduled by USEPA for November 1986) may significantly exacerbate the problem and cause the restriction, or require treatment of an additional 55 water supply wells (17% of the total) in Nassau County.

For this reason it is important that sources of organic chemical contamination in the aquifer system be determined and abated, and contaminated soils and groundwater be mitigated to minimize any additional impairment of public water supply.

The investigation undertaken in this project is one of Nassau County's most significant initiatives in defining areas of major groundwater contamination and developing a basis for remedial action. Information from this study will aid in long term planning and management of the County's water supply sources.

TABLE 1-1

VOLATILE ORGANIC LEVELS IN WELLS BY AQUIFER

NASSAU COUNTY, NEW YORK

Data Between October 1, 1983 and September 30, 1984

	Wells Tested	None Detected	<10 ug/l	>10 - <50 ug/l	>50 ug/l
A. Public Supply					
Glacial	27	14 52%	10 37%	2 7%	1 4%
Magothy	274	194 71%	52 19%	25 9%	3 1%
Lloyd	33	25 76%	7 21%	1 3%	0 0%
Subtotal	334	233 70%	69 21%	28 8%	4 1%
B. Monitoring					
Glacial	88	23 26%	31 35%	23 26%	11 13%
Magothy	55	31 56%	6 11%	2 4%	16 29%
Lloyd	5	3 60%	2 40%	0 0%	0 0%
Subtotal	148	57 39%	39 26%	25 17%	27 18%
C. Aquifer Total					
Glacial	115	37 32%	41 36%	25 22%	12 10%
Magothy	329	225 68%	58 18%	27 8%	19 6%
Lloyd	38	28 74%	9 24%	1 2%	0 0%
Total	482	290 60%	108 22%	53 11%	31 6%

Note: Based on the maximum level of any single organic chemical detected in the last sample at each well.

Source: Nassau County Department of Health

TABLE 1-2

VOLATILE ORGANIC LEVELS IN WELLS BY AQUIFER

NASSAU COUNTY, NEW YORK

Data Between July 1976 and September 30, 1984

	Wells Tested	None Detected	<10 ug/l	>10 - <50 ug/l	>50 ug/l
A. Public Supply					
Glacial	43	23 53%	13 30%	3 7%	4 9%
Magothy	348	241 69%	69 20%	31 9%	7 2%
Lloyd	43	34 79%	8 19%	1 2%	0 0%
Subtotal	434	298 69%	90 21%	35 8%	11 3%
B. Monitoring					
Glacial	283	83 29%	89 31%	68 24%	43 15%
Magothy	142	63 44%	31 22%	16 11%	32 23%
Lloyd	12	10 83%	2 17%	0 0%	0 0%
Subtotal	437	156 36%	122 28%	84 19%	75 18%
C. Aquifer Total					
Glacial	326	106 33%	102 31%	71 22%	47 14%
Magothy	490	304 62%	100 20%	47 10%	39 8%
Lloyd	55	44 80%	10 18%	1 2%	0 0%
Total	871	454 52%	212 24%	119 14%	86 10%

Note: Based on the maximum level of any single organic chemical detected in the last sample at each well.

Includes all wells tested since 1976 for volatile organics and BTX including abandoned wells.

Source: Nassau County Department of Health

2.0 DESCRIPTION OF MONITORING PROGRAM

2.1 Design and Installation of Monitoring Wells

Well drilling for this project consisted of the installation of two inch diameter "shallow" wells (53-62 feet deep) and four inch diameter "deep" wells (120-210 feet deep). The shallow wells were drilled to fifteen feet below the water table as estimated from existing data. Deep wells extended into deeper strata to monitor for downward migration of contaminants and to determine the vertical component of groundwater flow.

Well design specifications and construction supervision was provided by NCDH. All wells were installed and developed by Moretrench American Corporation. Each was finished to grade and furnished with a locking cast iron valve box. The elevation of the top of the casting was surveyed by the Nassau County Department of Public Works (mean sea level datum) and was used as the measuring point for water level readings.

Phase I wells are those installed between September 30, 1984 and December 3, 1984. Phase II wells were installed between August 13, 1985 and November 22, 1985. Table 2-1 lists all the wells installed as part of this project during each phase of drilling and their depths. Well survey diagrams are provided in Appendix C.

2.1.1 Drilling Methods

Wells less than 100 feet deep were drilled using the hollow stem auger method (eight-inch borehole). In most cases a wooden plug was used to cap the end of the auger to prevent soil from entering the hole. A head of potable water obtained from the local municipal water supply was kept in the auger to prevent soil from entering once the plug was removed by driving the casing. Well logs were recorded by examining soil taken from the auger flytes. Lithologic descriptions of these wells are provided in Appendix A.

Wells deeper than 100 feet were drilled using the mud rotary method (also eight-inch borehole) with a slurry composed of bentonite, potable water and "EZ Mud". Well logs were recorded using wash samples.

During Phase I of the well installation program, equipment was steam cleaned before beginning work at each of the five localities. During Phase II, the equipment was steam cleaned before drilling each well.

2.1.2 Well Construction

All wells were constructed with Schedule 80 flush joint threaded polyvinyl chloride (PVC) casing and screen (.020-inch horizontal slots) and provided with a vented PVC cap. Shallow wells were two-inch diameter PVC casing with ten feet of screen

TABLE 2-1

WELLS INSTALLED DURING EACH PHASE OF DRILLING

Area	Phase I Shallow	Phase I Deep	Phase II Shallow	Phase II Deep
New Cassel	NC-1 (60)		NC-13 (68)	NC-2d (120)
	NC-2s (57)		NC-14 (68)	NC-22d (125)
	NC-3 (60)		NC-15 (66)	NC-26d (120)
	NC-4 (62)		NC-16 (64)	NC-28d (130)
	NC-5 (67)		NC-17 (64)	NC-29d (121)
	NC-6 (62)		NC-18 (60)	NC-30d (118)
	NC-7 (57)		NC-19 (62)	
	NC-8 (57)		NC-20 (60)	
	NC-9 (59)		NC-21 (63)	
	NC-10 (58)		NC-23 (64)	
	NC-11 (58)		NC-24 (65)	
	NC-12 (57)		NC-25 (60)	
			NC-26s (62)	
			NC-27 (60)	
			NC-28s (57)	
			NC-29s (57)	
			NC-30s (40)	
Garden City Park	GCP-1 (55)		GCP-3 (40)	
	GCP-2 (59)		GCP-4 (61)	
			GCP-5 (59)	
			GCP-6 (55)	
			GCP-7 (65)	
			GCP-8 (60)	
			GCP-9 (61)	
New Hyde Park	NHP-1 (60)		NHP-3 (50) (raised 12 ft. during Phase II)	
	NHP-2 (63)			
	NHP-3 (62)			
West Hicksville	WH-1 (60)			
	WH-2 (63)			
	WH-3 (64)			
	WH-4 (66)			
	WH-5 (72)			
	WH-6 (64)			
North Hicksville	NH-1s (116)	NH-1d (212)		
	NH-2s (99)	NH-2d (210)		
	NH-3s (105)	NH-3d (225)		

Note: s -shallow
d -deep
( ) -depth below ground surface

at the bottom. Deep wells were four-inch diameter PVC casing with twenty feet of screen at the bottom. Each well screen was packed with #1 well gravel.

Two seals, two to five feet in thickness were placed in each borehole: a lower seal just above the screen and an upper seal at or near the top of the well. Lower seals were bentonite pellets in the deep wells, and either bentonite pellets, 5% bentonite cement, or cement were in the shallow wells. Upper seals were cement and located a few feet below the valve box. A cement seal inside the valve box was used on several wells, however, these caused flooding of the valve box and were later broken to prevent such flooding. In these cases only the lower seal remains reliable. Additional seals were also placed at confining (clay) layers encountered during construction of deeper wells to prevent cross contamination of the formations. Wells with additional seals are identified in the well construction diagrams in Appendix B.

With the exception of Phase II deep wells, the drilling cuttings were used to backfill the annular space unless the cuttings were suspected to be contaminated with organic chemicals. A "HNU Photoanalyzer" was used to detect possible contamination of cuttings during drilling. If contamination was suspected, a fine mortar sand was used as backfill. Soil samples were taken from the auger flytes at most wells and sent to the Nassau County laboratory for organic chemical analysis. Soil samples (wells) with detected organic compounds are identified in Table 3-3.

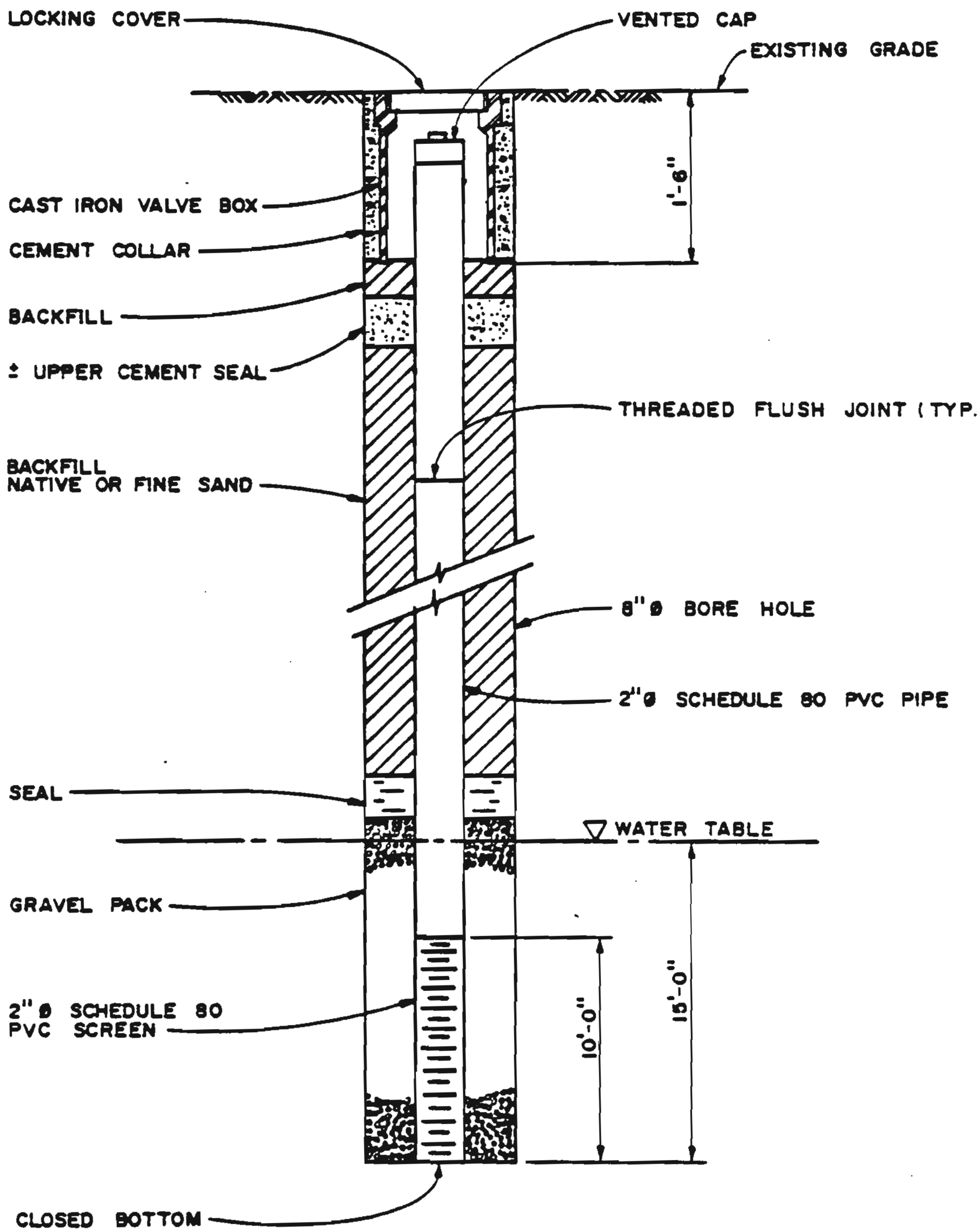
Because it is more likely to transfer contaminated soil from an upper portion of the aquifer to an area nearer to the screen in deep wells, all Phase II deep wells were backfilled with clean #1 gravel and no soil samples were analyzed for these wells. Gravel was used because of the anticipated difficulty in getting fine sand down through the bentonite mud.

Typical construction for the two-inch and four-inch wells are provided in Figures 2-1 and 2-2. Specific information for each well is detailed on the well completion diagrams in Appendix B.

It should be noted that these wells were constructed to obtain only preliminary indications of water quality and potential sources at least cost because of budget limitations. Additional groundwater investigations at these identified areas should use standard monitoring well construction methods as recommended by USEPA or the New York State Department of Environmental Conservation (NYSDEC).

2.1.3 Well Development

Wells were developed by air-lift pumping and by jetting with potable water. Air-lift development (no compressor air line



WELL INSTALLATION

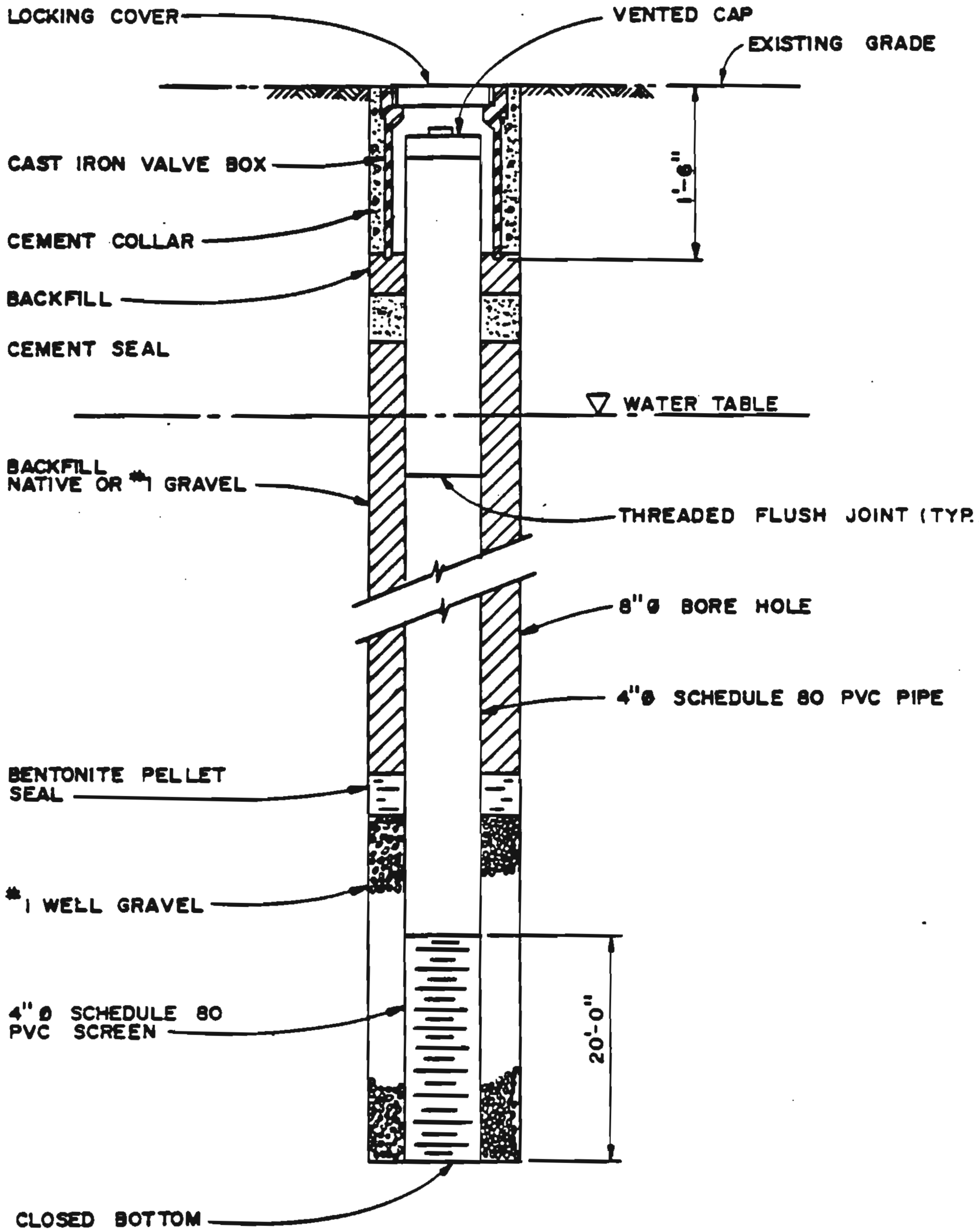
NO SCALE

301537

Dvirka and Bartilucci CONSULTING ENGINEERS

TYPICAL 2" DIA. MONITORING WELL DESIGN AND INSTALLATION

FIGURE NO. 2-1



WELL INSTALLATION

NO SCALE

301538

Dvirka and Bartilucci CONSULTING ENGINEERS

TYPICAL 4" DIA. MONITORING WELL DESIGN AND INSTALLATION

FIGURE NO. 2-2

filter was used) continued until little or no sand was visible in the discharge water and the flow of water appeared to have maximized. Most wells required one to two hours of air-lift development. Jetting was used at wells NC-28s, NC-26d and GCP-3. Wells were jetted with water when air lift pumping did not completely clear the screen. This occurred either because of excessive clay or hard pan in screened interval or because the screen was not completely below the water table. Equipment was steam cleaned before the development of each well.

2.2 Sampling and Analytical Procedures

All sampling and laboratory analyses were performed by Health Department personnel. During Phase I of the well drilling program at least several days lapsed between development and collection of the first samples, although some wells were sampled on the same day they were developed. During Phase II, several days lapsed in all cases. The construction logs in Appendix B indicate the date each well was developed. These can be compared with the sample dates given with the analytical results in Section 3.0.

2.2.1 Water Level Measurements

Water level readings were taken prior to sampling in order to determine the volume of water to be evacuated from each well. Water levels were obtained over the shortest time period possible in order to use them as an indicator of flow direction. Water levels were recorded for each site within a day. Measurements were made using a steel tape marked with chalk and referenced to the top of the well casing. Water levels obtained during this study are provided in Tables 2-2 through 2-6.

2.2.2 Water and Soil Sampling

Standardized USEPA protocol was used for the collection of water and soil samples. Soil samples were collected in 40 milliliter (ml) glass containers with teflon septum seals. Water samples were collected in two 250 ml glass containers with teflon lined caps. The sample containers were collected and capped so as to minimize agitation and prevent the entrapment of air bubbles. All samples were stored in crushed ice until delivered to the laboratory where they were refrigerated immediately.

Shallow wells were evacuated and sampled with a top loading stainless steel bailer. Three water column volumes were removed prior to sample collection. The bailer was rinsed first with a dilute acetone solution and then with distilled water before use at each well.

Deep wells were evacuated and sampled with a three-inch submersible pump. The pump was not cleaned between wells, however, ten to twelve water column volumes were evacuated to purge the pump and tubing.

TABLE 2-2

WATER LEVEL MEASUREMENTS FROM NEW CASSEL MONITORING WELLS

March 13, 1986

Well Number	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Water-Level Elevation (feet above mean sea level)
NC-1	119.3	46.7	72.6
NC-2s	121.3	48.5	72.8
NC-2d	121.0	48.3	72.7
NC-3	122.0	48.8	73.1
NC-4	123.9	49.9	74.0
NC-5	126.0	51.3	74.7
NC-6	126.6	51.1	75.4
NC-7	117.9	45.4	71.9
NC-8	118.7	44.1	74.5
NC-9	119.0	48.2	70.7
NC-10	119.2	---	---
NC-11	118.2	45.3	72.8
NC-12	123.3	48.0	75.3
NC-13	129.1	52.8	76.3
NC-14	130.9	54.6	76.2
NC-15	125.2	50.5	74.7
NC-16	123.2	49.2	73.9
NC-17	122.1	48.0	74.0
NC-18	117.1	45.1	71.9
NC-19	120.6	47.3	73.3
NC-20	117.6	45.5	72.1
NC-21	125.1	50.9	74.1
NC-22d	124.9	50.2	74.6
NC-23	122.8	48.4	74.3
NC-24	119.9	46.8	73.1
NC-25	118.9	45.3	73.5
NC-26s	112.9	41.2	71.8
NC-26d	111.4	39.0	72.3
NC-27	117.6	44.0	73.6
NC-28s	110.4	44.3	66.0
NC-28d	110.8	42.0	68.7
NC-29s	111.4	41.5	69.8
NC-29d	111.3	41.6	69.7
NC-30s	93.4	25.5	67.8
NC-30d	93.1	25.2	67.8

TABLE 2-2
(continued)

WATER LEVEL MEASUREMENTS FROM NEW CASSEL MONITORING WELLS

March 10, 1986

Well Number	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Water-Level Elevation (feet above mean sea level)
NC-1	119.3	46.6	72.6
NC-3	122.0	48.6	73.3
NC-4	123.9	49.8	74.1
NC-7	117.9	45.3	72.5
NC-8	118.7	46.6	72.1
NC-9	119.0	48.1	70.7
NC-10	119.2	46.9	72.3
NC-11	118.2	45.2	72.0
NC-12	123.3	48.8	74.4

WATER LEVEL MEASUREMENTS FROM NEW CASSEL MONITORING WELLS

March 7, 1986

Well Number	Elevation (feet above mean sea level)	Water (feet below measuring point)	Elevation (feet above mean sea level)
NC-5	126.0	51.2	74.8
NC-6	126.6	51.0	75.6
NC-13	129.1	53.6	75.5
NC-17	122.1	48.3	73.7
NC-22	124.9	50.5	74.3
NC-24	119.9	46.6	73.3
NC-25	118.9	45.1	73.7
NC-26s	112.9	39.5	73.5
NC-26d	111.4	40.8	70.6
NC-27	117.6	43.8	73.8
NC-28d	110.8	41.9	68.9
NC-30s	93.4	25.4	68.0
NC-30d	93.1	25.1	68.0

TABLE 2-2
(continued)

WATER LEVEL MEASUREMENTS FROM NEW CASSEL MONITORING WELLS

March 5, 1986

Well Number	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Water-Level Elevation (feet above mean sea level)
NC-2d	121.0	48.1	72.9
NC-14	130.9	54.4	76.4
NC-15	125.2	50.3	74.8
NC-16	123.2	49.1	74.1
NC-18	117.1	45.0	72.0
NC-19	120.6	47.8	72.7
NC-20	117.6	45.7	71.9
NC-21	125.1	50.8	74.3
NC-23	122.8	48.3	74.4
NC-29s	111.4	41.5	69.9
NC-29d	111.3	41.5	69.8

WATER LEVEL MEASUREMENTS FROM NEW CASSEL MONITORING WELLS

August 5, 1984

Well Number	Elevation (feet above mean sea level)	Water (feet below measuring point)	Elevation (feet above mean sea level)
NC-1	119.3	44.3	75.0
NC-2s	121.3	45.9	75.4
NC-3	122.0	46.2	75.8
NC-14	123.9	46.7	77.2
NC-25	126.0	47.9	78.1
NC-26	126.6	47.7	78.9
NC-27	117.9	43.3	74.6
NC-28s	118.7	44.6	74.1
NC-29d	119.0	44.4	74.6

TABLE 2-3

WATER LEVEL MEASUREMENTS FROM GARDEN CITY PARK MONITORING WELLS

March 11, 1986

Well Number	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Water-Level Elevation (feet above mean sea level)
GCP-1	89.4	41.7	47.7
GCP-2	100.7	50.7	49.9
GCP-3	88.6	37.4	51.1
GCP-5	94.8	45.6	49.1
GCP-6	95.4	46.0	49.4
GCP-7	98.5	51.1	47.4
GCP-8	94.8	47.3	47.5
GCP-9	92.8	44.4	48.3

TABLE 2-4

WATER LEVEL MEASUREMENTS FROM NEW HYDE PARK MONITORING WELLS

March 11, 1986

Well Number	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Water-Level Elevation (feet above mean sea level)
NHP-1	79.0	31.6	47.4
NHP-2	96.8	52.4	44.4
NHP-3	78.6	34.0	44.6

TABLE 2-5

WATER LEVEL MEASUREMENTS FROM WEST HICKSVILLE MONITORING WELLS

March 10, 1986

Well Number	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Water-Level Elevation (feet above mean sea level)
WH-1	125.4	48.9	76.4
WH-2	130.9	54.8	76.1
WH-3	139.7	53.7	86.0
WH-4	133.7	56.5	77.1
WH-5	134.9	57.3	77.5

TABLE 2-6

WATER LEVEL MEASUREMENTS FROM NORTH HICKSVILLE MONITORING WELLS

March 11, 1986

Well Number	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Water-Level Elevation (feet above mean sea level)
NH-1s	172.5	11.5	100.9
NH-1d	172.4	85.1	87.2
NH-2s	166.2	84.1	82.1
NH-2d	166.6	84.9	81.6
NH-3s	163.4	83.1	80.3
NH-3d	163.7	83.9	79.8

2.3 Analytical Procedures

All samples were analyzed by the Nassau County Department of Health Environmental Laboratory. Of the two 250 ml water samples, one was analyzed and the second was retained in reserve.

The analytical methods utilized for soil and water samples was a combination of USEPA method 624 and the New York State Department of Health approved method. A summary of the procedure used is as follows:

- Purge and trap onto poropak N adsorption tube.
- Methanol elution of adsorption tube.
- Analysis of effluent by capillary gas chromatography using an effluent splitter for dual detection by photoionization (volatile aromatic hydrocarbons) and electron capture detectors (volatile halogenated hydrocarbons)*

Quality Assurance and Quality Control (QA/QC) practices used for these procedures are taken from references 2 and 4.

The following areas of QA/QC were (and are routinely) addressed by the County Laboratory's Quality Assurance Program.

*Prior to January 8, 1985, the photoionization and electron capture detector analyses were performed separately.

- Documentation of day-to-day instrument performance.
- Records of instrument calibrations.
- Preparation of daily control charts.
- Records of personnel accountability to demonstrate chain of custody.
- Periodic laboratory replicate analyses.
- Regular use of laboratory blanks.
- Periodic recovery of standards by the method of standard additions
- Regular participation in proficiency programs sponsored by regulatory agencies and consultants.
- Regular participation in inter-laboratory splitting of reference samples.
- Records of precision and accuracy.
- Records of instrument repair and preventative maintenance.
- Regular monitoring of reagent quality.
- Records establishing the quality of reconditioned adsorption tubes.

Although formal chain of custody records were not kept, all field and laboratory personnel were accountable by signature for all work that they completed. Records were maintained so that all work functions could be traced back to the responsible individual. A "log-in" and tracking procedure was in place for all sample containers.

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3.0 MONITORING PROGRAM RESULTS

3.1 Methodology for Site-Specific Assessment

This monitoring program provides a preliminary determination of the extent of groundwater contamination in the five sites investigated as part of this study. This assessment is preliminary for several reasons. First, common to most studies only a small fraction of the groundwater is actually sampled. Second, there is always an unquantifiable difference between measured and actual groundwater conditions. Third, the construction of the local groundwater flow regimes is not based on long term groundwater level measurements and therefore for some of the areas, the most likely direction of contaminant movement is not well defined. Finally, the apparent variability in the analytical results from many of the same sampling points (originating from natural variability in water quality, sampling closely following development, erratic input of contaminants, sampling error and/or error in chemical analyses) has placed constraints in data evaluation.

The approach taken in the data evaluation was to discard the first analytical result for each of the wells installed during the study. It was felt that this sample may not be representative because in many cases it was taken shortly after well development and was possibly being influenced by the methods used in development. The water quality mapping for total organic compounds detected at each site was constructed based on the mean value. However, most mean values have an associated relatively large standard deviation indicating that the data are not consistent. In wells that seem to have increasing concentrations, this approach may not be valid. However, the data are not adequate to assess increasing or decreasing trends.

For each of the five selected areas, the site specific hydrogeology is assessed to the extent possible using static water level information and lithology obtained from well logs during construction of the monitoring wells. In addition, existing wells in each area (both water supply and monitoring) were also used in defining geologic and hydrologic conditions and supplementing the water quality data. Tentative boundaries between the glacial and Magothy aquifers based on the above information were not field verified, and thus can only be considered preliminary estimate.

Because land use in an area can have a direct effect on water quality, a site description is provided for each area. Land use is discussed from both a historical perspective as well as a current industrial profile.

Based on the above information, a preliminary assessment of water quality is made with respect to the extent of contamination and the threat to water supply, as well as general areas of contaminant sources. Water quality contouring of major contaminants is developed with special attention to potential source areas.

3.2 New Cassel

3.2.1 Site Description

New Cassel, shown in Figure 3-1, is an almost triangular shaped portion in the Town of North Hempstead with a total area of about three square miles. The northern borders are Brush Hollow Road east of Westbury and Cantiague Lane. The southern border is Old Country Road north of Bowling Green in the Town of Hempstead.

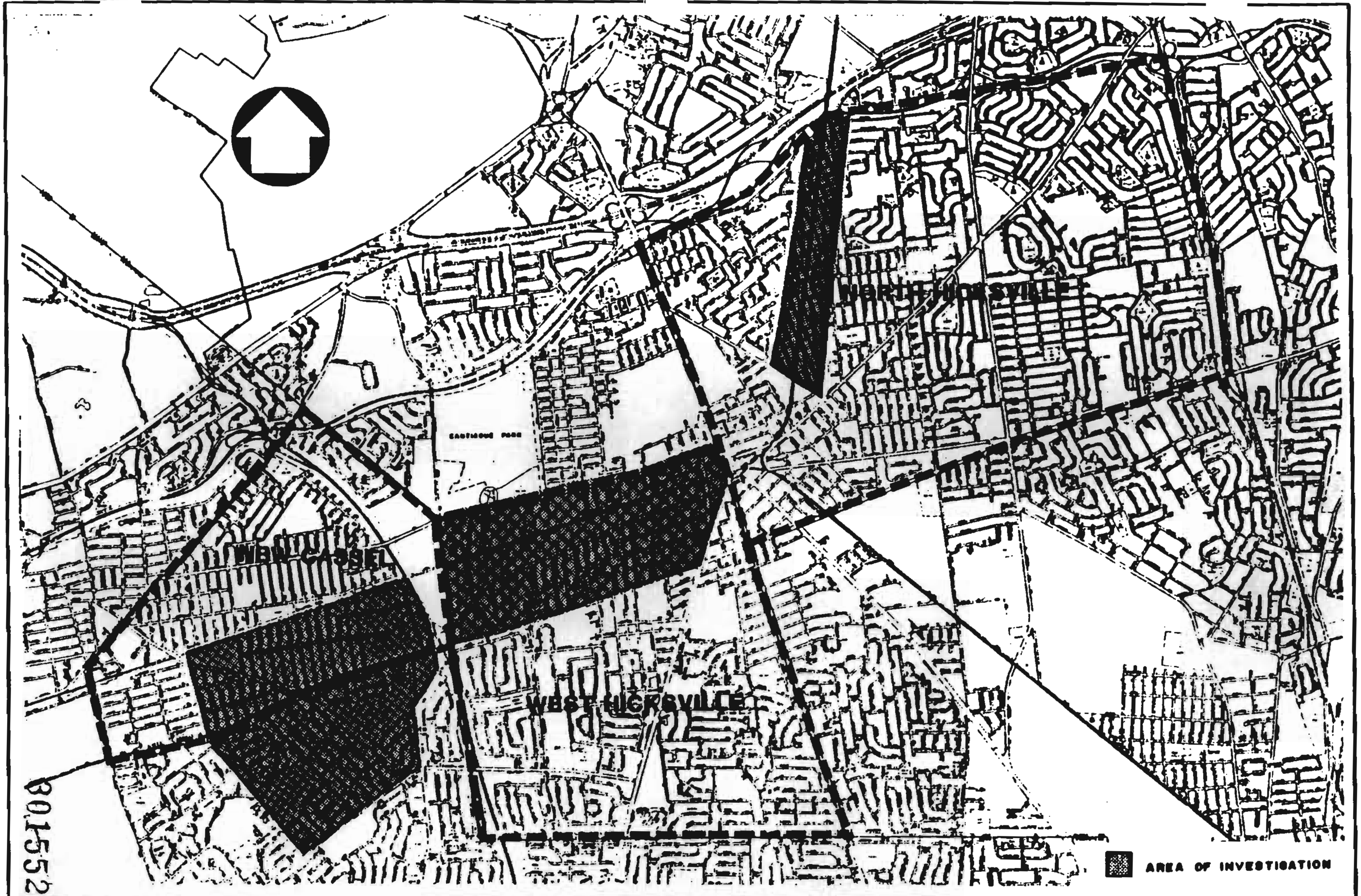
Most of the wells drilled as part of this study are located in the southern part of New Cassel near Railroad Avenue and north of Old Country Road between Grand Boulevard and Wantagh State Parkway. Three wells are located just north of Railroad Avenue and five wells are located south of Old Country Road in Bowling Green. Well locations are shown in Figure 3-2. This Figure also shows land use in the area.

The major land uses are residential, industrial, commercial and institutional. The residential area, located in the northern and southwestern part of New Cassel is of medium density with five to ten dwelling units per acre. Institutions (such as schools) are located within the residential areas. Commercial activity is concentrated on elongated strips along Prospect Avenue and along Old Country Road. Intensive industrial activity is concentrated between the Long Island Railroad and Old Country Road and north of the railroad west of Grand Avenue.

The area is serviced by the Town of North Hempstead Westbury Water District. New Cassel is part of Nassau County Sewage Disposal District #3 and the industrial area has been sewered since 1979. The area was developed about 30 to 40 years ago and growth since that time has been marginal. The 1980 population was 9,635, an increase of about 900 from 1970.

There are no known active or former landfills in New Cassel, however, there is a municipal landfill owned by the New York State Department of Parks and Recreation adjacent to the area on Duffy Avenue in Hicksville that accepts agricultural wastes, leaves, street sweepings and rubbish. There is also a former landfill on West John Street, east of Charlotte Street in Hicksville.

According to the Nassau County Department of Health, the only documented occurrence of groundwater contamination (prior to 1977) is from Jarco Metal Products Corporation located on Grand Avenue south of the railroad tracks. From at least 1952 to 1964, wastes were discharged directly into settling lagoons and cess-



Dvirka and Bartilucci CONSULTING ENGINEERS

LOCATION MAP OF NEW CASSEL, WEST HICKSVILLE AND NORTH HICKSVILLE

FIGURE NO. 3-1

Dvirka and Bartilucci

301553

NEW CASSEL
WELL LOCATION AND IDENTIFICATION

FIGURE NO.
3-2

pools. The groundwater was found to be contaminated with cyanide and hexavalent chromium. The contribution of this firm to contamination by organic compounds is unknown because organic chemical usage is not available and analytical methods were not developed until the mid 1970's to determine the presence of synthetic organics in water.

Information on the current industrial profile of New Cassel indicates that the area is heavily industrialized with a wide variety of industrial categories, including chemical, electrical, plastics and steel production facilities. Table 3-1 provides an industrial profile of the area from 1977 to 1985 and estimates annual organic chemical usage.

There are a number of facilities listed under either State Pollutant Discharge Elimination System (SPDES) discharge permit or NYS Part 360 permit. Known SPDES violations due to spills, illegal disposal of hazardous wastes or other violations are summarized below:

- Drum spill on June 7, 1984 (estimated to be 30-40 gallons of solvent) at 806 Oliver Avenue. Analyses of the drum material reported to be 1,1,2-trichloroethane at 2,000 ppm and 1,1,1-trichloroethane at 10,000 ppm.

- o Tishcon Corporation - two reported spills on September 19, 1984 off Brooklyn Avenue between Old Country Road and Main Street
  - 30 to 40 gallons of bright pink liquid
  - unknown white liquid around drywell

  Analyses reported to be 1,1,1-trichloroethane at 6,500 ppb, 1,1-dichloroethane at 450 ppb and trichloroethylene at 34 ppb. (This site has been cleaned up.)

- o Royal Athletic Supply Company - 120 Hopper St. - Complaint on November 29, 1979 about washing out 55 gallon drums in the street. The material is unknown.

3.2.2 Geology

The study wells in New Cassel tap the glacial and the upper Magothy aquifer. A hydrogeologic cross section is shown in Figure 3-3.

The upper glacial formation consists mainly of sand and gravel deposits with some cobbles in an unstratified mixture. The upper glacial aquifer is about 50 feet thick in the New Cassel area. This correlates with United States Geological Survey (USGS) information for this area.

The Magothy aquifer consists mainly of fine to medium sand with traces of silt and clay. The top of the Magothy is found at approximately 50 feet below the surface in New Cassel. Although scattered clay layers exist, the layers are not continuous in these wells, even at distances as close as 400 feet apart.

301555

TABLE 3-1

INDUSTRIAL PROFILE OF NEW CASSEL

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used, Stored, Disposed, etc. Since 1977
Duramed Pharmaceuticals	72 Sylvester St.	1,1,1 trichloroethane	1 drum
		Methylene chloride	1 drum
Custom Coatings Inc.	36 New York Ave.	Methylene chloride	200 gals/yr
		Chloroethene	200 gals/yr
Avanel Industries Inc.	121 Hopper St.	1,1,1 trichloroethane	35 gals/yr
Advance Food Service Equpt.	750 Summa Ave.	1,1,1 trichloroethane	330 gals/yr
Perma Fuse Corp.	675 Main St.	1,1,1 trichloroethane	200 gals/yr
		Toluene	2000 gals/yr
		Kerosene	600 gals/yr
Hamilton Avnet Electronics Inc.	70 State St.	Trichloroethylene	55 gals/yr
		Methyl ethyl ketone	300 gals/yr
Autronics Plastics	18 Sylvester St.	Toluene	120 gals/yr
Kwik-Eeze Corp.	54 Brooklyn Ave.	1,1,1 trichloroethane	1 gal/yr
		Toluene	1 gal/yr

301557

TABLE 3-1 (continued)

INDUSTRIAL PROFILE OF NEW CASSEL

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used Stored, Disposed, etc. Since 1977
LAKA Industry Inc.	62 Kinkel St.	Trichloroethylene	55 gals/yr
Holmes & Sons Inc.	84 New York Ave.	Methylene chloride	165 gals/yr
Warren Machine Co.	117 Urban Ave.	Methyl ethyl ketone	25 gals/yr
Molla Inc.	110 State St.	Paint thinner	2000 gals/yr
Bernite Products Inc.	84 New York Ave.	Methylene chloride Tetrachloroethylene	2000 gals/yr 500 gals/yr
Guillotine Splicer Co.	45 Urban Ave.	1,1,1 trichloroethane	12 gals/yr
Anthonsen's All Metal Prods.	630-640 Main St.	Methyl ethyl ketone	200 gals/yr
Sew Simple Inc.	115 Frost St.	Ink	300 gals/yr
Alltronics	45 Bond St.	Trichloroethane	600 gals/yr

TABLE 3-1 (continued)

INDUSTRIAL PROFILE OF NEW CASSEL

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used, Stored, Disposed, etc. Since 1977
Arkwin Industries Inc.	686 Main St.	1,1,1 trichloroethane Methyl ethyl ketone	4500 gals/yr 110 gals/yr
Atlas Graphics Inc.	567 Main St.	Trichloroethylene	312 gals/yr
Adchem Corp.	625 Main St. 85 New York Ave.	Toluene Methyl ethyl ketone	30,000 lbs/yr 30,000 lbs/yr
Bilt-Rite Steel Buck. Corp.	95 Hopper St.	Xylene	670 gals/yr
Dionics Inc.	65 Rushmore St.	Trichloroethylene Xylene	1000 gals/yr 100 gals/yr
Herbert Products Inc.	180 Linden Ave.	1,1,1 trichloroethane	4 gals/yr
Huron Tool & Cutting	75 State St.	Trichloroethane	20 gals/yr
IMC Magnets Corp.	570 Main St.	Tetrachloroethylene Methyl ethyl ketone Xylene	600 gals/yr 25 gals/yr 120 gals/yr

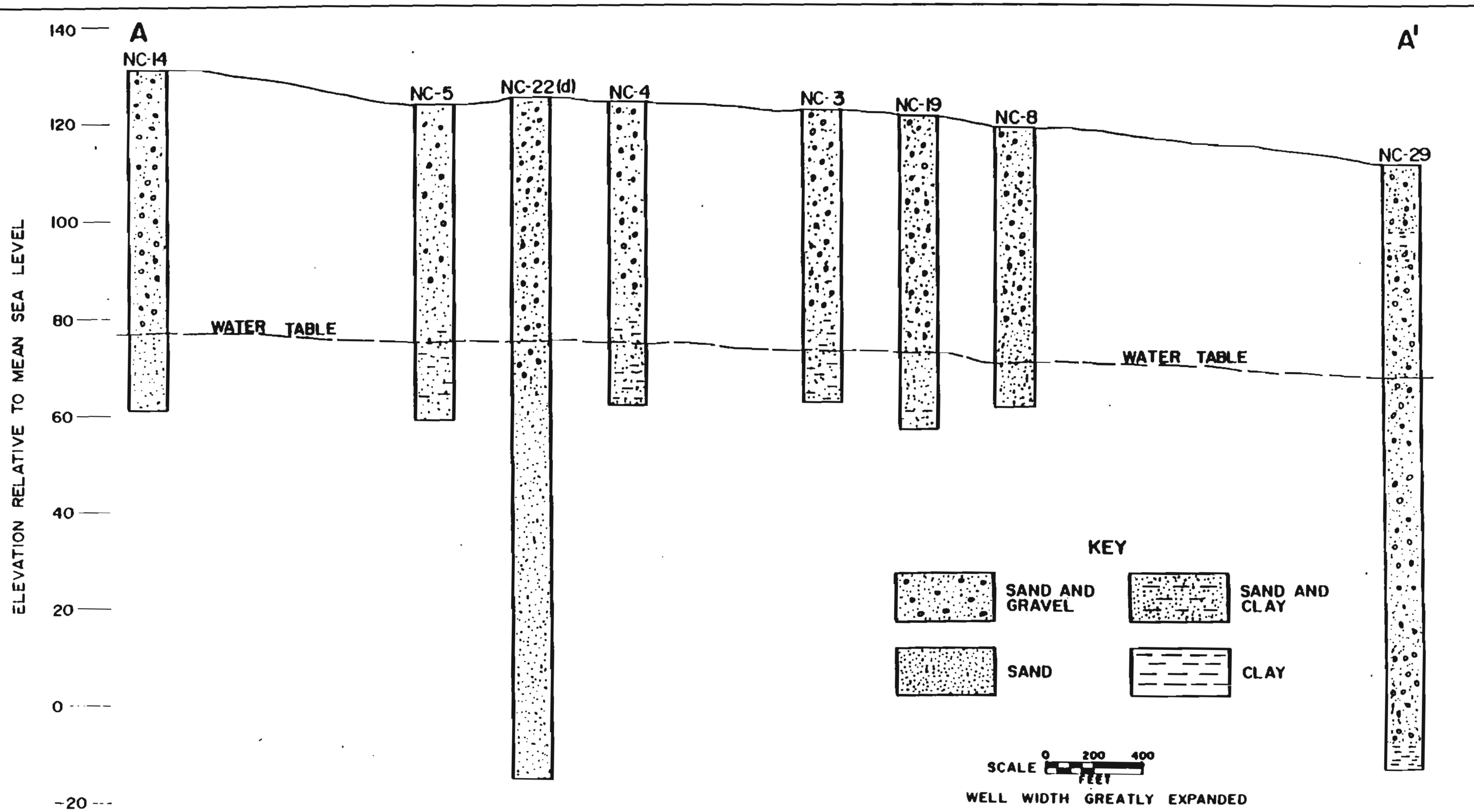
301559

TABLE 3-1 (continued)

INDUSTRIAL PROFILE OF NEW CASSEL

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used, Stored, Disposed, etc. Since 1977
International Ribbon & Carbon	49 Sylvester St.	1,1,1 trichloroethane	500 gals/yr
Island Transportation Corp.	299 Main St.	Trichloroethylene	80 gals/yr
Kaeonicks Inc.	700 Summa Ave.	1,1,1 trichloroethane	5-10 gals/yr
Westly Displays Inc.	589 Main St.	Toluol	10 gals/yr
Utility Mfg. Co.	700 Main St.	Trichloroethane	1500 gals/yr
Applied Fluids	770 Main St.	Methyl ethyl ketone Trichloroethylene	10 gals/yr 10 gals/yr
Parfuse Corp.	65 Kinkel St.	Tetrachloroethylene	55 gals/yr



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NEW CASSEL
HYDROGEOLOGIC CROSS SECTION A-A'

FIGURE NO. 3-3

301560

3.2.3 Hydrology

Regional groundwater flow direction in the New Cassel area is towards the southwest. This regional flow regime is evident in water level measurements taken from the New Cassel study wells, where water levels are found to be 76 feet above mean sea level in the northern area versus levels as low as 66 feet above mean sea level in the southwest. The contoured water levels for this area (Figure 3-4) show at least two modifications to the regional flow regime. Based on all available water level measurements and a resurvey of well elevations, well NC-12 is situated on what may be a local groundwater mound. NC-8 may may also be a local mound, however, only the most recent reading indicates the slightly higher water level for NC-8. Well NC-9 may be a local water table depression. This lower water level is consistent with other reported values for the past year. These local permutations to the groundwater regime may be the result of unknown pumping and recharge in New Cassel, or a survey error.

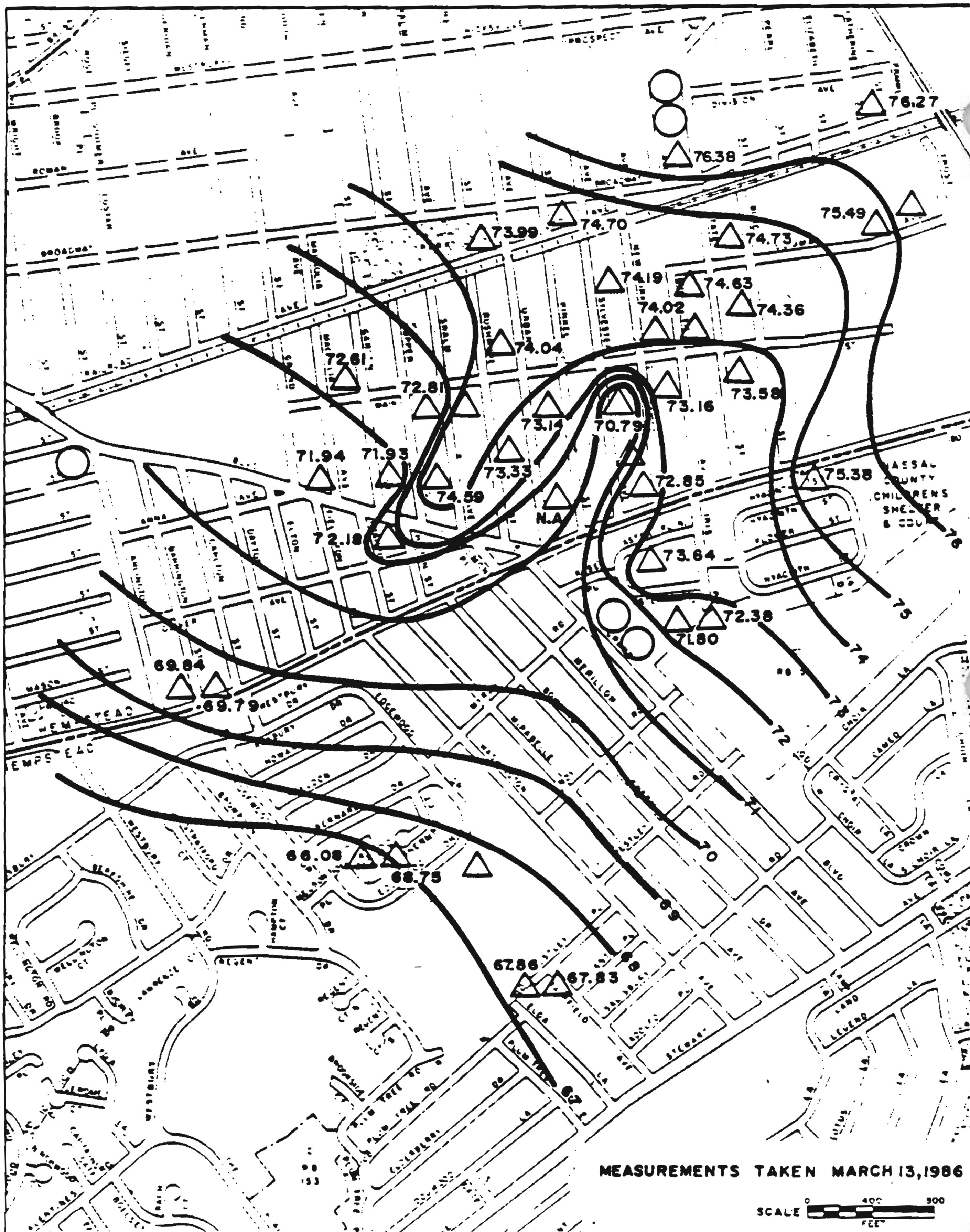
With regard to vertical flow in the New Cassel area, the static water levels in the shallow and deep cluster wells are not consistent. NC-2 did not demonstrate any appreciable difference in water levels between the shallow and deep wells. Well NC-26 showed a downgradient component of flow in the most recent reading, however, in a previous reading, the situation is reversed into an apparent groundwater upwelling based on the static water level measurements. In NC-28 where only one set of water level measurements are available, there is an apparent downward component of groundwater flow.

Although a determination of recharge/discharge characteristics cannot be inferred due to the data inconsistency obtained in this study, on a regional scale, New Cassel is in the deep recharge zone. Because the glacial and Magothy aquifers are hydraulically connected, contamination in the glacial aquifer is likely to migrate into the Magothy.

Additional data is necessary to determine an accurate and consistent picture of the local groundwater flow regime in this area.

3.2.4 Analytical Results and Findings

A total of 35 wells were installed in the New Cassel area as part of this groundwater investigation. The wells were sampled one to three times from December 1984 to February 1986. Seventeen of the 35 wells sampled as part of the New Cassel groundwater investigation exceed New York State guidelines for organic compounds in drinking water as do three existing wells in the area. One additional well also exceeds proposed Federal maximum limits for drinking water.



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NEW CASSEL
WATER LEVEL CONTOURS

FIGURE NO.
3-4

301563

Analytical results are shown in Table 3-2 and total organic compounds are summarized in Table 3-3. A graphic representation of analytical results for total organic compounds is shown in Figure 3-5.

Wells exhibiting significant contamination with mean values greater than 1000 ug/l of total organic compounds are NC-2s (2,927 ug/l); NC-7 (3,150 ug/l); NC-21 (1,023 ug/l); NC-25 (1,822 ug/l); N7732 (2,726 ug/l); and N9938 (9,800 ug/l). These wells are less than 2,400 feet from each other, and some are as close as 400 feet.

Principal contaminants in these wells are 1,1,1-trichloroethane; tetrachloroethylene; trichloroethylene; 1,1-dichloroethane; and (analyzed jointly) methylene chloride/1,1,2-trichlorotrifluoroethane/1,1-dichloroethylene.

These heavily contaminated wells are typically about 60 feet deep, however, two wells are deeper: N9938 is 80 feet deep and N7732 is 108 feet deep.

There are 12 wells with total organic compounds between 100 and 1000 ug/l:

Well No.	Total Organic Compounds (ug/l)
NC-2d	797
NC-4	503
NC-8	714
NC-9	532
NC-11	206
NC-19	112
NC-20	401
NC-23	127
NC-24	735
NC-27	344
NC-29s	873

Principal contaminants are 1,1,1-trichloroethane; tetrachloroethylene; trichloroethylene; chloroform; cis and trans-1,2-dichloroethylene; and (analyzed together) methylene chloride/1,1,2-trichlorotrifluoroethane/1,1-dichloroethylene.

These wells are also less than 4,000 feet from each other and some are as close as 400 feet.

There are seven wells with concentrations of total organic compounds between 10 and 100 ug/l:

Well Number	Total Organic Compounds (ug/l)
NC-3	35
NC-5	15
NC-16	16
NC-26s	14
NC-26d	22
NC-29d	48
NC-30d	27

The principal contaminants are tetrachloroethylene; 1,1,1-trichloroethane; trichloroethylene; and (analyzed jointly) methylene chloride/1,1,2-trichlorotrifluorethane/1,1-dichloroethylene. Four of these wells are about 65 feet deep, and three are about 120 feet deep.

Sixteen wells had non-detected to 10 ug/l of total organic compounds. Seven of these had no reported concentrations above the detection limit: NC-6; NC-14; NC-28s; N6819; N8497; N8956; and N8957. Three of these wells are about sixty feet deep; the remaining three are greater than 500 feet deep. One of these

TABLE 3-2

ANALYTICAL RESULTS - NEW CASSEL - GROUNDWATER QUALITY

WELL NUMBER	NC-1	NC-1	NC-1	NC-2s	NC-2s	NC-2s	NC-2s	NC-2s	NC-2s	NC-2d	NC-2d	NC-3	NC-3
WELL DEPTH	60	60	60	57	57	57	57	57	57	120	120	60	60
SAMPLE DATE	12/4/84	3/26/85	12/27/85	10/16/84	12/4/84	3/18/85	3/26/85	12/27/85	1/31/86	11/25/85	1/31/86	12/4/84	3/13/85
Trichlorofluoromethane	<1	<1	NA	<3	<1	<1	<1	NA	NA	NA	NA	<1	<1
Methylene Chloride }													
1,1,2-Trichlorotrifluoroethane }	<10	<4	<3	10	14	11	11	<3	84	<3	310	<10	<4
1,1-Dichloroethylene }													
c & t-1,2-Dichloroethylene	<15		<14	<10	<15		<20	17	22	NR	<10	<15	
t-1,2-Dichloroethylene		<5				<5							<5
1,1-Dichloroethane	<15	NA	<14	<15	<15	NA	NA	<14	<12	NR	71	<15	NA
c-1,2-Dichloroethylene		<20				<20							<20
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	2	<1	<1
1,1,1-Trichloroethane	<1	<1	1	69	40	130	150	390	560	430	260	2	3
Carbon Tetrachloride	<1	<1	<1	<1	<1	NR	<1	<1	<1	<1	<1	<1	<1
Trichloroethylene	<1	<1	<1	190	1300	2100	2300	2200	1500	68	64	<1	3
Bromodichloromethane	<1	<1	<1	<3	<10	NR	NR	<1	<1	<1	<1	<1	<1
c-1,3-Dichloropropene }													
Dibromochloromethane }	<2			<2	<2							<2	
1,1,2-Trichloroethane }													
c-1,3 Dichloropropene }													
Dibromochloromethane }		<1	<1			<1	<1	<1	<1	<1	<1		<1
1,1,2-Trichlroroethane		<2	<1			2	2	NR	1	<1	<1		<2
1,2-Dibromoethane	<6	<2	NA	<10	<60	NR	NR	NA	NA	NA	NA	<6	<2
Tetrachloroethylene	<1	1	2	62	1200	420	470	950	2200	41	90	16	39
Bromoform	<3	<1	<2	<6	<3	<1	<1	<2	<1	<2	<1	<3	<1
Benzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	NA	<3	<3	<3
Toluene	<3	<4	<6	<3	<3	<4	<4	<6	<4	NA	<4	<3	<4
Chlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<4	NA	<4	<3	<3
Ethylbenzene	<3	<3	<6	<3	<3	NR	NR	<6	<4	NA	<4	<3	<3
Xylene (o,m,p)	<3	<3	<6	<3	<3	<10	<3	<6	<5	NA	<5	<3	<3
Dichlorobenzene (o,m,p)	<5	<4	<9	<6	<5	<3	<4	<9	<9	NA	<9	<5	<4
Total	0	1	3	331	2554	2663	2933	3557	4307	541	797	18	45

301566

NA-Not Analyzed   NR-No Result Due To Technical Reasons   ?-No Mention On Lab Results

TABLE 3-2

ANALYTICAL RESULTS - NEW CASSEL - GROUNDWATER QUALITY

WELL NUMBER	NC-3	NC-4	NC-4	NC-4	NC-5	NC-5	NC-5	NC-6	NC-6	NC-6	NC-7	NC-7	NC-7
WELL DEPTH	60	62	62	62	67	67	67	62	62	62	57	57	57
SAMPLE DATE	12/26/85	12/4/84	3/25/85	12/24/85	12/4/85	3/25/85	12/24/85	12/4/84	3/26/85	12/24/85	12/4/84	2/28/85	12/27/85
Trichlorofluoromethane	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA
Methylene Chloride)													
1,1,2-Trichlorotrifluoroethane)--	<8	<10	6	<8	<10	<4	<8	<10	<4	<8	<10	<7	60
1,1-Dichloroethylene)													
c & t-1,2-Dichloroethylene	<14	<15		<14	<15		<14	<15		<14	<15		<14
t-1,2-Dichloroethylene			<5			<5			<5			<7	
1,1-Dichloroethane	<14	<15	NA	<14	<15	NA	<14	<15	NA	<14	170	NA	1300
c-1,2-Dichloroethylene			<20			<20			<20			7	
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	2	3	30	490	8	5	2	<1	<1	<1	420	510	4400
Carbon Tetrachloride	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<10	<1
Trichloroethylene	1	160	150	270	14	7	1	<1	<1	<1	<10	4	10
Bromodichloromethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
c-1,3-Dichloropropene)													
Dibromochloromethane)--		<2			<2			<2			<2		
1,1,2-Trichloroethane)													
c-1,3 Dichloropropene)													
Dibromochloromethane)--	<1		<1	<1		<1	<1		<1	<1		<1	<1
1,1,2-Trichlroroethane	<1		<2	<1		<2	<1		<2	<1		<2	2
1,2-Dibromoethane	NA	<6	<2	NA	<6	<2	NA	<6	<2	NA	<6	<2	NA
Tetrachloroethylene	21	2	2	58	13	10	5	<1	<1	<1	1	4	10
Bromoform	<2	<3	<1	<2	<3	<1	<2	<3	<1	<2	<3	<1	<2
Benzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Toluene	<6	<3	<4	<6	<3	<4	<6	<3	<4	<6	<3	<4	<6
Chlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Ethylbenzene	<6	<3	<3	<6	<3	<3	<6	<3	<3	<6	<3	<3	<6
Xylene (o,m,p)	<6	<3	<3	<6	<3	<3	<6	<3	<3	<6	<3	<3	<6
Dichlorobenzene (o,m,p)	<9	<5	<4	<9	<5	<4	<9	<5	<4	<9	<5	<4	<9
Total	24	165	188	818	35	22	8	0	0	0	591	518	5782

NA-N[illegible]yzed NR-No Result Due To Technical Reasons ?-No Ment[illegible] Lab Results

301567

TABLE 3-2

ANALYTICAL RESULTS - NEW CASSEL - GROUNDWATER QUALITY

WELL NUMBER	NC-8	NC-8	NC-8	NC-9	NC-9	NC-9	NC-10	NC-10	NC-10	NC-11	NC-11	NC-11	NC-12
WELL DEPTH	57	57	57	59	59	59	58	58	58	58	58	58	57
SAMPLE DATE	12/4/84	3/26/85	12/27/85	12/5/84	3/25/85	12/27/85	12/5/84	3/25/85	12/26/85	12/5/84	3/27/85	12/27/85	12/5/84
Trichlorofluoromethane	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1	<1	NA	<1
Methylene Chloride)													
1,1,2-Trichlorotrifluoroethane)	43	<4	<8	<10	14	39	<10	<4	<8	33	28	54	<10
1,1-Dichloroethylene)													
c & t-1,2-Dichloroethylene	120		<14	<15		<14	<15		<14	17		<14	<15
t-1,2-Dichloroethylene		<5			<5			<5			<5		
1,1-Dichloroethane	<15	NA	<14	<15	NA	35	<15	NA	<14	NR	NA	<14	<15
c-1,2-Dichloroethylene		<20			<20			<20			<20		
Chloroform	9	1	<1	13	250	110	<1	<1	<1	8	6	3	<1
1,1,1-Trichloroethane	42	13	31	50	150	180	1	1	1	35	26	20	3
Carbon Tetrachloride	<1	<1	<1	1	12	1	<1	<1	<1	<1	<1	<1	<1
Trichloroethylene	68	12	10	24	89	100	<1	<1	<1	150	120	120	1
Bromodichloroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
c-1,3-Dichloropropene)													
Dibromochloromethane)	<2			<2			<2			<2			<2
1,1,2-Trichloroethane)													
c-1,3 Dichloropropene)													
Dibromochloroethane)		<1	<1		<1	<1		<1	<1		<1	<1	
1,1,2-Trichlroroethane		<2	<1		<2	<1		<2	<1		<2	<1	
1,2-Dibromoethane	<60	NR	NA	<6	<2	NA	<6	<2	NA	<6	<2	NA	<6
Tetrachloroethylene	2300	920	440	46	72	62	1	1	1	32	20	14	1
Bromoform	<3	<1	<2	<3	<1	<2	<3	<1	<2	<3	<1	<2	<3
Benzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Toluene	<3	<4	<6	<3	<4	<6	<3	<4	<6	<3	<4	<6	<3
Chlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Ethylbenzene	<3	<3	<6	<3	<3	<6	<3	<3	<6	<3	<3	<3	<3
Xylene (o,m,p)	<3	<3	<6	<3	<3	<6	<3	<3	<6	<3	<3	<6	<3
Dichlorobenzene (o,m,p)	<5	<4	<9	<5	<4	<9	<5	<4	<9	<5	<4	<9	<5
Total	2582	946	481	134	587	527	2	2	2	275	200	211	5

NA-Not Analyzed NR-No Result Due To Technical Reasons ?-No Mention On Lab Results

TABLE 3-2

ANALYTICAL RESULTS - NEW CASSEL - GROUNDWATER QUALITY

WELL NUMBER	NC-12	NC-12	NC-13	NC-13	NC-14	NC-14	NC-15	NC-15	NC-16	NC-16	NC-17	NC-17	NC-18
WELL DEPTH	57	57	68	68	68	68	66	66	64	64	64	64	60
SAMPLE DATE	9/27/85	12/26/85	10/28/85	12/31/85	10/28/85	12/31/85	10/30/85	12/31/85	10/28/85	12/31/85	10/31/85	12/30/85	11/25/85
Trichlorofluoromethane	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride)													
1,1,2-Trichlorotrifluoroethane)--	<4	<8	NR	<8	NR	<8	NR	<8	NR	<8	NR	<8	<6
1,1-Dichloroethylene)													
c & t-1,2-Dichloroethylene		<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	<14	NR
t-1,2-Dichloroethylene	<5												
1,1-Dichloroethane	NA	<14	<15	<14	<15	<14	<15	<14	<15	<14	<15	<14	NR
c-1,2-Dichloroethylene	<20												
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	1	3	5	8	<1	<1	4	5	<1	<1	2	2	9
Carbon Tetrachloride	<1	<1	NR	<1	NR	<1	NR	<1	NR	<1	NR	<1	<1
Trichloroethylene	1	<1	<1	<1	<1	<1	<1	<1	2	7	<1	<1	11
Bromodichloromethane	<1	<1	NR	<1	NR	<1	NR	<1	NR	<1	NR	<1	<1
c-1,3-Dichloropropene)													
Dibromochloromethane)--													
1,1,2-Trichloroethane)													
c-1,3 Dichloropropene)													
Dibromochloromethane)--	<1	<1	NR	<1	NR	<1	NR	<1	NR	<1	NR	<1	<1
1,1,2-Trichlroroethane	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	<2	NA	<1	NA	<1	NA	<1	NA	<1	NA	<1	NA	<1
Tetrachloroethylene	7	<1	<1	<1	<1	<1	<1	<1	3	9	<1	<1	3
Bromoform	<1	<2	<1	<2	<1	<2	<1	<2	<1	<2	<1	<2	<2
Benzene	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	NA
Toluene	<4	<6	<4	<6	<4	<6	<4	<6	<4	<6	<4	<6	NA
Chlorobenzene	<3	<3	<4	<3	<4	<3	<4	<3	<4	<3	<4	<3	NA
Ethylbenzene	<3	<6	<4	<6	<4	<6	<4	<6	<4	<6	<4	<6	NA
Xylene (o,m,p)	<3	<6	NR	<6	NR	<6	NR	<6	NR	<6	NR	<6	NA
Dichlorobenzene (o,m,p)	<4	<9	<8	<9	<8	<9	<3	<9	<8	<9	<8	<9	NA
Total	9	3	5	8	0	0	4	5	5	16	2	2	23

NA-Not Analyzed   NR-No Result Due To Technical Reasons   ?-No Mention On Lab Results

TABLE 3-2

ANALYTICAL RESULTS - NEW CASTLE - GROUNDWATER QUALITY

WELL NUMBER	NC-18	NC-19	NC-19	NC-20	NC-20	NC-21	NC-21	9938	9938	NC-22d	NC-22d	NC-23	NC-23
WELL DEPTH	60	62	62	60	60	63	63	80	80	125	125	64	64
SAMPLE DATE	12/30/85	10/30/85	12/30/85	10/31/85	12/30/85	10/30/85	12/30/85	5/10/85	12/23/85	11/26/85	12/23/85	10/30/85	12/23/85
Trichlorofluoromethane	NA	NA	NA	NA	NA	NA	NA	<1	NA	NA	NA	NA	NA
Methylene Chloride)													
1,1,2-Trichlorotrifluoroethane)	<8	NR	<8	NR	<8	<9	9	58	1500	<6	<8	NR	100
1,1-Dichloroethylene)													
c & t-1,2-Dichloroethylene	<14	<15	<14	<15	<14	<94	94	32	32	NR	<14	<15	<14
t-1,2-Dichloroethylene													
1,1-Dichloroethane	<14	<26	<14	<26	<14	26	<14	64	46	NR	<14	<26	<14
c-1,2-Dichloroethylene													
Chloroform	<1	110	93	<1	<1	11	10	<1	1	<1	<1	<1	<1
1,1,1-Trichloroethane	4	2	2	94	260	58	150	610	7700	6	8	11	14
Carbon Tetrachloride	<1	NR	<1	NR	<1	<1	<1	<10	<1	<1	<1	NR	<1
Trichloroethylene	2	2	8	36	11	86	310	360	460	<1	<1	9	13
Bromodichloromethane	<1	NR	<1	NR	<1	<1	<1	<10	<1	<1	<1	NR	<1
c-1,3-Dichloropropene)													
Dibromochloromethane)													
1,1,2-Trichloroethane)													
c-1,3 Dichloropropene)													
Dibromochloromethane)	<1	NR	<1	NR	<1	<1	<1	<1	<1	<1	<1	NR	<1
1,1,2-Trichlroroethane	<1	<1	<1	<1	<1	<3	<1	2	2	<1	<1	<1	<1
1,2-Dibromoethane	NA	<1	NA	<1	NA	<1	NA	<1	NA	<1	NA	<1	NA
Tetrachloroethylene	2	9	14	100	130	240	450	42	59	<1	2	<1	<1
Bromoform	<2	<1	<2	<1	<2	<1	<2	<1	<2	<2	<2	<1	<2
Benzene	<3	<8	<3	<3	<3	2	<3	<3	<3	NA	<3	<3	<3
Toluene	<6	<5	<6	<5	<6	<4	<6	<4	<6	NA	<6	<5	<6
Chlorobenzene	<3	<3	<3	<3	<3	<2	<3	<8	<3	NA	<3	<3	<3
Ethylbenzene	<6	<3	<6	3	<6	<5	<6	<5	<6	NA	<6	<3	<6
Xylene (o,m,p)	<6	NR	<6	13	<6	7	<6	<4	<6	NA	<6	NR	<6
Dichlorobenzene (o,m,p)	<9	<8	<9	<8	<9	<11	<9	<8	<9	NA	<9	<8	<9
Total	8	123	112	246	401	430	1023	1168	9800	6	10	20	127

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NA-Not Analyzed   NR-No Result Due To Technical Reasons   ?-No Mention On Lab Results

TABLE 3-2

ANALYTICAL RESULTS - NEW CASSEL - GROUNDWATER QUALITY

WELL NUMBER	NC-24	NC-24	NC-25	NC-25	NC-26s	NC-26s	NC-26d	NC-26d	NC-27	NC-27	NC-27	NC-28s	NC-28s
WELL DEPTH	65	65	60	60	62	62	120	120	60	60	60	57	57
SAMPLE DATE	10/30/85	12/23/85	10/31/85	12/24/85	10/28/85	12/26/85	10/29/85	12/26/85	10/31/85	11/25/85	12/26/85	10/31/85	12/31/85
Trichlorofluoromethane	NA	NA	NA	NA	< NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride)													
1,1,2-Trichlorotrifluoroethane)--	NR	28	NR	190	<9	<8	NR	<8	220	<8	35	NR	<8
1,1-Dichloroethylene)													
c & t-1,2-Dichloroethylene	37	39	63	100	<94	<14	<14	<14	20	NR	<14	<14	<14
t-1,2-Dichloroethylene													
1,1-Dichloroethane	71	53	100	88	<12	<14	<15	<14	<26	NR	<14	<15	<14
c-1,2-Dichloroethylene													
Chloroform	<1	<1	<1	<1	3	1	1	<1	3	2	3	<1	<1
1,1,1-Trichloroethane	370	320	470	700	11	13	1	19	51	68	85	<1	<1
Carbon Tetrachloride	NR	<1	NR	<1	<1	<1	NR	<1	NR	<1	<1	NR	<1
Trichloroethylene	9	15	74	120	<2	<1	<1	2	78	200	200	<1	<1
Bromodichloromethane	NR	<1	NR	<1	<1	<1	NR	<1	NR	<1	<1	NR	<1
c-1,3-Dichloropropene)													
Dibromochloromethane)--													
1,1,2-Trichloroethane)													
c-1,3 Dichloropropene)													
Dibromochloromethane)--	NR	<1	NR	<1	<1	<1	NR	<1	NR	<1	<1	NR	<1
1,1,2-Trichlroroethane	<1	<1	3	4	<3	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	<1	NA	NR	NA	<1	NA	<1	NA	<1	NA	NA	<1	NA
Tetrachloroethylene	100	280	340	620	<1	<1	<1	1	30	41	51	<1	<1
Bromoform	<1	<2	<1	<2	<1	<2	<1	<2	<1	<2	<2	<1	<2
Benzene	<3	<3	<3	<3	<2	<3	<3	<3	<3	NA	3	<3	<3
Toluene	<5	<6	<5	<6	<4	<6	<4	<6	<5	NA	<6	<4	<6
Chlorobenzene	<3	<3	<3	<3	<2	<3	<4	<3	<3	NA	<3	<4	<3
Ethylbenzene	<3	<6	<3	<6	<5	<6	<4	<6	<3	NA	<6	<4	<6
Xylene (o,m,p)	NR	<6	8	<6	<6	<6	NR	<6	NR	NA	NR	7	<6
Dichlorobenzene (o,m,p)	<8	<9	<8	<9	<11	<9	<8	<9	<8	NA	<9	<8	<9
Total	587	735	1058	1822	14	14	2	22	402	311	377	7	0

NA-N[illegible]lyzed   NR-No Result Due To Technical Reasons   7-No Menti[illegible] Lab Results

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TABLE 3-2

ANALYTICAL RESULTS - NEW CASSEL - GROUNDWATER QUALITY

WELL NUMBER	NC-28s	NC-28d	NC-29s	NC-29s	NC-29s	NC-29d	NC-29d	NC-30s	NC-30s	NC-30d	NC-30d
WELL DEPTH	57	130	57	57	57	121	121	40	40	118	118
SAMPLE DATE	2/3/86	10/29/85	11/1/85	12/31/85	1/31/86	11/25/85	1/30/86	11/25/85	12/31/85	11/26/85	1/30/86
Trichlorofluoromethane	<NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride)											
1,1,2-Trichlorotrifluoroethane)--	<7	NR	NR	<8	<7	<6	12	<6	<8	<6	<7
1,1-Dichloroethylene)											
c & t-1,2-Dichloroethylene	<10	<14	72	94	120	NR	<10	NR	<14	NR	<10
t-1,2-Dichloroethylene											
1,1-Dichloroethane	<12	<15	<26	<14	<12	NR	<12	NR	<14	NR	<12
c-1,2-Dichloroethylene											
Chloroform	<1	<1	<1	<1	<1	<1	1	<1	2	1	2
1,1,1-Trichloroethane	<1	2	<1	<1	<1	19	21	2	8	15	19
Carbon Tetrachloride	<1	NR	NR	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethylene	<1	<1	24	16	16	4	8	<1	<1	1	2
Bromodichloromethane	<1	NR	NR	<1	<1	<1	<1	<1	<1	<1	<1
c-1,3-Dichloropropene)											
Dibromochloromethane)--											
1,1,2-Trichloroethane)											
c-1,3 Dichloropropene)											
Dibromochloromethane)--	<1	NR	NR	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichlroroethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	<NA	<1	NR	NA	NA	<1	NA	<1	NA	<1	NA
Tetrachloroethylene	<1	<1	640	560	940	4	6	<1	<1	8	4
Bromoform	<1	<1	<1	NR	<1	<2	<1	<2	<2	<2	<1
Benzene	<8	<8	<8	<8	<8	NA	<8	NA	<8	NA	<8
Toluene	<4	5	<5	<6	<4	NA	<4	NA	<6	NA	<4
Chlorobenzene	<4	<4	<8	<8	<4	NA	<4	NA	<8	NA	<4
Ethylbenzene	<4	<4	<8	<6	<4	NA	<4	NA	<6	NA	<4
Xylene (o,m,p)	<5	NR	<8	<6	<5	NA	<5	NA	<6	NA	<5
Dichlorobenzene (o,m,p)	<9	<8	<8	<9	<9	NA	<9	NA	<9	NA	<9
Total	0	7	736	670	1076	27	48	2	10	20	27

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NA-Not Analyzed   NR-No Result Due To Technical Reasons   ?-No Mention On Lab Results

TABLE 3-2

ANALYTICAL RESULTS
NEW CASSEL - GROUNDWATER QUALITY

Well Number	N5655	N6819	N6848	N7732	N8472	N8497	N8956	N8957
Well Depth (feet)*	260	260	104	108	195	544	530	584
Sample Date	8/7/85	8/7/85	5/10/85	5/10/85	5/10/85	8/21/85	4/11/85	2/6/85
Trichlorofluoromethane	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Methlyene Chloride)	NA	NA	6	230	< 4	NA	< 4	<10
1,1,2-Trichlorotrifluoroethane)								
1,1-Dichloroethylene)								
c & t-1,2-Dichloroethylene	NA	NA	<25	48	<25	NA	<20	NA
t-1,2-Dichloroethylene	< 1	< 1	NA	NA	NA	< 1	NA	< 7
1,1-Dichloroethane	< 1	< 1	74	860	NA	< 1	NA	NA
c-1,2-Dichloroethylene	< 1	< 1	NA	NA	NA	< 1	NA	NA
Chloroform	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	< 1	< 1	35	1200	10	< 1	< 1	< 1
Carbon Tetrachloride	< 1	< 1	< 1	<10	1	< 1	< 1	< 1
Trichloroethylene	< 1	< 1	1	360	6	< 1	< 1	< 1
Bromodichloromethane	< 1	< 1	< 1	<10	< 1	< 1	< 1	< 1
c-1,3-Dichloropropene)								
Dibromochloromethane)	NA	NA	NA	NA	NA	NA		
1,1,2-Trichloroethane)								
c-1,3-Dichloropropene)								
Dibromochloromethane)	NA	NA	< 1	< 1	< 1	NA	< 1	< 1
1,1,2-Trichloroethane	< 1	< 1	< 1	5	< 1	< 1	< 2	< 3
1,2-Dibromoethane	NA	NA	< 1	< 1	< 1	NA	< 2	< 2
Tetrachloroethylene	4	< 1	1	21	4	< 1	< 1	< 2
Bromoform	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Benzene	NA	NA	< 3	< 3	< 3	NA	< 3	< 5
Toluene	NA	NA	< 4	< 4	< 4	NA	< 4	< 3
Chlorobenzene	< 1	< 1	< 4	< 4	< 4	< 1	< 3	< 3
Ethylbenzene	NA	NA	< 5	< 5	< 3	NA	< 3	< 3
Xylene (o,m,p)	NA	NA	< 4	< 4	< 4	NA	< 3	< 3
Dichlorobenzene (o,m,p)	NA	NA	< 8	< 8	< 8	NA	< 4	<10
Total	4	0	117	2,726	21	0	0	0

*Below Ground Surface
NA - Not Analyzed

TABLE 3-3

NEW CASSEL - CONTAMINATED AQUIFER SEGMENTS
TOTAL ORGANIC COMPOUNDS
DATA SUMMARY
(ug/l)

New Cassel	Depth* (Feet)	Mean	Range	Median	Number of Data Points
NC-1	60	2	1-3		2
NC-2s	57	2927	2554-3557	2798	4
NC-2d	120	797			1
NC-3	60	35	24-45		2
NC-4	62	503	188-818		2
NC-5	67	15	8-22		2
NC-6	62	0	0-0		2
NC-7	57	3150	518-5782		2
NC-8	57	714	481-946		2
NC-9	59	532	527-537		2
NC-10	58	2	2-2		2
NC-11	58	206	200-211		2
NC-12	57	6	3-9		2
NC-13	68	8			1
NC-14**	68	0			1
NC-15	66	5			1
NC-16	64	16			1
NC-17	64	2			1
NC-18†	60	8			1
NC-19	62	112			1
NC-20	60	401			1
NC-21	63	1023			1
NC-22d	125	10			1
NC-23	64	127			1
NC-24	65	735			1
NC-25†	60	1822			1
NC-26s	62	14			1
NC-26d	120	22			1
NC-27	60	344	311-377		2
NC-28s	57	0	0-0		2
NC-28d	130	(7)			(1)
NC-29s	57	873	670-1076		2
NC-29d	121	48			1
NC-30s	40	10			1
NC-30d	118	27			1
N5655	260	4			1
N6819	260	0			1
N6848	104	117			1
N7732	108	2726			1

TABLE 3-3 (continued)

NEW CASSEL - CONTAMINATED AQUIFER SEGMENTS
TOTAL ORGANIC COMPOUNDS
DATA SUMMARY
(ug/l)

New Cassel	Depth* (Feet)	Mean	Range	Median	Number of Data Points
N8472	195	21			1
N8497	544	0			1
N8956	530	0			1
N8957	584	0			1
N9938	80	9800			1

Note: The first sample after well development was discarded in this data summary when more than one well analyses exist

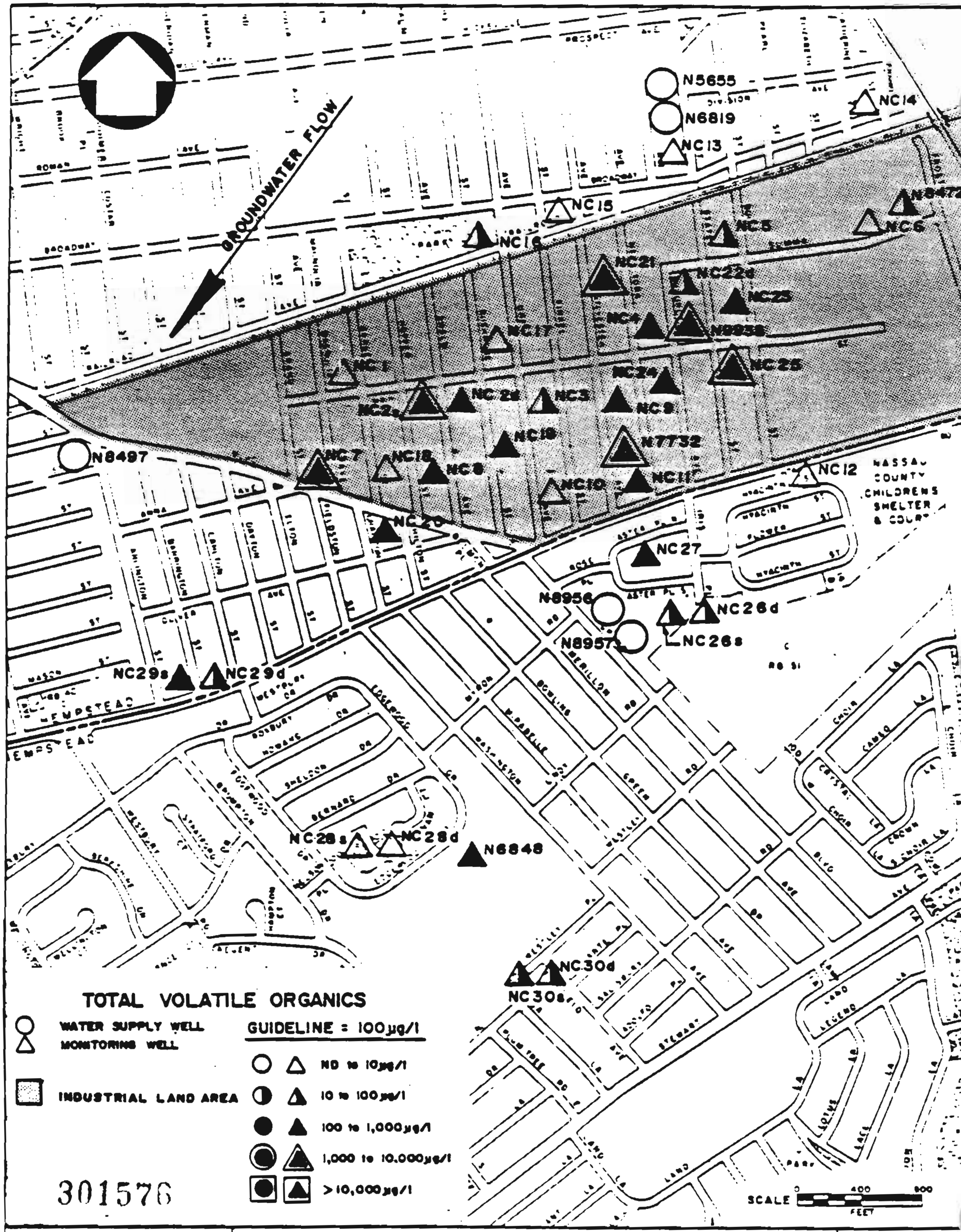
* Below ground surface

**No information is available on soil or drill cutting backfill

† Soil sample of drill cutting backfill indicate the following parameters:

NC-18	Ethylbenzene	140 ppb
	Xylene	160 ppb
NC-25	1,1,1-trichloroethane	26 ppb

( ) This is the first sample after well development; no subsequent samples available for this well.



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NEW CASSEL
WATER QUALITY-TOTAL VOLATILE ORGANICS

FIGURE NO. 3-5

wells, NC-28s is not contaminated at shallower depths, however, the one sample available for NC-28d has 7 ug/l reported for total organic compounds. Wells with 1 to 10 ug/l detected for total organic compounds are:

Well Number	Total Organic Compounds (ug/l)
NC-1	2
NC-10	2
NC-12	6
NC-13	8
NC-15	5
NC-17	2
NC-18	8
NC-22d	10
N-5655	4

Seven of these wells are about 60 feet deep, but NC-22d (125 feet) and N5655 (270 feet) are deeper.

The data suggests that the glacial and upper Magothy aquifers up to 120 feet below the surface are significantly contaminated with organic compounds. Some contamination also exists in wells up to 240 feet deep. Wells greater than 500 feet deep are not contaminated in the New Cassel area. The suite of organic compounds that are found in the shallow wells are larger than, but similar to compounds detected at greater depths. The site specific hydrogeology needs additional investigation before prediction of contaminant movement can be assessed.

Upgradient wells, such as NC-14, N-6, NC-13 and N-15 indicate that the source of organic contamination in New Cassel is to the south of these wells and in an industrial area.

For the six most contaminated wells, the following analysis is provided based on specific chemicals detected. Levels of total organic compounds for NC-7, the well furthest downgradient within the industrial area, increased from 518 ug/l in February 1985 to 5,782 ug/l in December 1985. (The first analysis in December 1984 reported 591 ug/l of total organic compounds was discarded as described in Section 3.1.) This increase can be attributed to two chemicals; 1,1-dichloroethane was not analyzed for in the February sample and had a reported concentration of 1,300 ug/l in December 1985; 1,1,1-trichloroethane increased from 510 ug/l to 4,400 ug/l. Further sampling and analyses for NC-7 are necessary to determine a consistent value and/or quantify any increasing trends.

There are several industrial users of 1,1,1-trichloroethane upgradient of well NC-7, but reported annual usage is generally small, less than 35 gallons per year. 1,1,1-trichloroethane may also have been used as a cesspool cleaning product prior to recent sewering of the area. There is no reported industrial use of 1,1-dichloroethane in the New Cassel area; however, this compound is a degradation product of 1,1,1-trichloroethane.

Well NC-2s, about 800 feet upgradient from NC-7 has four analyses available from December 1984 to December 1985 (a fifth was discarded as described in Section 3.1). Total organics increased from 2,554 to 3,557 ug/l over the year. This increase results primarily from two chemicals; 1,1,1-trichloroethane increased from 40 ug/l to 390 ug/l and trichloroethylene increased from 1,300 ug/l in the first sample to about 2,200 ug/l in the three subsequent analyses. Bromoform decreased from 1,200 ug/l in December 1984 to 450 ug/l in two samples taken March 1984. The most recent analysis for bromoform in this well was 950 ug/l. Currently, there are no reported industrial users of bromoform in the area. Bromoform is used in pharmaceutical manufacturing, as an ingredient in fire resistant chemicals and gauge fluid, and as a solvent for waxes, grease and oils.

1,1,1-trichloroethane has apparently migrated deeper into well NC-2d at a reported concentration of 430 ug/l in the one sample taken from this well. Well NC-21, about 1,200 feet upgradient of NC-2 shows a slightly different suite of contaminants; 1,1,1-trichloroethane is still present, but at a lower concentration (150 ug/l). Trichloroethylene (350 ug/l) and tetrachloroethylene (450 ug/l) are the largest contaminants in this well. There are several large users of trichloroethylene (300-1,000 gallons/year) and tetrachloroethylene in the New Cassel area (see Table 3-1).

Well N7732, located about 1,200 feet to the east of NC-2, has several contaminants reported in the most recent routine analysis; 1,1-dichloroethane (860 ug/l) and 1,1,1-trichloroethane (1,200 ug/l) are found in amounts that are similar to NC-7 and NC-2. Trichloroethylene is reported at 360 ug/l, but tetrachloroethylene is reported at only 21 ug/l. The other major constituent reported is methylene chloride/1,1,2-trichlorotrifluoroethane/1,1-dichloroethylene (not resolved analytically). There are several industries in the New Cassel area that report using methylene chloride up to 8,000 gallons per year.

NC-25 (one analysis used), located about 800 feet upgradient from N7732 and about 800 feet southwest of NC-21 contains 1,1,1-trichloroethane (700 ug/l), trichloroethylene (620 ug/l), methylene chloride/1,1,2-trichlorotrifluoroethane/1,1-dichloroethylene (100 ug/l) and trichloroethylene (120 ug/l).

Well N9938 (one analysis used), located 400 feet to the northwest of NC-25 has 7,700 ug/l of 1,1,1-trichloroethane, 1,500 ug/l of methylene chloride/1,1,2-trichlorotrifluoroethane/1,1-dichloroethylene and 460 ug/l of trichloroethylene.

In summary, it appears that contamination has migrated in the glacial and upper Magothy aquifer downgradient of the New Cassel area. Public water supply wells located as close as 800 feet from significantly contaminated observation wells, however,

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do not show signs of contamination. This indicates that the deeper portions of the Magothy aquifer in the study area have not been affected at the present time. However, lack of well defined clay layers as described in Section 3.2.2 indicates that there is a potential threat to water supply wells in and downgradient of this area.

3.3 Garden City Park

3.3.1 Site Description

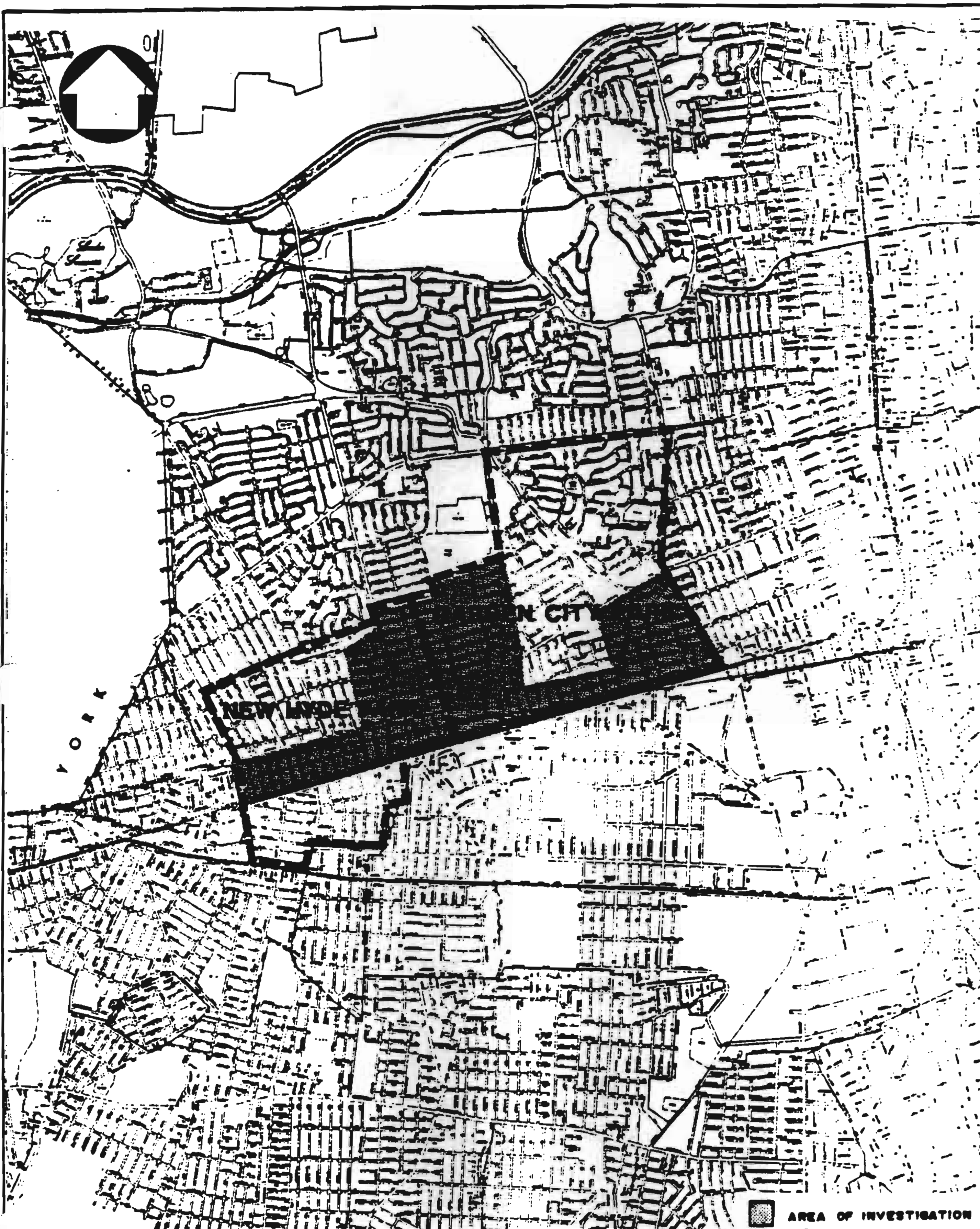
As shown in Figure 3-6, Garden City Park is a one square mile area that is part of the Town of North Hempstead. The northern border is along Hillside Avenue and extends southwards to the railroad tracks south of Jericho Turnpike. The eastern border is Herricks Road adjacent to Mineola, and the western boundary is approximately located by Leonard Boulevard next to New Hyde Park. All of the wells in this study are located in the most southern part of Garden City Park between the Long Island Railroad and Jericho Turnpike on the north (Figure 3-7). Two wells are located across the southern border into Garden City Village.

The major land uses are residential, commercial and industrial. The residential area, mainly to the north, is medium density, with five to ten dwelling units per acre. Commercial activity is concentrated in elongated strips along Jericho

Turnpike. Industry is concentrated along the southern railroad border of Garden City Park and in a north-south strip along Denton Avenue.

The area is serviced by the Town of North Hempstead Garden City Park Water District, and is part of Nassau County Sewage Disposal District #2 which has been serving the area since the early 1950's. The area was developed approximately 40 years ago and there is little current growth. The 1980 population was 7,712 people, an increase of 300 people since 1970. There are two former landfills in Garden City Park along Denton Avenue. These landfills are discussed in Section 3.5 because they are closer to wells drilled as part of the New Hyde Park groundwater investigation.

There are no known historical occurrences of groundwater contamination in this area. However, past storage and disposal practices of industry in the area are potential sources of contamination. In the 1977-1978 Industrial Survey Report prepared by NCDH, methods of disposing of organic chemical waste in this area included discharging of chemicals into drains and drywells, and disposal into trash or at unidentified landfills. Follow-up action required the cessation of these activities, but the impact on groundwater quality as a result of previous activities is unknown.



301583

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LOCATION MAP OF GARDEN CITY PARK AND NEW HYDE PARK

FIGURE NO. 3-6

Dvirka and Bartilucci

301584

GARDEN CITY PARK
WELL LOCATION AND IDENTIFICATION

FIGURE NO
3-7

Information on the current industrial profile of Garden City Park indicates that the major industry is manufacturing (chemical colloids, metal products, electrical and mechanical equipment) and printing. Table 3-4 lists the known industry in Garden City Park and estimated annual organic chemical usage. Dry cleaners have also been identified as a source of organic chemicals (tetrachloroethylene) in this area as a result of a study undertaken by Cornell University.

There are no facilities permitted for the disposal of hazardous chemicals although there are facilities permitted for storage of hazardous materials for disposal elsewhere.

3.3.2 Geology

A hydrogeologic cross section for wells in Garden City Park is shown in Figure 3-8. The wells installed in Garden City Park tap the upper glacial aquifer. The upper glacial aquifer is between 50-100 feet thick in this study area. Lithologic descriptions do not show a clear distinction between these formations.

There is no confining clay layer or interstitial clay described in these wells which have a maximum depth of about 70 feet below land surface. Similar descriptions for GCP-7, GCP-5 and GCP-2, of a clean well sorted medium sized sand are the basis of the tentative boundary between the glacial and Magothy sediments.

In the well log for N8409 (410 feet deep), which is located about 800 feet north of GCP-1, sand and gravel are found to a depth of 104 feet below ground surface with 50 feet of clay, sand and some gravel to about 154 feet. Two clay layers are described, one from 181 to 186 feet below the surface and one from 291 to 293 feet below the surface. In well N2565 (432 feet deep), there are three clay layers from 281 to 286, from 355 to 361 and 405 to 412 feet. The stratigraphic continuity of these layers is unknown and the potential correlation of the clay layers cannot be assessed based on available information.

3.3.3 Hydrology

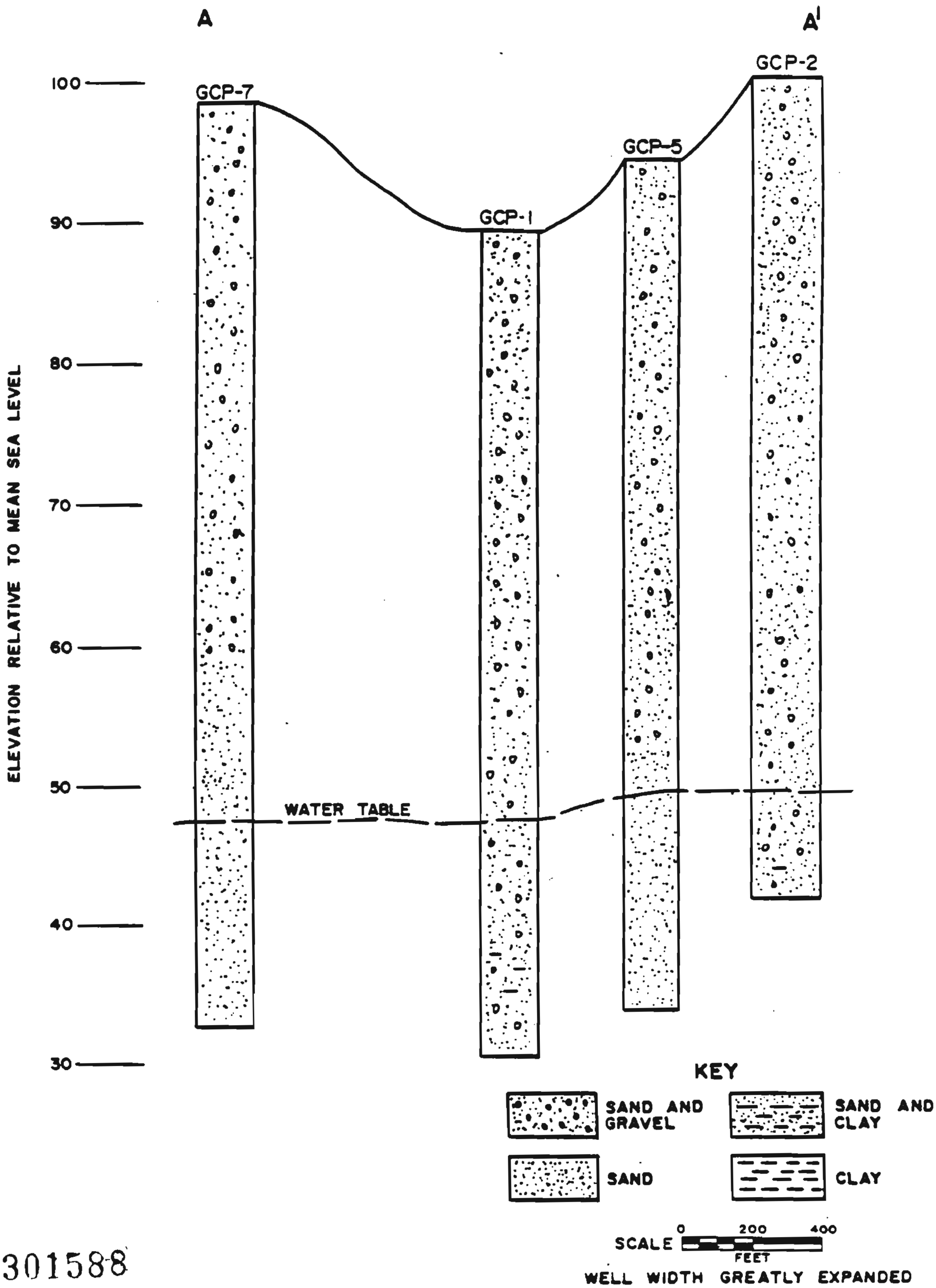
The regional groundwater flow direction in Garden City Park is towards the southwest. This general direction is observed in static water level measurements taken from wells constructed as part of this study. Water level contours, based on data from Table 2-3, are shown in Figure 3-9. The only departure from the regional flow regime is an apparent local high in GCP-9. This elevation in water level of about two feet over expected is based on one set of water level measurements. There were no well clusters installed in Garden City Park, so a vertical flow component cannot be assessed, however, the area is

TABLE 3-4

INDUSTRIAL PROFILE OF GARDEN CITY PARK

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used, Stored, Disposed,etc. Since 1977
American Improved Products	2350 Jericho Tpke.	Tetrachloroethylene	90
At-Pon Industries	133 Railroad Ave.	Benzene	10
Chemicolloid Laboratories Inc.	55 Herricks Rd.	Trichloroethylene	3
CNR Refrigeration	141 Herricks Rd.	Trichlorotrifluoroethane	4,800
Hub Spring and Industrial Truck Co. Inc.	Fulton & Cornelia Ave.	Tetrachloroethylene	
Mercury Electronics	270 Park Ave.	Trichloroethylene	400
Precision Fabricators	200 Broadway	Trichloroethylene Methyl ethyl ketone Xylol	1,800 800 100
Seaman Studios Inc.	50 Rose Pl.	Toluene Methyl ethyl ketone	800 18,000
Sprague Goodman Electronics	134 Fulton Ave.	1,1,1 trichloroethane	100-150
Village Industries	120 Old Broadway	Tetrachloroethylene	300



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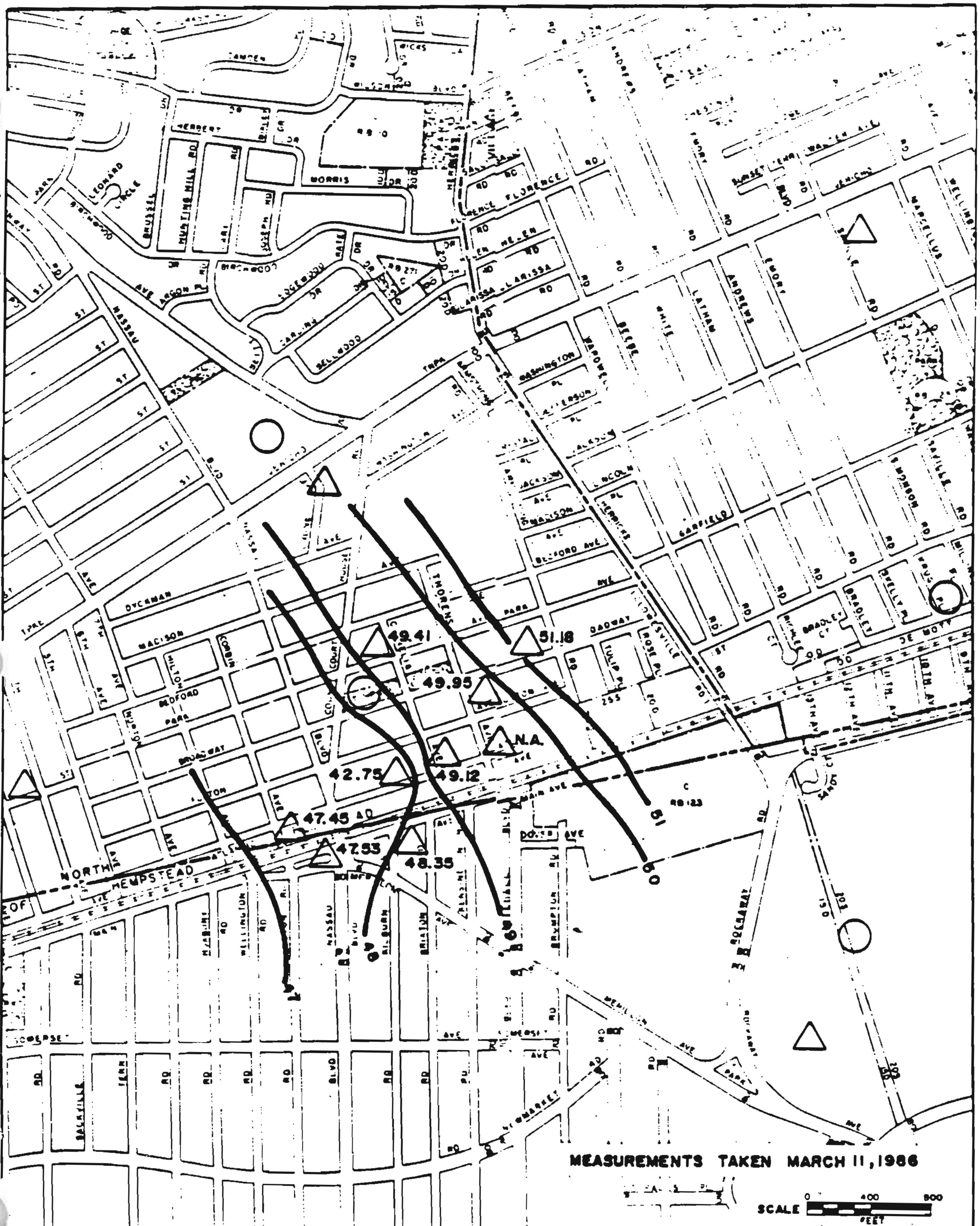
GARDEN CITY PARK
HYDROGEOLOGIC CROSS SECTION A-A'

FIGURE NO. 3-8



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GARDEN CITY PARK
WATER LEVEL CONTOURS

301589

FIGURE NO.
3-9

known to be in the deep recharge zone of the County. Additional data is needed to more accurately define the local groundwater flow regime.

3.3.4 Analytical Results and Findings

Analytical results are available from the nine wells that were installed in Garden City Park as part of this groundwater investigation, and eight existing wells in the area. Results from one to three different well samples were used in this preliminary water quality assessment.

The analytical results are shown in Table 3-5, and are summarized in Table 3-6. The results for total organic compounds are graphically depicted in Figure 3-10.

Nine of the 17 wells in the area exceed NYS guidelines for organic compounds in drinking water. Two of these wells are significantly contaminated. These wells are GCP-1 (20,616 ug/l) and GCP-7 (2,572 ug/l). Well GCP-7 is located 800 feet down-gradient of GCP-1 and the contamination could have migrated to this well and be part of the same plume.

Two sets of analytical results were used. Total organic compounds in GCP-1 increased from 3,436 in March 1985 to 37,795 ug/l in December 1985. However, additional data is needed for this well to determine consistent and/or increasing trends. The principal contaminant is tetrachloroethylene which increased from

3,400 to 36,000 ug/l. In addition, cis and trans-1,2-dichloroethylene was not detected in the March 1985 sample, but was reported at 1,400 ug/l in December 1985. There are several reported industrial users of tetrachloroethylene, but these facilities are not in close proximity to this well. Wells to the northeast (GCP-2,3,4,5) also seem to be contaminated with tetrachloroethylene (about 300 ug/l each). Well GCP-5 also contains 210 ug/l of trichloroethylene.

Tetrachloroethylene appears to have migrated into the deeper wells as indicated by N2565 (410 feet deep) and N3185 (463 feet deep) which contain 17 and 9 ug/l, respectively.

The extent of contamination cannot be assessed based on available data. More consistent data over time, as well as additional wells are needed.

Contamination has migrated into the deeper portions of the Magothy aquifer up to about 450 feet deep. The quality of water for public supply is threatened in this area. All of the water supply wells (N2565, N3185, N5163, and N8409) contain detected organic compounds. (Well N5163 contains only 1 ug/l total organic compounds.)

3.4 New Hyde Park (Garden City Park West)

3.4.1 Site Description

This study area is located in the Town of North Hempstead near the eastern boundary of the incorporated Village of New Hyde

TABLE 3-5

ANALYTICAL RESULTS - GARDEN CITY PARK - GROUNDWATER QUALITY

WELL NUMBER	GCP-1	GCP-1	GCP-1	GCP-1	GCP-2	GCP-2	GCP-2	GCP-3	GCP-3	GCP-4	GCP-4	GCP-5	GCP-5
WELL DEPTH	55	55	55	55	59	59	59	40	40	61	61	59	59
SAMPLE DATE	12/6/84	3/27/85	12/18/85	1/17/86	12/6/84	3/27/85	12/18/85	11/29/85	12/20/85	11/27/85	12/19/85	11/27/85	12/19/85
Trichlorofluoroethane	<1	<1	NA	NA	<1	<1	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride)													
1,1,2-Trichlorotrifluoroethane)	<10	<4	<8	<7	<10	<4	<8	<8	<8	<8	<8	<8	<8
1,1-Dichloroethylene)													
c & t-1,2-Dichloroethylene	<15	<20	1400	780	<15	<20	14	<13	16	NR	<14	NR	<14
t-1,2-Dichloroethylene													
1,1-Dichloroethane	<15	NA	<14	<12	<15	NA	<14	<16	<14	NR	<14	NR	<14
c-1,2-Dichloroethylene													
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	33	32	45	80	<1	<1	8	<1	9	5	5	7	10
Carbon Tetrachloride	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethylene	3	4	350	350	440	54	96	<1	82	40	28	830	210
Bromodichloromethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
c-1,3-Dichloropropene)													
Dibromochloromethane)	<2				<2								
1,1,2-Trichloroethane)													
c-1,3 Dichloropropene)													
Dibromochloromethane)		<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichlroroethane		<2	<1	<1		<2	<1	<1	<1	<1	<1	<1	<1
1,2-Dibromoethane	<60	NR	NA	NA	<6	<2	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethylene	9700	3400	86000	50000	150	17	200	<1	240	800	120	450	310
Bromoform	<3	<1	<40	NR	<3	<1	<2	<2	<2	<2	<2	<2	<2
Benzene	<3	<3	<3	<3	<3	<3	<3	<4	<3	NA	<3	NA	<3
Toluene	<3	<4	<6	<4	<3	<4	<6	<4	<6	NA	<6	NA	<6
Chlorobenzene	<3	<3	<60	<4	<3	<3	<3	<6	<3	NA	<3	NA	<3
Ethylbenzene	<3	<3	<120	<40	<3	<3	<6	<6	<6	NA	<6	NA	<6
Xylene (o,m,p)	17	<3	<120	<50	<3	<3	<6	<12	<6	NA	<6	NA	<6
Dichlorobenzene (o,m,p)	<10	<4	<9	<9	<5	<4	<9	<10	<9	NA	<9	NA	<9
Total	9753	3436	87795	51210	590	71	318	0	347	845	153	1287	530

NA-Not Analyzed NR-No Result Due To Technical Reasons ?-No Mention On Lab Results

301592

ANALYTICAL RESULTS - GARI TTY PARK - GROUNDWATER QUALITY

WELL NUMBER	GCP-6	GCP-6	GCP-7	GCP-7	GCP-8	GCP-8	GCP-9	GCP-9
WELL DEPTH	55	55	65	65	60	60	61	61
SAMPLE DATE	11/27/85	12/20/85	11/1/85	12/19/85	1/1/85	12/19/85	11/1/85	12/19/85
Trichlorofluoroaethane	NA	NA	NA	NA	< NA	NA	< NA	NA
Methylene Chloride								
1,1,2-Trichlorotrifluoroethane	<6	<8	NR	8	<9	<8	<9	<8
1,1-Dichloroethylene								
c & t-1,2-Dichloroethylene	NR	<14	28	52	<94	<14	<94	<14
t-1,2-Dichloroethylene								
1,1-Dichloroethane	NR	<14	<26	<14	<12	<14	<12	<14
c-1,2-Dichloroethylene								
Chlorofore	<1	<1	<1	<1	35	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	85	110	<1	100	<1	<1
Carbon Tetrachloride	<1	<1	NR	<1	<1	<1	<1	<1
Trichloroethylene	<1	<1	60	100	<2	1	<2	<1
Bromodichloromethane	<1	<1	NR	<1	<1	<1	<1	<1
c-1,3-Dichloropropene								
Dibromochloroethane								
1,1,2-Trichloroethane								
c-1,3 Dichloropropene								
Dibroeochloroeethane	<1	<1	NR	<1	<1	<1	<1	<1
1,1,2-Trichlroroethane	<1	<1	<1	2	<3	<1	<3	<1
1,2-Dibromoethane	<1	NA	NR	NA	<1	NA	<1	NA
Tetrachloroethylene	<1	<1	1700	2300	67	250	16	36
Bromofore	<2	<2	<1	<2	<1	<2	<1	<2
Benzene	NA	<3	<3	<3	<2	<3	<2	<3
Toluene	NA	<6	<5	<6	<4	<6	<4	<6
Chlorobenzene	NA	<3	<3	<3	<2	<3	<2	<3
Ethylbenzene	NA	<6	<3	<6	<5	<6	5	<6
Xylene (o,m,p)	NA	<6	<3	<6	<6	<6	14	<6
Dichlorobenzene (o,m,p)	NA	<9	<8	<9	<1	<9	<11	<9
Total	0	0	1873	2572	102	351	35	36

NA-Not Analyzed NR-No Result Due To Technical Reasons ?-No Mention On Lab Results

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TABLE 3-5

ANALYTICAL RESULTS
GARDEN CITY PARK - GROUNDWATER QUALITY

Well Number	N2565	N3185	N5163	N6320	N6502	N8409	N8623	N9944
Well Depth (feet)*	410	463	480	76	90	405	96	96
Sample Date	11/13/85	3/29/85	1/7/85	7/26/84	7/26/84	10/25/85	5/1/84	5/30/84
Trichlorofluoromethane	NA	< 1	< 1	< 1	< 1	< 1	NA	< 1
Methlyene Chloride)								
1,1,2-Trichlorotrifluoroethane)--	< 3	< 4	< 6	23	<14	<14	< 3	< 3
1,1-Dichloroethylene)								
c & t-1,2-Dichloroethylene	< 2	<20	NA	<16	<16	<16	< 2	12
t-1,2-Dichloroethylene	< 1	NA	NA	NA	NA	NA	< 1	NA
1,1-Dichloroethane	< 1	< 1	NA	<20	<20	<14	< 1	< 9
c-1,2-Dichloroethylene	< 1	NA	NA	NA	NA	NA	< 1	NA
Chloroform	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1
1,1,1-Trichloroethane	< 1	< 1	< 1	61	61	2	< 1	3
Carbon Tetrachloride	< 1	< 1	< 1	< 2	< 2	< 2	< 1	< 1
Trichloroethylene	< 1	15	1	27	27	1	9	140
Bromodichloromethane	< 1	< 1	< 2	< 2	< 2	< 2	< 1	< 1
c-1,3-Dichloropropene)								
Dibromochloromethane)--	NA	NA	< 3	< 3	< 3	NA	< 1	< 1
1,1,2-Trichloroethane)								
c-1,3-Dichloropropene)								
Dibromochloromethane)--	< 2	< 1	NA	NA	< 3	< 2	NA	NA
1,1,2-Trichlroroethane	< 1	< 2	NA	NA	< 3	< 1	NA	NA
1,2-Dibromoethane	NA	<10	< 5	< 1	NA	NA	< 1	< 1
Tetrachloroethylene	17	9	< 2	16	< 3	1	4	24
Bromoform	< 1	< 1	< 2	< 4	< 4	< 1	< 1	< 1
Benzene	NA	< 3	< 3	< 5	< 5	NA	< 3	< 3
Toluene	NA	< 4	<15	< 8	< 8	NA	< 3	< 3
Chlorobenzene	< 1	< 3	<15	< 6	< 6	< 1	< 3	< 3
Ethylbenzene	NA	< 3	< 4	< 5	< 5	NA	< 3	< 3
Xylene (o,m,p)	NA	< 3	< 4	< 5	< 5	NA	< 3	< 3
Dichlorobenzene (o,m,p)	NA	< 4	<20	<20	<20	NA	< 6	< 6
Total	17	24	1	127	4	10	4	179

*Below Ground Surface
NA - Not Available

TABLE 3-6

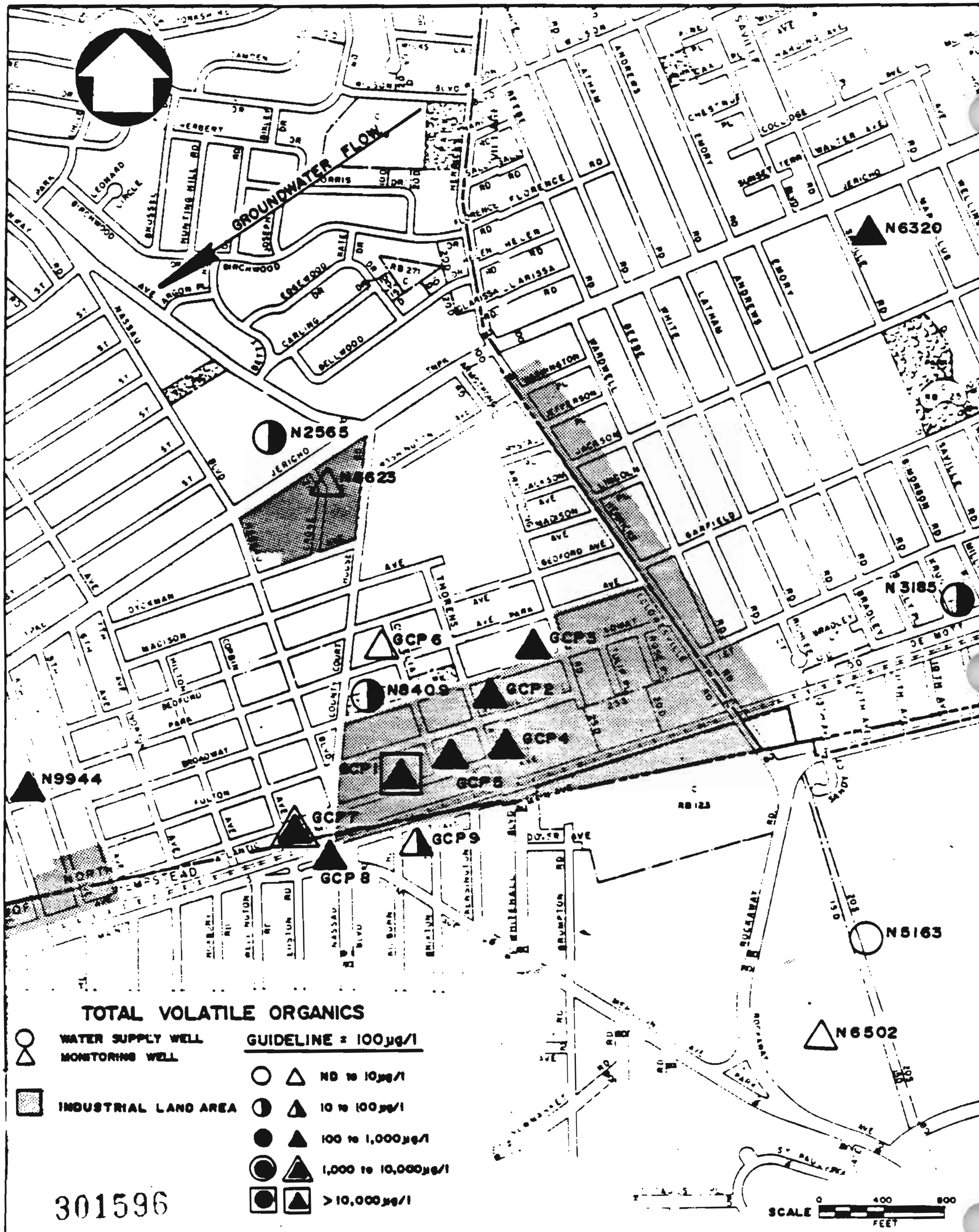
GARDEN CITY PARK - CONTAMINATED AQUIFER SEGMENTS
TOTAL ORGANIC COMPOUNDS
DATA SUMMARY
(ug/l)

Garden City Park	Depth* (Feet)	Mean	Range	Median	Number of Data Points
GCP-1**	55	30,814	3436-51,210	37,795	3
GCP-2**	59	195	71-318		2
GCP-3	40	347			1
GCP-4	61	153			1
GCP-5	59	530			1
GCP-6	55	0			1
GCP-7	65	2572			1
GCP-8	60	351			1
GCP-9	61	36			1
N2565	410	17			1
N3185	463	24			1
N5163	480	1			1
N6320	76	127			1
N6502	90	4			1
N8409	405	10			1
N8623	96	4			1
N9944	96	179			1

Note: The first sample after well development was discarded in this data summary when more than one well analyses exist

* Below ground surface

**No information is available on soil or drill cutting backfill



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Dvirka and Bartilucci CONSULTING ENGINEERS	GARDEN CITY PARK WATER QUALITY-TOTAL VOLATILE ORGANICS	FIGURE NO. 3-10

Park (Figure 3-6). It is known variously as the unincorporated part of New Hyde Park, Hillside Park Oaks (until 1975), or more recently, as the western portion of Garden City Park.

Garden City Park is described in Section 3.3. This section includes a brief description of the New Hyde Park area. New Hyde Park includes the area in the incorporated village of New Hyde Park (over one square mile of area) as well as unincorporated areas to the north (about one square mile). These areas are bounded on the north by Lake Success and on the south by Garden City, Stewart Manor and Floral Park.

The major land uses in New Hyde Park are residential, commercial, institutional and industrial. The major industrial area along Denton Avenue is described in Section 3.3. Other industry is concentrated in a thin east-west band along the Long Island Railroad.

All of the wells drilled as part of this groundwater investigation are along the north-south industrial strip near Denton Avenue as shown in Figure 3-11.

Both the Village of New Hyde Park and the associated unincorporated area are serviced by the Jamaica Water Supply Company. This area is part of Nassau County Sewage Disposal District #2 which has been in operation since the 1950's. The area has been developed for approximately 40 years and has shown no growth. The 1980 population of New Hyde Park Village was 5,754, a decrease of about 50 people since the 1970 census. The unincorporated area population also dropped from 18,154 in 1970 to 15,114 in 1980.

There are two inactive landfills in the study area. Each former landfill was about 30 acres in size and located on the west side of Denton Avenue in New Hyde Park. They are bounded on the north by Hillside Avenue, Evergreen Avenue on the south and Leonard Avenue on the west, and are separated by a large recharge basin. The southern section is now the site of a recreational facility and the northern plot is now an undeveloped field. Material accepted at the landfill is described as municipal refuse. In a 1983 groundwater investigation conducted in proximity to the Denton Avenue landfill, no volatile organic compounds were detected in the monitoring well samples.

There are no known historical occurrences of groundwater contamination in this area. However, past storage and disposal practices of industry in the area are potential sources of contamination.

Information on the current industrial profile of New Hyde Park indicates that the major industry is electrical and metal finishing. Table 3-7 lists the known industry in the New Hyde Park area and estimated annual organic chemical usage.

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NEW HYDE PARK
WELL LOCATION AND IDENTIFICATION

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FIGURE NO. 3-11

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TABLE 3-7

INDUSTRIAL PROFILE OF NEW HYDE PARK

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used, Stored, Disposed, etc. Since 1977
Agard Electronic Corp.	40 Nassau Terminal Rd.	Methylene chloride 1,1,1 trichloroethane	50 gals/yr 5000 gals/yr
Air Techniques Inc.	2020 Jericho Tpke.	1,1,1 trichloroethane	600 gals/yr
Allomatic Inc.	2099 Jericho Tpke.	Methylene chloride	600 gals/yr
Avanel Industries	1827 Gilford Ave.	1,1,1 trichloroethane	100 gals/yr
Big Apple Ducts & Filter Corp.	445 1st St.	Methylene chloride	50 gals/yr
Cellu-Craft Inc.	1403 4th Ave.	Toluene	800 gals/yr
Dakon Corp.	1836 Gilford Ave.	Trichloroethylene	55 gals/yr
Cascade Refrigerator Corp.	520 Cherry Ln.	Trichloroflurومethane	350 gals/yr
Emil Asch Inc.	15 Jericho Tpke	Methylene chloride	50 gals/yr
Jasco Window Corp.	11 S. Denton Ave.	Toluene	10 gals/yr
Jet-Flo Corp.	44 S. 1st St.	Tetrachloroethylene	100 gals/yr
Petrometer Corp.	1807 Gilford Ave.	Trichloroethylene	15 gals/yr
Prime Air Con. Co.	402 Jericho Tpke.	Trichlorotrifluroethane	50 gals/yr

TABLE 3-7 (continued)

INDUSTRIAL PROFILE OF NEW HYDE PARK

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used, Stored, Disposed, etc. Since 1977
R.S. Precision Industries Inc.	110 Denton Ave.	1,1,1 trichloroethane	25-30 gals/yr
Signal Heating and Air Conditioning Corp.	20 Jericho Tpke.	Trichlorotrifluroethane	30 gals/yr
Standard Precision Products Inc.	149 Denton Ave.	Trichlorotrifluroethane	55 gals/yr
T.F. O'Brien Co. Inc.	1219 Jericho Tpke.	Trichlorotrifluroethane	1000 gals/yr
Tek-Wave Inc.	3 Delaware Dr.	1,1,1 trichloroethane	1000 gals/yr
Triangle Sheet Metal Inc.	115 New Hyde Park Rd.	Methylene chloride	1200 gals/yr
Zoe Chemical Co.	1801 Falmouth Ave.	Methylene chloride	7500 gals/yr
Weba Inc.	1301 4th Ave.	Trichloroethylene	55 gals/yr
Spec-Cons Inc.	86 Denton Ave.	Trichlorotrifluroethane	30 gals/yr

There is one facility in violation of SPDES discharge requirements, spills, illegal disposal of hazardous wastes, or other complaints or violations. This facility is Fumex Sanitation where a chlordane spill occurred in August 1981, and contaminated soil and a leaching pool.

Voluntary enforcement action is currently being undertaken at two New Hyde Park facilities. These are:

- Covert Electric Motor, Pump & Compresser Co. - a dry well was contaminated with methylene chloride. (An investigation of the cleanup activities showed minor levels of xylene and toluene with no methylene chloride detected. A letter approving the cleanup activities is currently pending.)
- Manfred F.J. Schulte - a dry well was heavily contaminated with tetrachloroethylene from spills from a transfer operation with an underground storage tank. (On February 3, 1986 the facility excavated soil beneath the drywell and is currently in voluntary compliance.)

3.4.2 Geology

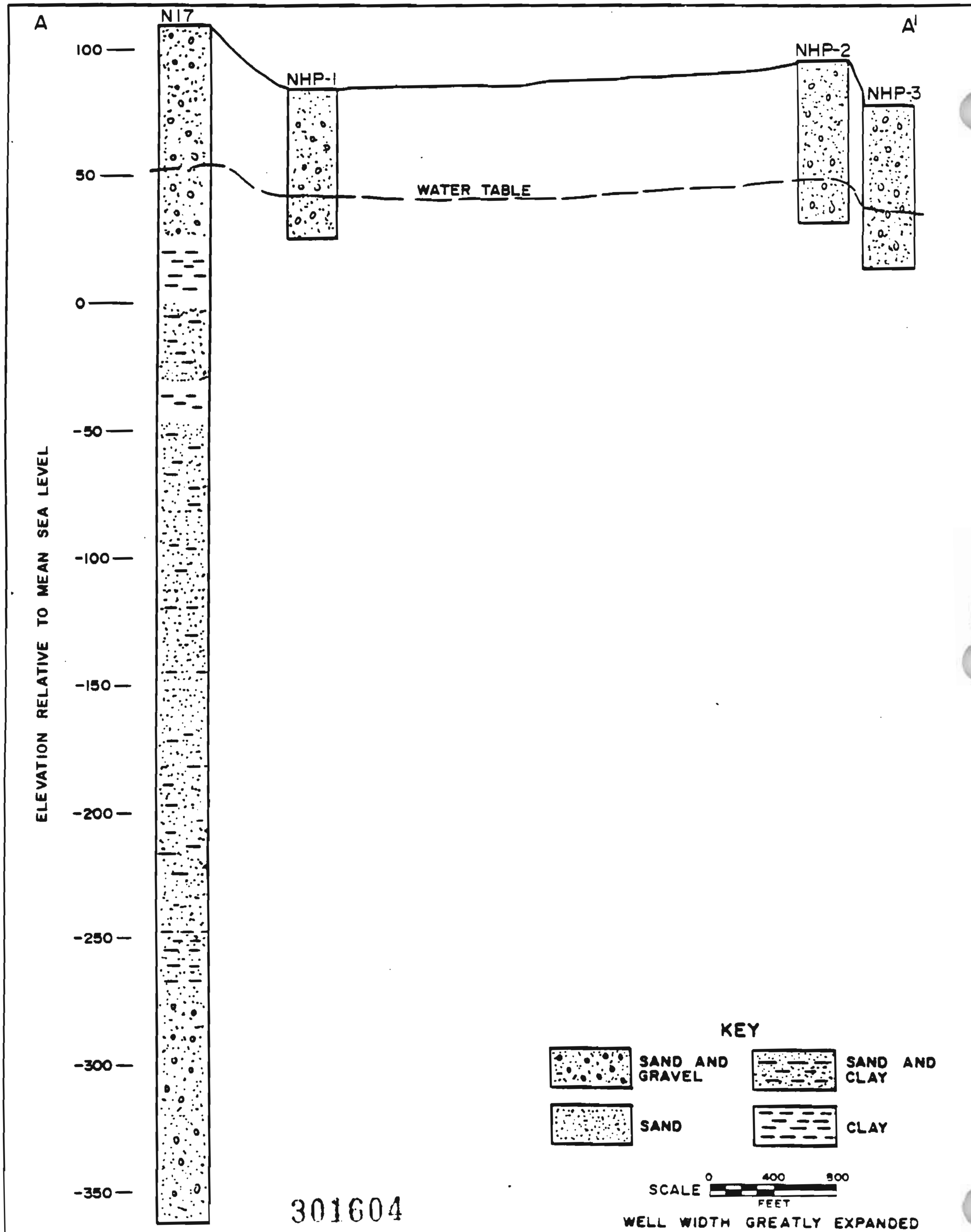
The study wells in the New Hyde Park area tap the glacial aquifer and possibly the upper Magothy aquifer. The deposits consist of unstratified sand and gravel. A hydrogeologic cross section is shown in Figure 3-12 for the New Hyde Park study wells. NHP-3, which is located in a topographic low, may tap the uppermost portion of the Magothy at about 25 feet above mean sea level based on descriptions of uniformly graded sand at this level. This is approximately the same depth where N27 also reports a lithologic change from coarse sand and gravel to a sandy clay. The USGS estimates that the upper glacial aquifer is about 100 feet thick in the New Hyde Park area. This is consistent with the review of data from the well logs in New Hyde Park.

The deepest well log in the area describes at least one solid clay layer. This layer is described about 100 feet below the surface, which is deeper than any wells drilled as part of this investigation. The continuity of this clay layer throughout the study area is unknown.

3.4.3 Hydrology

The regional flow regime in New Hyde Park is towards the southwest. Wells drilled as part of this groundwater investigation apparently follow this trend. There are not enough wells to define any local permutations in groundwater, therefore, detailed water level contouring is not presented.

No well clusters of shallow and deep wells were installed as part of this groundwater investigation, therefore, a vertical flow component cannot be assessed. However, this area is known to be in the Magothy recharge zone.



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Dvirka and Bartilucci CONSULTING ENGINEERS

NEW HYDE PARK
HYDROGEOLOGIC CROSS SECTION A-A'

FIGURE NO. 3-12

3.4.4 Analytical Results and Findings

A total of three wells were installed in the New Hyde Park area. Two wells were sampled three times and one well (NHP-3), was sampled five times from December 1984 to February 1985. Analytical results are shown in Table 3-8 and total organic compounds are summarized in Table 3-9. A graphic representation of total organic compounds is shown in Figure 3-13.

None of the wells (deepest well: 63 feet below land surface) installed in the New Hyde Park area are considered to be contaminated appreciably with synthetic organic chemicals. Total organics in NHP-1 are less than 2 ug/l for all samples. Trichloroethylene and tetrachloroethylene were detected at 1 ug/l each. Analyses for NHP-2 reported a maximum of 6 ug/l of total organic compounds. NHP-3 had a reported total organic compound concentration of 354 ug/l shortly after well development. Two subsequent samples from this well report less than the minimum detectable concentration for total organic compounds.

Recent analytical results for existing wells in the New Hyde Park.area follows an interesting contamination pattern. Both the shallower (about 100 feet below the land surface) and deeper wells (465 feet) to the north have reported concentrations of organic compounds below the detectable limit. However, wells to the south and southwest, have significant reported concentrations of organic compounds. Well N9949 (119 feet deep) contains 201 ug/l of total organic compounds, while N8026, located about 1,200 feet to the southwest contains 3,308 ug/l of total organic compounds, (essentially all trichloroethylene).

Wells 7649 (210 feet deep) and N7650 (445 feet deep), located about 2,400 feet to the southwest of N8026, have reported concentrations of total organic compounds of 13 and 70 ug/l, respectively.

The above pattern of analytical results indicates that both shallow and deep upgradient wells are not contaminated with organic compounds. Shallow wells (up to 63 feet deep) in the New Hyde Park area also do not exhibit contamination; however, wells about 100 feet deep in the area do exhibit significant contamination, as do deeper wells downgradient. This indicates that contaminated groundwater has migrated into the deeper wells downgradient of the New Hyde Park site. However, the source of this contamination could possibly originate from outside of the study area, possibly from Garden City Park, or more likely the source could be located in the vicinity, or upgradient of N8026.

TABLE 3-8

ANALYTICAL RESULTS - NEW HYDE PARK - GROUNDWATER QUALITY

WELL NUMBER	NHP-1	NHP-1	NHP-1	NHP-2	NHP-2	NHP-2	NHP-3	NHP-3	NHP-3	NHP-3	NHP-3
WELL DEPTH	60	60	60	63	63	63	62	62	50	50	50
SAMPLE DATE	12/6/84	4/4/85	12/20/85	12/6/84	3/27/85	12/20/85	12/6/84	4/4/85	11/29/85	12/20/85	2/3/86
Trichlorofluoromethane	<1	<1	NA	<1	<1	NA	<1	<1	NA	NA	NA
Methylene Chloride)											
1,1,2-Trichlorotrifluoroethane)	<10	<4	<8	<10	<4	<8	<10	<4	<8	<8	<7
1,1-Dichloroethylene)											
c & t-1,2-Dichloroethylene	<15	<20	<14	<15		<14	<15	<20	64	<14	<10
t-1,2-Dichloroethylene					<5						
1,1-Dichloroethane	<15	<10	<14	<15	NA	<14	<15	<10	<16	<14	<12
c-1,2-Dichloroethylene					<20						
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	2	<1	<1	1	<1	<1
Carbon Tetrachloride	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethylene	<1	1	<1	<1	<1	1	4	3	270	<1	<1
Bromodichloromethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
c-1,3-Dichloropropene)											
Dibromochloromethane)	<2			<2			<2				
1,1,2-Trichloroethane)											
c-1,3 Dichloropropene)											
Dibromochloromethane)		<1	<1		<1	<1		<1	<1	<1	<1
1,1,2-Trichlroroethane		<2	<1		<2	<1		<2	<1	<1	<1
1,2-Dibromoethane	<6	<2	NA	<6	<2	<NA	<6	<2	NA	NA	NA
Tetrachloroethylene	<1	1	1	<1	1	3	1	1	19	<1	<1
Bromoform	<3	<1	<2	<3	<1	<2	<3	<1	<2	<2	<1
Benzene	<3	<3	<3	<3	<3	<3	<3	<3	<4	<3	<3
Toluene	<3	<4	<6	<3	<4	<6	<3	<4	<4	<6	<4
Chlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3	<6	<3	<4
Ethylbenzene	<3	<3	<6	<3	<3	<6	<3	<3	<6	<6	<4
Xylene (o,m,p)	<3	<3	<6	<3	<3	<6	<3	<3	<12	<6	<5
Dichlorobenzene (o,m,p)	<5	<4	<9	<5	<4	<9	<5	<4	<10	<9	<9
Total	0	2	1	0	1	6	5	4	354	0	0

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NA-Not Analyzed NR-No Result Due To Technical Reasons 7-No Mention On Lab Results

ANALYTICAL RESULTS
NEW HYDE PARK - GROUNDWATER QUALITY

Well Number	N17	N7649	N7650	N8026	N8585	N9949	N10059	N10060
Well Depth (feet)*	465	210			107	96	95	114
Sample Date	2/25/85	4/25/85	5/30/85	3/11/80	10/30/85	5/30/84	1/13/83	1/13/83
Trichlorofluoromethane	< 1	< 1	< 1	NA	NA	< 1	< 1	< 1
Methlyene Chloride / 1,1,2-Trichlorotrifluoroethane / 1,1-Dichloroethylene	< 3	<12	< 4	4	NA	5	< 7	< 7
c & t-1,2-Dichloroethylene	< 2	<10	<25	NA	<14	44	< 1	< 1
t-1,2-Dichloroethylene	< 1	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	< 1	NA	<10	NA	<15	36	< 4	< 4
c-1,2-Dichloroethylene	< 1	NA	NA	NA	NA	NA	NA	NA
Chloroform	< 1	< 1	< 1	4	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	< 2	< 1	< 1	2	< 1	57	< 1	< 1
Carbon Tetrachloride	< 1	< 1	< 1	2	NA	< 1	< 1	< 1
Trichloroethylene	< 1	13	70	3300	< 1	59	< 1	< 1
Bromodichloromethane	< 1	< 1	<10	1	NA	< 1	< 1	< 1
c-1,3-Dichloropropene / Dibromochloromethane / 1,1,2-Trichloroethane	NA	NA	NA	NA	NA	< 1	< 1	< 1
c-1,3-Dichloropropene / Dibromochloromethane	< 2	< 1	< 1	NA	NA	NA	NA	NA
1,1,2-Trichlroroethane	< 1	< 2	< 1	NA	< 1	NA	NA	NA
1,2-Dibromoethane	NA	< 1	< 1	NA	< 1	< 1	NA	NA
Tetrachloroethylene	8	6	3	300	< 1	160	< 1	< 1
Bromoform	< 1	< 1	< 1	NA	< 1	< 1	< 1	< 1
Benzene	NA	< 3	< 3	NA	< 3	< 3	< 4	< 4
Toluene	NA	< 3	< 4	NA	< 4	< 3	< 4	< 4
Chlorobenzene	< 1	< 3	< 4	NA	< 4	< 3	5	< 5
Ethylbenzene	NA	< 3	< 5	NA	< 4	< 3	< 3	< 3
Xylene (o,m,p)	NA	< 4	< 4	NA	NA	< 3	< 4	< 4
Dichlorobenzene (o,m,p)	NA	< 6	< 8	NA	< 8	< 6	<10	<10
Total	8	19	73	3,613	0	361	5	0

* Below Ground Surface
NA - Not Available

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TABLE 3-9

NEW HYDE PARK - CONTAMINATED AQUIFER SEGMENTS
TOTAL ORGANIC COMPOUNDS
DATA SUMMARY
(ug/l)

New Hyde Park	Depth* (Feet)	Mean	Range	Median	Number of Data Points
NHP-1	60	2	1-2		2
NHP-2	63	4	1-6		2
NHP-3**	50	1	0-4	0	3
N17	465	8			1
N7649	210	19			1
N7650	445	73			1
N8026	119	3613			1
N8585	107	0			1
N9949	96	361			1
N10059	95	5			1
N10060	114	0			1

Note: The first sample after well development was discarded in this data summary when more than one well analyses exist

* Below ground surface

**No information is available on soil or drill cutting backfill

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NEW HYDE PARK
WATER QUALITY-TOTAL VOLATILE ORGANICS

FIGURE NO. 3-13

Because of the limited amount of available data, the extent of groundwater contamination cannot be assessed. However, there seems to be a definite threat to water supply wells downgradient. Jamaica water supply well N7650 exceeds NYS drinking water guidelines for organic chemicals. Both wells, N7649 and N7650 exceed USEPA proposed maximum concentration limits of 5 ug/l for trichloroethylene. Water from both of these wells is being treated by air stripping before distribution. Additional wells are needed both down and upgradient of N8026 to define the extent and source of contamination by trichloroethylene in this area.

3.5 West Hicksville

3.5.1 Site Description

The area identified as West Hicksville in this report is located east of the Wantagh Parkway, west of North Broadway, north of Stewart Avenue and south of the Northern State Parkway in the Town of Oyster Bay (Figure 3-1). Monitoring wells installed as part of this investigation are shown in Figure 3-14.

There are ten monitoring wells located in the West Hicksville area. Most of the wells are clustered centrally between Duffy Avenue and Old Country Road.

Information on the current industrial profile of West Hicksville indicates that the area is heavily industrialized with a wide variety of industrial categories, including chemical, electronics and electrical equipment. Table 3-10 provides an industrial profile of the area from 1977 to 1985 and estimates the annual organic chemical usage for each industry.

The residential area in West Hicksville, south of Old Country Road is considered to be of intermediate density with about approximately five to ten dwelling units per acre.

Industrial and commercial firms are concentrated generally along West John Street and Duffy Avenue, which run east and west along central Hicksville and adjacent to Long Island Railroad.

West Hicksville is served by the Hicksville Water District. The area is part of Nassau County Sewer District #3, and has been sewered since about 1980.

The area has been developed for about 30 years, and has exhibited no recent growth. The population of Hicksville, including the western and northern sections, decreased from 49,820 in 1970 to 41,727 in 1984.

There are two landfills within the West Hicksville area on West John Street and on Duffy Avenue. The West John Street landfill, owned by AGO Association (located east of Charlotte Street), has been abandoned. The only remaining active landfill

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WEST HICKSVILLE
WELL LOCATION AND IDENTIFICATION

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FIGURE NO. 3-14

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TABLE 3-10

INDUSTRIAL PROFILE OF WEST HICKSVILLE

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used Stored, Disposed, etc. Since 1977
Amperex Electronic Co.	230 Duffy Ave.	Benzene 1,1,1 trichloroethane	20 gals/yr 5,375 gals/yr
Four Star Association Inc.	260 Duffy Ave.	Methylene chloride	55 gals/yr
MHI Knitware Ltd.	270 Duffy Ave.	1,1,1 trichloroethane	55 gals/yr
Maganosonic Devices Inc.	290 Duffy Ave.	1,1,1 trichloroethane	660 gals/yr
Depew Mfg. Corp.	359 Duffy Ave.	Benzene Toluene	
Dyna Magnetic	200 Frank Rd.	Trichloroethylene	200 gals/yr
Model Communication	307 W. John St.	Trichloroethylene	10 gals/yr
Nestor Systems Inc.	489 W. John St.	Trichloroethylene	10 gals/yr
Universal Shallac and Supply Co.	495 W. John St.	Trichloroethylene	325 gals/yr
General Instrument Corp.	600 W. John St.	Trichloroethylene	3,600 gals/yr
Micro Contacts Inc.	62 Alpha Pl.	1,1,1 trichloroethane	1,920 gals/yr

TABLE 3-10 (continued)

INDUSTRIAL PROFILE OF WEST HICKSVILLE

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used Stored, Disposed, etc. Since 1977
Anchor Lithkemko	500 W. John St.	Methyl chloride 1,1,1 trichloroethane	
Metco	325 Duffy Ave.	Trichloroethylene Tetrachloroethylene Methylene chloride Trichlorotrifluoroethane	Varying quantities 50 - 400 gals/yr

is located on Duffy Avenue. It is a municipal facility owned by New York State Department of Parks and Recreation and accepts agricultural waste, sweepings, rubbish and leaves.

There were several reported complaints concerning organic chemicals filed with the Nassau County Department of Health in the area of West Hicksville.

- o A spill in February 1982 by Mattiace Petrochemicals involved the discharge of methyl ethyl ketone (MEK) contaminating both the surrounding soil and groundwater. In September 1982, USEPA issued an Administrative Order to have Mattiace clean up the contaminated soil and groundwater. The firm complied with the cleanup order for five months (from May to October 1984) until the project was terminated due to lack of funds. Based upon this situation and the magnitude and severity of the spill, NYSDEC is requesting that EPA consider this site as a possible Federal Superfund Site. EPA is currently pursuing an administrative lawsuit against Mattiace Petrochemical and is continuing routine monitoring of the site.
- o In February 1984, Alsy Manufacturing located on Duffy Avenue was found discharging metals and volatile organic chemicals into leaching pools. NYSDEC issued an Abatement Order in April 1985 requiring that all discharges not in compliance with standards be immediately terminated and removal of all wastes

from onsite leaching pools be undertaken. Cleanup of contaminated leaching pools was completed in May 1985. As of December 1985, Alsy Manufacturing had not fully complied with all requirements of the Abatement Order. The case has been referred to the State Attorney General's office for criminal prosecution and is currently under investigation by DEC and the Attorney General's office.

- A complaint against General Instrument (located at 600 West John Street) involved the contamination of soil caused by a leaking underground storage tank containing organic chemicals. General Instrument voluntarily commenced cleanup activities. By February 1984, a cleanup system had been installed and operated. Further testing by NYSDEC in August 1985 indicated inadequate operation. General Instrument was advised to alter the cleanup system which is now in the process of being completed. The case is currently under the supervision of the DEC Division of Solid and Hazardous Waste as a State Superfund site.
- Depew Manufacturing (located at 359 Duffy Avenue) was found to be discharging fiberglass containing styrene and aluminum to an open leaching lagoon. Voluntary action by Depew involved the bagging, removal and offsite disposal of the contaminated material to an approved waste disposal site.

In addition to these possible contamination sources, an industrial profile in West Hicksville (1977-1985) along with estimated organic chemical usage and handling is provided in Table 3-10.

3.5.2 Geology

The wells installed as part of this groundwater investigation in the western part of Hicksville all tap the upper glacial aquifer. A hydrogeologic cross section is shown in Figure 3-15. The sediments encountered during drilling are unstratified deposits of sand and gravel. The USGS estimates the thickness of the upper glacial aquifer to be between 50 and 100 feet in this area. The lithologic log for Well N9463 (638 feet deep) describes sand, grit and gravel to 155 feet. Several clay layers are also described ranging in thickness from one to 15 feet thick.

The lithologic log for N8880 (247 feet deep) describes sand, grit and gravel for the first 62 feet. A significant clay layer exists between 70 and 98 feet below the surface. Smaller layers of clay are also described for this well, but are reported to be less than two feet thick.

The areal extent of these clay layers is unknown. They do not demonstrate clear stratigraphic continuity in wells N8880 and N9463.

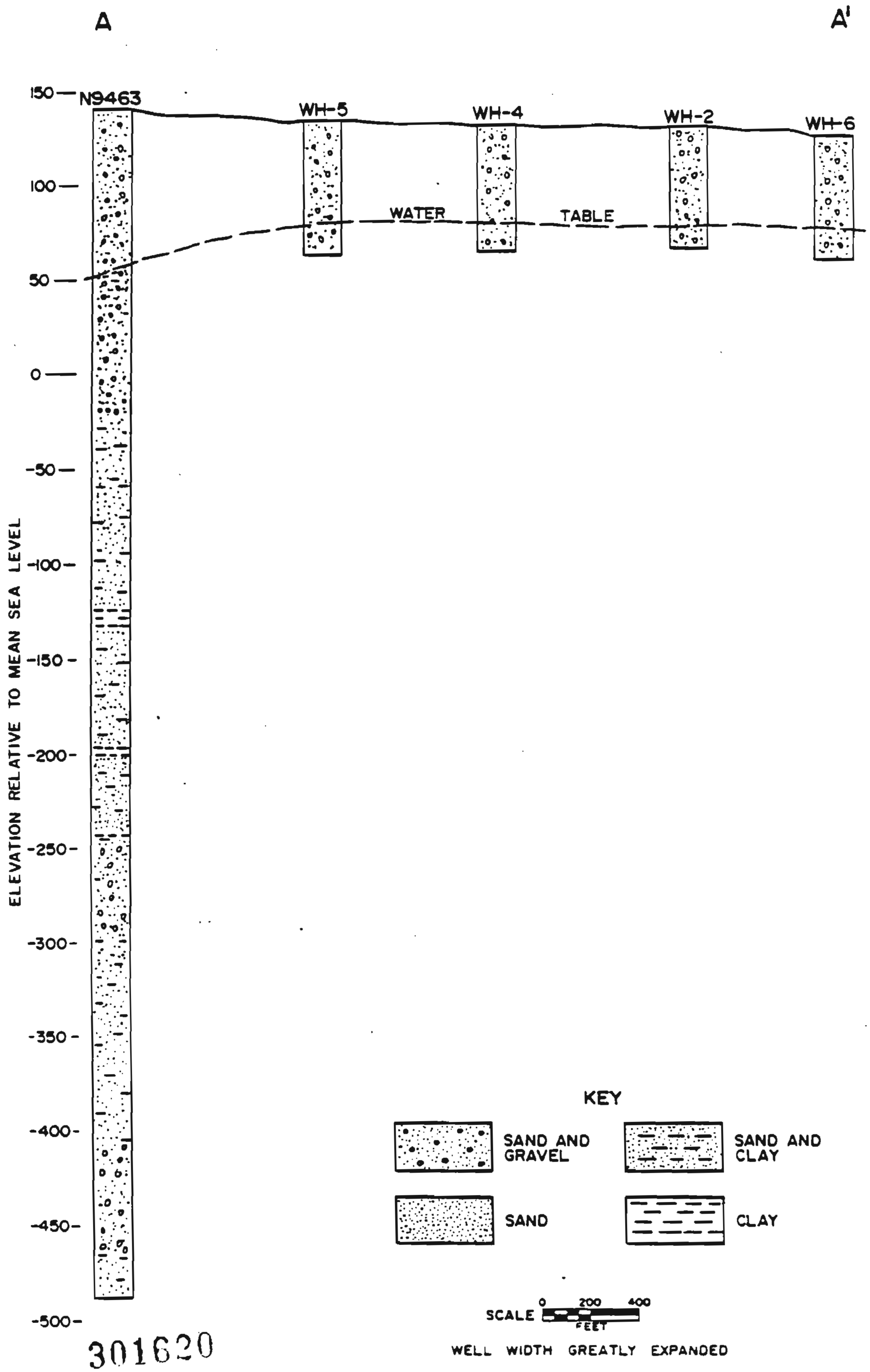
3.5.3 Hydrology

The regional flow pattern of the glacial aquifer in West Hicksville is towards the south and southwest. Static water level measurements from wells installed as part of this investigation generally follow this trend. One exception is WH-3 which appears to be on a local groundwater mound. Water levels in this well are reported to be ten feet above the other wells in the area in both sets of water level measurements taken from last year and this year. The cause of this groundwater mound is unknown. There is no recharge basin or reported injection well in the area or any other known reason for the high values. Because of the extremely high reported static water level, this value may be the result of a survey error and is discarded in the definition of the local flow regime. A map showing water level contours is provided in Figure 3-16. Additional data is needed at this site to more accurately determine groundwater flow.

There were no deep wells drilled in the West Hicksville area, therefore, the vertical component of groundwater is unknown. However, based on regional information, this area is part of the Magothy recharge zone.

3.5.4 Analytical Results and Findings

This preliminary contamination assessment is based upon at most three samples for each well taken between March 1984 and



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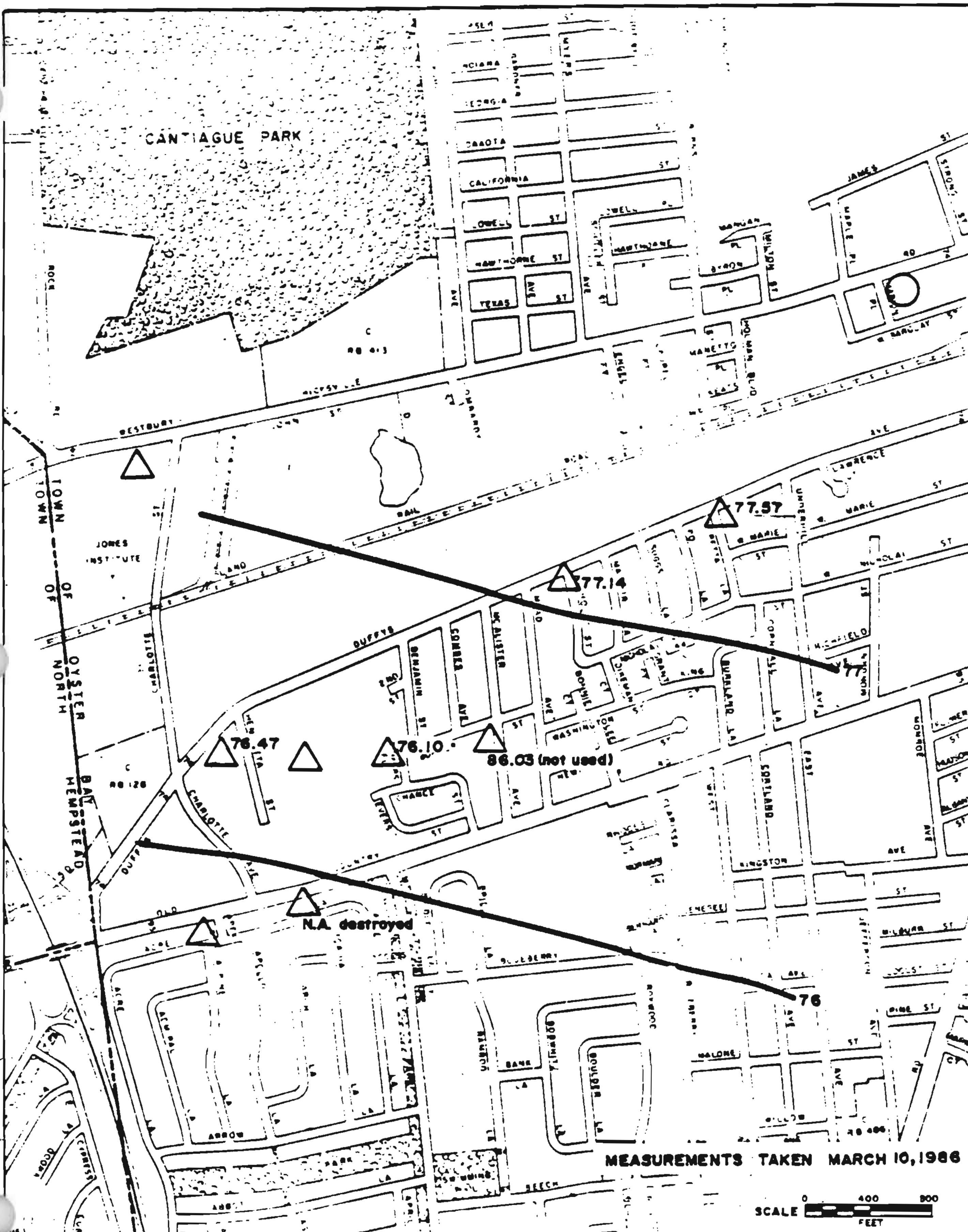
WEST HICKSVILLE
HYDROGEOLOGIC CROSS SECTION A-A'

FIGURE NO. 3-15



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WEST HICKSVILLE WATER LEVEL CONTOURS

FIGURE NO. 3-16

December 1985. Six wells were installed as part of this project, in addition to the four existing water supply wells and monitoring wells in the West Hicksville area. Analytical results for these wells are tabulated in Table 3-11 and a summary of water quality for total organic chemicals is provided in Table 3-12. A graphic representation of total volatile compounds is illustrated in Figure 3-17.

Analytical data for wells WH-1 and WH-4 reported almost nondetectable amounts of total volatile organic compounds. Each well had a maximum detected value of 4 ug/l for total organic compounds for three sets of samples.

Well WH-2 has a median value of 12 ug/l of 1,1,1-trichloroethane reported (the only compound detected). Wells WH-1, WH-4 and WH-3 are all below NYS Drinking Water Guidelines for organic chemicals.

Analytical results for Well WH-3 increased by an order of magnitude between sets of samples. Reported values for total organics increased from 688 ug/l to 6,844 ug/l in less than eight months. Additional data is needed for WH-3 to determine a consistent value or an increasing trend.

Analytical results for wells WH-5 and WH-6 also fluctuated between samples. Well WH-5 increased from 116 ug/l to 640 ug/l total organic compounds. Analytical results for WH-6

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reported 193, 64 and 319 ug/l for total volatile organics. Although wells WH-3, WH-5 and WH-6 exceed NYS Drinking Water Guidelines for organic compounds, additional data is also needed for these wells to determine consistency and trends.

In addition to the six monitoring wells installed as part of this investigation, four other wells (one water supply and three monitoring) exist in the West Hicksville study area. Analysis was based upon one sample obtained from each well and it was assumed that this information is representative. These four additional wells are N8880, N9341, N9917 and N9463. The analytical results for total organic compounds are 175, 2,691, 2 ug/l and non-detected, respectively. Well N-9463 is a water supply well (638 feet deep) in which no volatile organics were detected. The other three wells are: a Nassau County observation well (N9917) which is 73 feet deep, and two industrial wells (N8880 and N9341) which are 247 feet and 265 feet below ground surface, respectively. Based on these results, significant contamination has migrated into the Magothy aquifer up to at least 265 feet deep.

A principal contaminant in the wells is 1,1,1-trichloroethane. The largest concentration of 1,1,1-trichloroethane (5,400 ug/l) was detected in well WH-3. There are three industrial firms located less than a quarter of a mile upgradient of this well that report using significant quantities of this chemical. 1,1,1 trichloroethane may also have been used as a cesspool and drain cleaner prior to sewering.

TABLE 3-11

ANALYTICAL RESULTS - WEST HICKSVILLE - GROUNDWATER QUALITY

WELL NUMBER	WH-1	WH-1	WH-1	WH-1	WH-2	WH-2	WH-2	WH-3	WH-3	WH-3	WH-4	WH-4	WH-4
WELL DEPTH	60	60	60	60	63	63	68	64	64	64	66	66	66
SAMPLE DATE	10/16/84	12/5/84	4/1/85	12/18/85	12/5/84	4/1/85	12/18/85	12/5/84	4/1/85	12/18/85	10/19/84	12/5/84	4/1/85
Trichlorofluoroethane	<3	<1	<1	NA	<1	<1	NA	<1	<1	NA	<8	<1	<1
Methylene Chloride }													
1,1,2-Trichlorotrifluoroethane }	<4	<10	<4	<8	<10	<4	<8	<10	150	520	<10	<10	<4
1,1-Dichloroethylene }													
c & t-1,2-Dichloroethylene	<10	<15	<20	<14	<15		<18	<15	<20	<14	<10	<15	<20
t-1,2-Dichloroethylene						<5							
1,1-Dichloroethane	<15	<15	NA	<14	<15	NA	<16	<15	NA	<14	<15	<15	<10
c-1,2-Dichloroethylene						<20							
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	1	1	<1	1	<1
1,1,1-Trichloroethane	<1	<1	<1	<1	4	8	16	40	460	5400	<1	2	1
Carbon Tetrachloride	<1	<1	<1	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1
Trichloroethylene	<1	<1	<1	<1	<1	<1	<1	5	64	900	<1	1	<1
Bromodichloromethane	<3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<3	<1	<1
c-1,3-Dichloropropene }													
Dibromochloromethane }		<2			<2			<2			<2	<2	
1,1,2-Trichloroethane }													
c-1,3 Dichloropropene }													
Dibromochloromethane }	<2		<1	<1		<1	<1		<1	<1			<1
1,1,2-Trichlroroethane	7		<2	<1		<2	<1		<2	<1			<2
1,2-Dibromoethane	<10	<6	<2	NA	<6	<2	NA	<6	<2	NA	<10	<6	<2
Tetrachloroethylene	<1	<1	<1	<1	<1	<1	<1	17	18	28	<1	<1	<1
Bromoform	<6	<8	<1	<2	<8	<1	<2	<8	<1	<2	<6	<8	<1
Benzene	<8	<8	4	<8	<8	<8	<4	<8	<8	<8	<8	<8	<8
Toluene	<3	<8	<4	<6	<8	<4	<4	<8	<4	<6	<8	<8	<4
Chlorobenzene	<3	<8	<8	<8	<8	<8	<6	<8	<8	<8	<8	<8	<8
Ethylbenzene	<8	<8	<8	<6	<8	<8	<6	<8	<8	<6	<8	<8	<8
Xylene (o,m,p)	12	<8	<3	<6	<8	<3	<12	<8	<8	<6	<8	<8	<3
Dichlorobenzene (o,m,p)	<6	<5	<4	<9	<5	<4	<10	<5	<4	<9	<6	<5	<4
Total	12	0	4	0	4	8	16	62	688	6844	0	4	1

NA-Not Analyzed   NR-No Result Due To Technical Reasons   7-No Mention On Lab Reports

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TABLE 3-11

ANALYTICAL RESULTS - WEST HICKSVILLE - GROUNDWATER QUALITY

WELL NUMBER	WH-4	WH-5	WH-5	WH-5	WH-6	WH-6	WH-6	WH-6
WELL DEPTH	66	72	72	72	64	64	64	64
SAMPLE DATE	12/17/85	12/5/84	4/2/85	12/17/85	10/19/84	12/5/84	4/2/85	12/18/85
Trichlorofluoromethane	NA	<1	<1	NA	<3	2	1	NA
Methylene Chloride)								
1,1,2-Trichlorotrifluoroethane)	<8	<10	<4	<8	11	<10	<4	8
1,1-Dichloroethylene)								
c & t-1,2-Dichloroethylene	<13	36	<20	<13	25	23	<20	25
t-1,2-Dichloroethylene								
1,1-Dichloroethane	<16	25	NA	<16	NR	44	NA	27
c-1,2-Dichloroethylene								
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	<1	29	4	11	55	43	21	170
Carbon Tetrachloride	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethylene	<1	23	2	9	96	73	35	80
Bromodichloromethane	<1	<1	<1	<1	<3	<1	<1	<1
c-1,3-Dichloropropene)								
Dibromochloromethane)		<2			<2	<2		
1,1,2-Trichloroethane)								
c-1,3 Dichloropropene)								
Dibromochloromethane)	<1		<1	<1			<1	<1
1,1,2-Trichlroroethane	<1		<2	<1			<2	<1
1,2-Dibromoethane	NA	<60	NR	NA	<10	<6	<2	NA
Tetrachloroethylene	<1	160	110	620	8	8	7	9
Bromoform	<2	<3	<1	<2	<6	<3	<1	<2
Benzene	<4	<3	<3	<4	<3	<3	<3	<4
Toluene	<4	<3	<4	<4	<3	<3	<4	<4
Chlorobenzene	<6	<3	<3	<6	<3	<3	<3	<6
Ethylbenzene	<6	<3	<3	<6	<3	<3	<3	<6
Xylene (o,m,p)	<12	<3	<3	<12	15	<3	<3	<12
Dichlorobenzene (o,m,p)	<10	<5	<4	<10	7	<5	<4	<10
Total	0	273	116	640	217	193	64	319

NA-Not Analyzed NR-No Result Due To Technical Reasons ?-No Mention On Lab Reports

TABLE 3-11

ANALYTICAL RESULTS
WEST HICKSVILLE - GROUNDWATER QUALITY

Well Number	N8880	N9341	N9463	N9917
Well Depth (feet)*	247	265	638	73
Sample Date	3/20/84	5/10/85	1/9/85	3/1/85
Trichlorofluoromethane	< 1	1	< 1	< 1
Methlyene Chloride)				
1,1,2-Trichlorotrifluoroethane)--	6	21	< 6	< 7
1,1-Dichloroethylene)				
c & t-1,2-Dichloroethylene	< 4	440	NA	< 7
t-1,2-Dichloroethylene	< 4	NA	NA	NA
1,1-Dichloroethane	< 5	66	NA	NA
c-1,2-Dichloroethylene	< 4	NA	NA	NA
Chloroform	< 1	2	< 1	< 1
1,1,1-Trichloroethane	16	16	< 1	1
Carbon Tetrachloride	< 1	2	< 1	< 1
Trichloroethylene	150	1600	< 1	1
Bromodichloromethane	< 1	<10	< 2	< 1
c-1,3-Dichloropropene)				
Dibromochloromethane)--	< 1	NA	< 3	NA
1,1,2-Trichloroethane)				
c-1,3-Dichloropropene)				
Dibromochloromethane)--	NA	<10	NA	< 1
1,1,2-Trichlroroethane	NA	< 1	NA	< 3
1,2-Dibromoethane	< 1	<10	< 5	< 2
Tetrachloroethylene	3	260	< 2	< 1
Bromoform	< 1	1	< 2	< 1
Benzene	< 3	< 3	< 3	< 5
Toluene	< 3	< 4	<15	< 3
Chlorobenzene	< 3	< 4	<15	< 3
Ethylbenzene	< 3	57	< 4	< 3
Xylene (o,m,p)	< 3	95	< 4	< 3
Dichlorobenzene (o,m,p)	< 6	130	<20	<10
Total	175	2,691	0	0

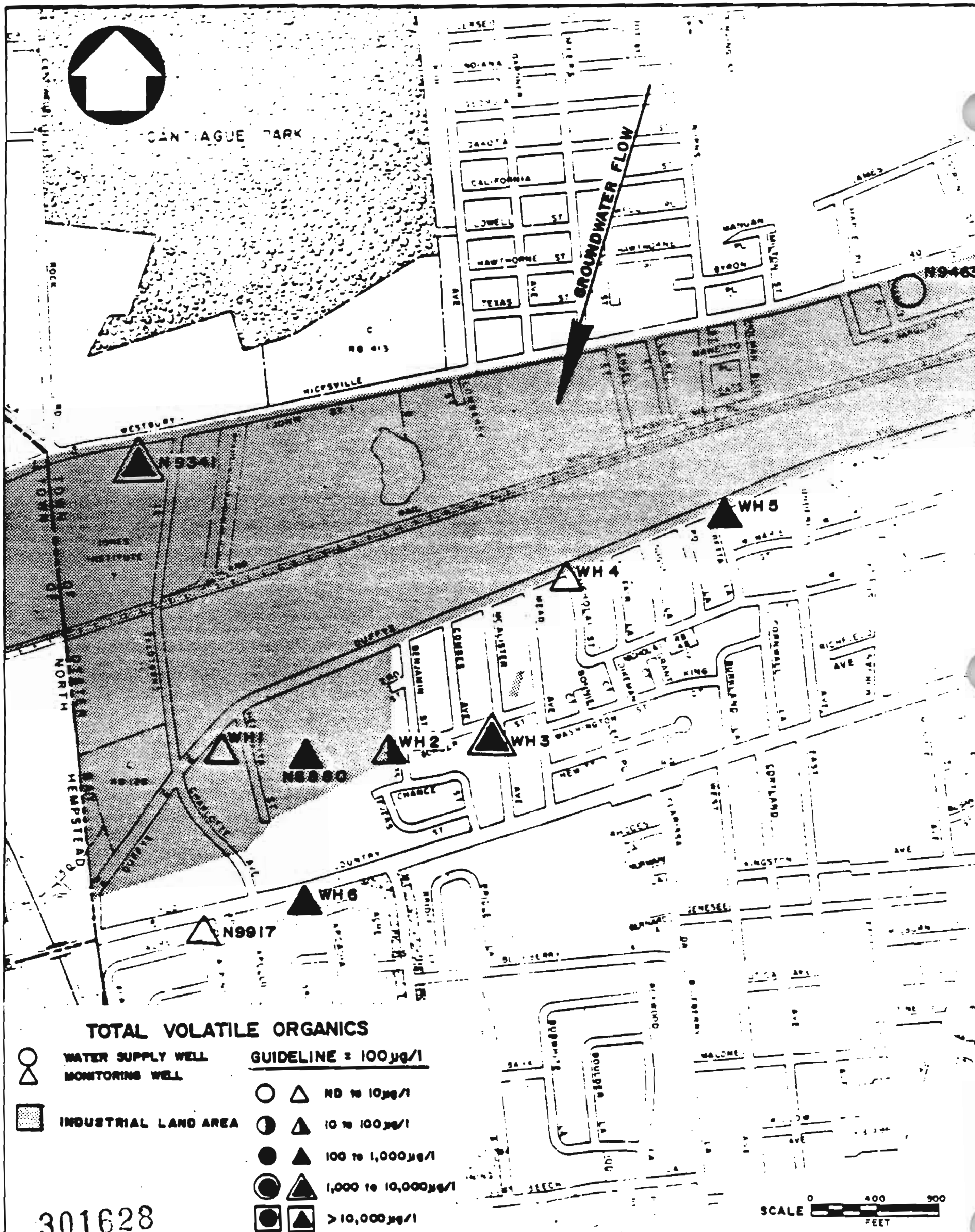
TABLE 3-12

WEST HICKSVILLE - CONTAMINATED AQUIFER SEGMENTS
TOTAL ORGANIC COMPOUNDS
DATA SUMMARY
(ug/l)

West Hicksville	Depth* (Feet)	Mean	Range	Median	Number of Data Points
WH-1	60	1	0-4	0	3
WH-2	63	12	8-16		2
WH-3	64	3766	688-6844		2
WH-4	66	2	0-4	1	3
WH-5	72	378	116-640		2
WH-6	64	192	64-319	193	3
N8880	247	175			1
N9341	265	2691			1
N9463	638	0			1
N9917	73	2			1

Note: The first sample after well development was discarded in this data summary when more than one well analyses exist

* Below ground surface



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WEST HICKSVILLE
WATER QUALITY - TOTAL VOLATILE ORGANICS

FIGURE NO. 3-17

Concentrations of 1,1,1-trichloroethane are not as high in the deeper wells. This contaminant is found up to 16 ug/l in wells 265 feet below land surface. The primary contaminant in the deeper wells is trichloroethylene.

Analytical results for well N8880 report elevated concentrations of trichloroethylene (150 ug/l), and well N9341 located about 2,000 feet north of this well reported 1,600 ug/l of this same chemical. Both wells are of similar depth (about 250 feet), which indicates that contamination has migrated into the Magothy aquifer. Because N9341 is not directly upgradient of N8880, the source of contamination is likely to originate from different sources.

Several firms in the vicinity of well N9341 are reported using up to 3,600 gallons per year of trichloroethylene. Two firms in the immediate vicinity had leaking underground storage tanks containing organic solvents and chemicals. However, because of the depth of more than 250 feet below land surface, it is more probable that the contamination source is located upgradient of the study area.

There is only one water supply well (N9463) located in the West Hicksville study area. Since most of the contaminated wells are located in the southern and western regions downgradient of the supply well, it appears that contamination of groundwater in West Hicksville does not pose a serious threat to this well.

There are, however, two wells located southwest of Hicksville in the Bowling Green Water District, which may be downgradient of a portion of the contaminated aquifer segment. These wells, N8956 and N8957, contain less than detectable limit of organic compounds at the present time. There are several clay layers described in the lithologic logs for the deeper Hicksville wells which could impede the migration of contaminants, however, the areal extent and stratigraphic continuity of the clay is unknown. Without more site specific hydrogeologic information it is assumed that the contaminated groundwater in West Hicksville could pose a serious threat to the water supply wells downgradient.

3.6 North Hicksville

3.6.1 Site Description

The North Hicksville area (Figure 3-1) is defined as the region east of North Broadway and west of South Oyster Bay Road. The northern border extends to the Northern State Parkway and the southern border extends southward towards Old Country Road. Locations of wells in this study area and land use are shown in Figure 3-18.

The major land uses are residential, commercial and industrial. The area located along the eastern border is considered to be intermediate density residential consisting of

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NORTH HICKSVILLE
WELL LOCATION AND IDENTIFICATION

301631

FIGURE NO. 3-18

approximately five to ten dwelling units per acre. Industry is concentrated in elongated north-south strips adjacent to the Long Island Railroad.

The area is served by the Hicksville Water District, and is part of the Nassau County Sewage Disposal District #3. The North Hicksville area has only been sewered since about 1980. This area has been developed for approximately 30 years and has experienced little recent growth. This is shown by the decrease in population described in Section 3.5.1.

There are no active or former landfills in North Hicksville. However, immediately north of this study area is the site of the former Syosset landfill. In a 1983 investigation of this landfill, volatile organic chemicals were detected at concentrations below NYS guidelines for organic compounds. There are no documented historical occurrences of soil or groundwater contamination in this study area.

Table 3-13 provides an industrial profile of the North Hicksville area from 1977 to 1985, together with an estimate of annual organic chemical handling and usage.

3.6.2 Geology

The shallow study wells in North Hicksville tap the upper glacial aquifer or possibly the uppermost of the Magothy aquifer. The deep wells are installed in the upper Magothy aquifer. A hydrogeologic cross section is shown in Figure 3-19. Based on analysis of the well logs in the area, the thickness of the glacial aquifer is about 100 feet in the area of North Hicksville.

The glacial sediments are sand and gravel deposits while Magothy sediments are composed of sand and clay. Clay occurs in layers that are for the most part stratigraphically inconsistent. Wells NH-3, N7562 and NH-2 do show a consistent layer of clay about ten feet thick at 50 feet below mean sea level. This clay layer may correlate with the ten foot clay layer of similar depth in N6531 located 1,200 feet to the north, but a missing well log for N8888 located between NH-2 and N7531 could not verify this correlation. The well log for N6190, located about 800 feet northeast of N8888 has clay described at this interval but not separated as a solid clay layer.

3.6.3 Hydrology

The regional groundwater flow in the northern part of Hicksville is towards the south with slight eastern components of flow. The differential water levels in the three well cluster locations drilled as part of this groundwater investigation are apparently consistent with the regional flow regime. However, three well locations were not considered adequate to provide a site specific water table or potentiometric contour.

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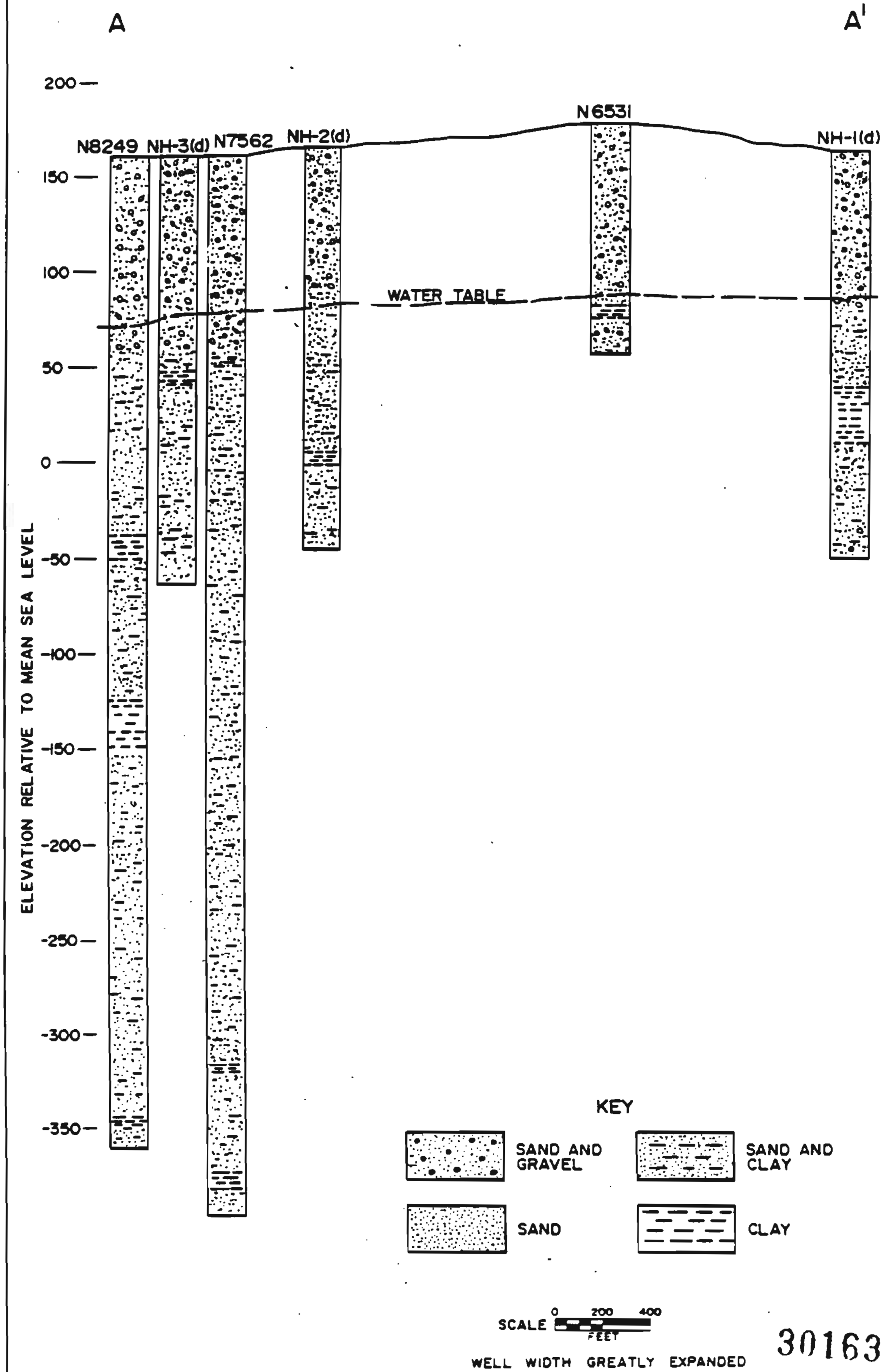
TABLE 3-13

INDUSTRIAL PROFILE OF NORTH HICKSVILLE

Source: NCHD Industrial Survey Program

Name	Location	Organic Chemicals Used	Amount Used Stored, disposed, etc. Since 1977
AMX Collision Inc.	54 Bethpage Rd.	Toluene	16 gals/yr
Radio Relay	60 Bethpage Rd.	Trichlorotrifluroethane	20 gals/yr
Spectrum Communications and Electronics Corp.			
Digital Interface	87 Bethpage Rd.	Trichlorotrifluroethane	10 gals/yr
Remington Division	Andrews Rd.	1,1,1 Trichloroethane	1,320 gals/yr
American Bank Stationery Co.	78 Midland Ave.	1,1,1 trichloroethane	30 gals/yr
Savant Instruments Inc.	221 Park Ave.	Methyl ethyl ketone	10 gals/yr
Dahl's Auto Body	56 E. Barclay St.	Toluene	Storage
Kleer-Fax Inc.	140 Miller Pl.	Tetrachloroethylene	30 gals/yr
Mod-A-Can Inc.	178 Miller Pl.	1,1,1 trichloroethane	110 gals/yr



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Water level measurements in the shallow and deep well clusters are inconsistent and provide no further information on vertical flow in the area. However, North Hicksville is regionally located in the deep recharge area for the Magothy aquifer.

Additional information is needed to define the local groundwater flow patterns in the area of North Hicksville.

3.6.4 Analytical Results and Findings

The preliminary contamination assessment is based upon analytical results obtained between June 1980 and December 1985. (The first sample from each well installed as part of this investigation was not used as described in Section 3.1.) The analytical results for the wells installed as part of this study, provided in Table 3-14, and Table 3-15, identifies and summarizes the total organic compounds detected in each well, including previously existing Nassau County monitoring wells. A graphic representation of these results is shown in Figure 3-20.

Well NH-1s (shallow) had no organic compounds detected. The adjacent well NH-1d (deep) contained trace amounts of organic compounds with a mean value of 2 ug/l and a maximum of 6 ug/l.

The second pair of wells, NH-2s and NH-2d, also had low levels of total volatile organics Well NH-2s had a mean value of 12 ug/l with a maximum of 16 ug/l. NH-2d had a maximum of 8 ug/l with a mean of 5 ug/l.

TABLE 3-14

ANALYTICAL RESULTS - NORTH HICKSVILLE - GROUNDWATER QUALITY

WELL NUMBER	NH-1s	NH-1s	NH-1s	NH-1s	NH-1d	NH-1d	NH-1d	NH-1d	NH-2s	NH-2s	NH-2s	NH-2s	NH-2d
WELL DEPTH	116	116	116	116	212	212	212	212	99	99	99	99	210
SAMPLE DATE	12/3/84	1/3/85	4/2/85	12/17/85	12/3/84	1/3/85	3/21/85	12/17/85	12/5/84	1/3/85	4/2/85	12/16/85	12/3/84
Trichlorofluoromethane	<1	<1	<1	NA	<1	<1	<1	NA	<1	<1	<1	NA	<1
Methylene Chloride }													
1,1,2-Trichlorotrifluoroethane }	<10	<6	<4	<8	<10	<6	<4	<8	<10	<6	<4	<8	<10
1,1-Dichloroethylene }													
c & t-1,2-Dichloroethylene	<15	NA		<18	<15	NA		<18	<15	NA		<18	<15
t-1,2-Dichloroethylene			<5				<5				<5		
1,1-Dichloroethane	<15	NA	NA	<16	<15	NA	NA	<16	<15	NA	NA	<16	<15
c-1,2-Dichloroethylene			<20				<20				<20		
Chloroform	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	1	2	<1
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	<1	1	<1	9	10	12	8	<1
Carbon Tetrachloride	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethylene	<1	<1	<1	<1	<1	1	<1	<1	2	2	2	<1	<1
Bromodichloromethane	<1	<2	<1	<1	<1	<2	<1	<1	<1	<2	<1	<1	<1
c-1,3-Dichloropropene }													
Dibromochloromethane }	<2	<3			<2	<3			<2	<3			<2
1,1,2-Trichloroethane }													
c-1,3 Dichloropropene }													
Dibromochloromethane }			<1	<1			<1	<1			<1	<1	
1,1,2-Trichlroroethane			<2	<1			<2	<1			<2	<1	
1,2-Dibromoethane	<6	<5	<2	NA	<6	<5	<2	NA	<6	<5	<2	NA	<6
Tetrachloroethylene	<1	<2	<1	<1	<1	<2	<1	<1	<1	<2	1	<1	<1
Bromoform	<3	<2	<1	<2	<3	<2	<1	<2	<3	<2	<1	<1	<3
Benzene	3	<3	<3	<4	5	<3	<3	<4	4	<3	<3	<4	5
Toluene	6	<15	<4	<4	19	<15	<4	<4	6	<15	<4	<4	16
Chlorobenzene	<3	<15	<3	<6	<3	<15	<3	<6	<3	<15	<3	<6	<3
Ethylbenzene	9	<4	<3	<6	16	<4	<3	<6	<3	<4	<3	<6	11
Xylene (o,m,p)	53	<4	<3	<12	110	5	<3	<12	35	<4	<3	<12	69
Dichlorobenzene (o,m,p)	<25	<20	<4	<10	<50	<20	<4	<10	10	<20	<4	<10	<15
Total	71	0	0	0	150	6	1	0	67	12	16	10	101

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NA-Not Analyzed NR-No Result Due To Technical Reasons ?-No Mention On Lab Results

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TABLE 3-14

ANALYTICAL RESULTS - NORTH HICKSVILLE - GROUNDWATER QUALITY

WELL NUMBER	NH-2d	NH-2d	NH-2d	NH-3s	NH-3s	NH-3s	NH-3s	NH-3d	NH-3d	NH-3d	NH-3d
WELL DEPTH	210	210	210	105	105	105	105	225	225	225	225
SAMPLE DATE	1/3/85	3/18/85	12/16/85	12/3/84	1/3/85	4/2/85	12/16/85	12/3/84	1/3/85	3/18/85	12/16/85
Trichlorofluoromethane	<1	<1	NA	<1	<1	<1	NA	<1	<1	<1	NA
Methylene Chloride }											
1,1,2-Trichlorotrifluoroethane }	<6	4	<8	<10	<6	<4	<8	10	7	5	<8
1,1-Dichloroethylene }											
c & t-1,2-Dichloroethylene	NA		<13	<15	NA	<20	<13	<15	NA		<13
t-1,2-Dichloroethylene		<5								<5	
1,1-Dichloroethane	NA	NA	<16	<15	NA	NA	NR	<15	NA	NA	<16
c-1,2-Dichloroethylene		<20								<20	
Chloroform	<1	1	<1	<1	<1	<1	<1	<1	<1	1	<1
1,1,1-Trichloroethane	3	3	3	120	77	270	940	4	13	11	15
Carbon Tetrachloride	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1
Trichloroethylene	1	<1	1	2	2	1	2	9	15	13	14
Bromodichloromethane	<2	<1	<1	<1	<2	<1	<1	<1	<2	<1	<1
c-1,3-Dichloropropene }											
Dibromochloromethane }	<3			<2	<3			<2	<3		
1,1,2-Trichloroethane }											
c-1,3 Dichloropropene }											
Dibromochloromethane }		<1	<1			<1	<1			<1	<1
1,1,2-Trichlroroethane		<2	<1			<2	<1			<2	<1
1,2-Dibromoethane	<5	<2	NA	<6	<5	<2	NA	<6	<5	<2	NA
Tetrachloroethylene	<2	<1	<1	<1	<2	<1	1	1	2	2	2
Bromoform	<2	<1	<2	<3	<2	<1	<2	<3	<2	<1	<2
Benzene	<3	<3	<4	<3	<3	<3	<4	<3	<3	<3	<4
Toluene	<15	<4	<4	4	<15	<4	<4	4	<15	<4	<4
Chlorobenzene	<15	<3	<6	<3	<15	<3	<6	<3	<15	<3	<6
Ethylbenzene	<4	<3	<6	5	<4	<3	<6	4	<4	<3	<6
Xylene (o,m,p)	<4	<3	<12	33	<4	<15	<12	22	<4	<3	<12
Dichlorobenzene (o,m,p)	<20	<4	<10	<15	<20	<4	<10	<10	<20	<4	<10
Total	4	8	4	164	79	271	943	54	37	32	31

NA-N[illegible]alyzed NR-No Result Due To Technical Reasons ?-No Menti[illegible]On Lab Results

TABLE 3-14

ANALYTICAL RESULTS
NORTH HICKSVILLE - GROUNDWATER QUALITY

Well Number	N6531	N6190	N6191	N7562	N8249	N8436	N8888	N9488	N9927
Well Depth (feet)*	119	605	555	545	495	188	111	575	91
Sample Date	9/23/83	6/11/85	9/22/83	8/23/85	5/14/85	6/4/80	12/5/83	6/18/85	1/14/83
Trichlorofluoromethane	1	< 1	1	< 1	< 1	NA	< 1	< 1	< 1
Methlyene Chloride)									
1,1,2-Trichlorotrifluoroethane)--	2	< 2	< 4	< 1	4	4	1	36	< 5
1,1-Dichloroethylene)									
c & t-1,2-Dichloroethylene	< 4	NA	< 4	3	78	NA	< 4	3	< 1
t-1,2-Dichloroethylene	NA	< 1	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	< 4	< 1	< 4	1	28	NA	< 4	< 1	9
c-1,2-Dichloroethylene	NA	< 1	< 1	NA	NA	NA	NA	NA	NA
Chloroform	< 1	< 1	< 1	< 1	< 1	4	2	< 1	< 1
1,1,1-Trichloroethane	38	< 4	< 1	< 1	32	45	15	< 3	18
Carbon Tetrachloride	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1
Trichloroethylene	7	< 1	1	3	65	45	6	31	< 1
Bromodichloromethane	< 1	< 1	NA	< 1	< 1	2	< 1	< 1	< 1
c-1,3-Dichloropropene)									
Dibromochloromethane)--	< 1	NA	< 1	NA	NA	NA	< 1	NA	< 1
1,1,2-Trichloroethane)									
c-1,3-Dichloropropene)									
Dibromochloromethane)--	NA	< 1	NA	< 2	< 1	NA	NA	NA	NA
1,1,2-Trichlroroethane	NA	< 1	NA	< 1	< 1	NA	NA	< 1	NA
1,2-Dibromoethane	NA	NA	< 1	NA	< 1	NA	NA	NA	NA
Tetrachloroethylene	3	< 1	3	< 1	2	11	5	< 1	1
Bromoform	< 1	< 1	< 1	< 1	< 1	NA	< 1	< 1	< 1
Benzene	< 4	NA	< 4	NA	< 3	NA	< 4	NA	< 4
Toluene	< 4	NA	< 4	NA	< 4	NA	< 4	NA	< 4
Chlorobenzene	< 4	< 1	< 4	< 1	< 4	NA	< 4	< 1	< 5
Ethylbenzene	< 4	NA	< 4	NA	< 5	NA	< 4	NA	< 3
Xylene (o,m,p)	< 4	NA	< 4	NA	< 4	NA	< 4	NA	< 4
Dichlorobenzene (o,m,p)	< 8	NA	< 8	NA	< 8	NA	< 8	NA	<10
Total	51	0	5	7	209	113	29	69	28

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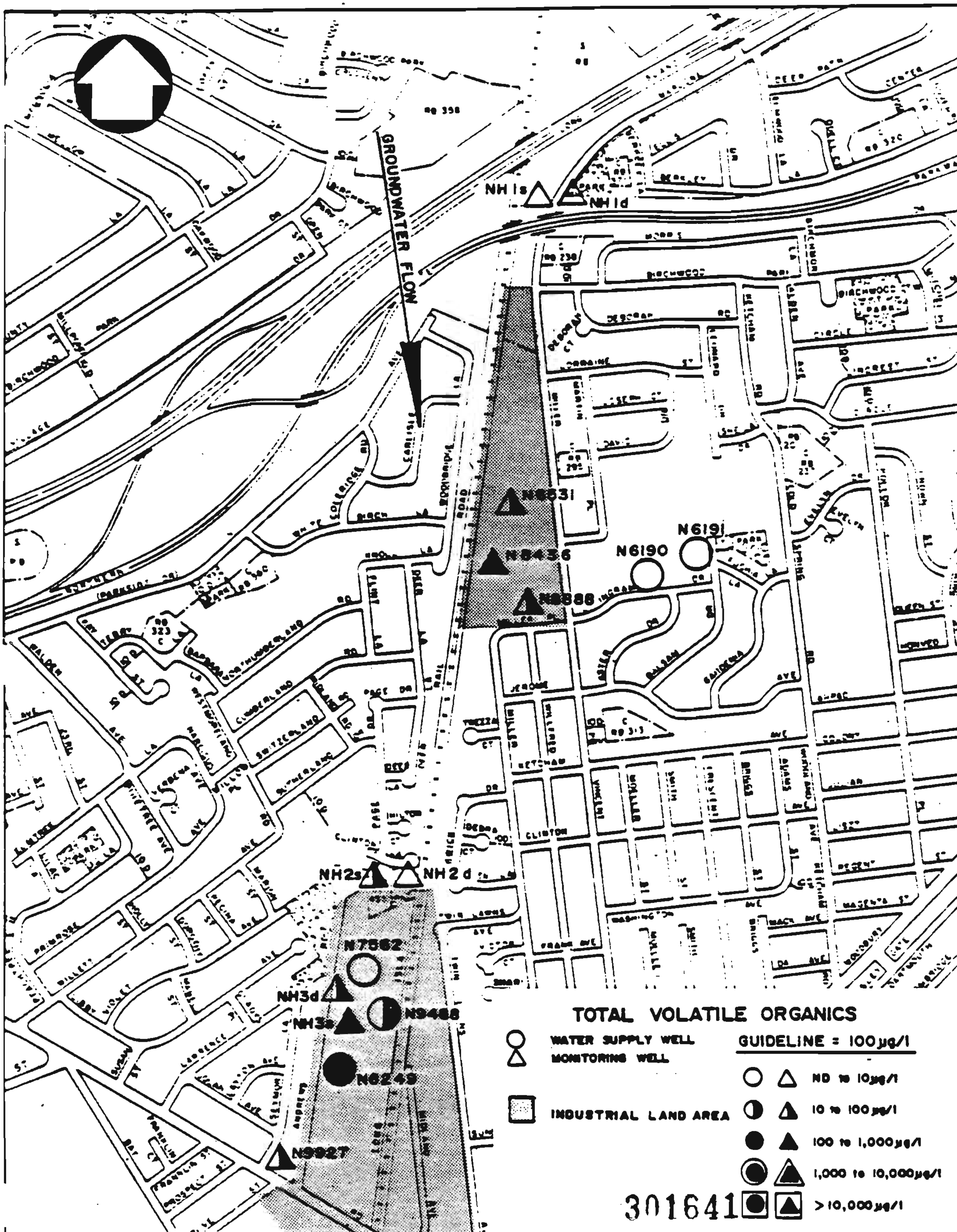
TABLE 3-15

NORTH HICKSVILLE - CONTAMINATED AQUIFER SEGMENTS
TOTAL ORGANIC COMPOUNDS
DATA SUMMARY
(ug/l)

North Hicksville	Depth* (Feet)	Mean	Range	Median	Number of Data Points
NH-1s	116	0	0-0	0	3
NH-1d	212	2	0-6	1	3
NH-2s	99	13	10-16	12	3
NH-2d	210	5	4-8	4	3
NH-3s	105	431	79-943	271	3
NH-3d	225	33	31-37	31	3
N6531	119	51			1
N6190	605	0			1
N6191	555	5			1
N7562	545	7			1
N8249	495	209			1
N8436	188	113			1
N8888	111	29			1
N9488	575	69			1
N9927	91	28			1

Note: The first sample after well development was discarded in this data summary when more than one well analyses exist

* Below ground surface



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NORTH HICKSVILLE
WATER QUALITY-TOTAL VOLATILE ORGANICS

FIGURE NO. 3-20

trichloroethylene with the greatest concentration of these two constituents (113 ug/l) found in well N8436. Well N8888 down-gradient of well N8436 contained the same compounds, but in smaller concentrations (29 ug/l). The well north of N8436 (N6531) had elevated concentrations of 1,1,1 trichloroethane only (38 ug/l). Water supply wells N6190 and N6191 contain less than 5 ug/l total organic compounds. The exact source of this contamination in the area is unknown, however, there are a few industries in the vicinity of these wells that are known to handle or store significant quantities of trichloroethane. Upgradient wells NH-1s and 1d, which have nondetectable and 2 ug/l concentrations of total volatile organics respectively, also appear to isolate the industries as a probable source of contamination.

Analytical results from the other wells south of Clinton Lane indicate that NH-3, N9927, and N8249 showed signs of contamination, and that the primary contaminant is 1,1,1 trichloroethane. There are two firms located in the vicinity of Andrews Road that are reported to handle this chemical.

Another observation is the extent of contamination of trichloroethylene. This compound was detected in wells NH-3d (14 ug/l), N8249 (65 ug/l) and N9488 (31 ug/l). What is more significant is that the highest concentration among the three wells was detected at a depth of 495 feet in water supply well N8249.

Results of upgradient wells along Clinton Lane (NH-2s and 2d; 13 and 5 ug/l respectively) indicate that the industry between Clinton Lane and the Hicksville Water District wells may be a source of contamination and impairment of the supply wells. (It should be noted that treatment is currently employed at this well field site.)

The three other existing water supply wells in the North Hicksville area (N6190, N6191 and N7562) all contain trace amounts of organic compounds indicating migration of organic contamination into the deepest portion of the Magothy aquifer appears to have occurred throughout the area, and restriction of these wells may occur in the future.

4.0 Contaminated Aquifer Management and Remedial Alternatives

Based on the preliminary contamination assessment of the five areas, there are several applicable management alternatives. The most immediate management alternative to mitigate groundwater contamination is to abate the sources of contamination. This often requires a comprehensive investigation comprising surveys, soil borings, monitoring well installation, and sampling and analysis of waste discharges, soils, sediments and groundwater to identify the contaminant source. However, if the site problem involves more than source abatement, which is the situation for most of the five areas in this study, and soil and groundwater are significantly contaminated, the approach to remedial action is more complex.

Depending on the site specific problem, a number of remedial alternatives are available. Once the source(s) have been determined, abatement alternatives include discharge elimination (hold and haul); treatment prior to groundwater discharge; and discharge to a municipal treatment facility with or without pretreatment depending on the quantity and level of contamination. This is done as part of the New York State Pollutant Discharge Elimination System and Nassau County Public Health Ordinance, Articles Nine and Eleven. In order to determine the most implementable and cost-effective solution it is important to first define the site problem.

Site problems can generally be placed in one or more of the following categories: (1) air pollution; (2) surface water infiltration or contamination; (3) leachate generation and contaminated groundwater; (4) gas migration; (5) presence of wastes in drums, lagoons, tanks, etc; (6) contaminated sediments and soils; (7) contaminated water supply; and (8) contaminated sanitary and storm sewer lines.

With regard to the sites evaluated in this investigation, contaminated soils, groundwater and water supply are of most concern, although wastes themselves, organic vapor migration and contaminated sediments in storm drainage systems are also potential problems. Air contamination and surface water contamination are remote possibilities.

General response actions to mitigate these problems and associated remedial technologies are provided in Table 4-1. For the categories identified as of primary concern in this groundwater investigation above, Table 4-2 presents a list of remedial technologies classified according to the type of offsite problem (leachate generation and contaminated groundwater; contaminated sediments and soils; and contaminated water supply) they are intended to mitigate.

In order to determine the most appropriate remedial alternative or combination of alternatives, a cost-benefit analysis

TABLE 4-1

GENERAL RESPONSE ACTIONS AND ASSOCIATED REMEDIAL TECHNOLOGIES

General Response Action	Technologies
No Action	Some monitoring and analyses may be performed.
Containment	Capping; groundwater containment barrier walls; bulkheads; gas barriers.
Pumping	Groundwater pumping; liquid removal; dredging.
Collection	Sedimentation basins; French drains; gas vents; gas collection systems.
Diversion	Grading; dikes and berms; stream diversion ditches; trenches; terraces and benches; chutes and downpipes; levees; seepage basins.
Complete Removal	Tanks; drums; soils; sediments; liquid wastes; contaminated structures; sewers and water pipes.
Partial Removal	Tanks; drums; soils; sediments; liquid wastes.
On-site Treatment	Incineration; solidification; land treatment; biological, chemical, and physical treatment.
Off-site Treatment	Incineration; biological, chemical, and physical treatment.
In Situ Treatment	Permeable treatment beds; bioreclamation; soil flushing; neutralization; land farming.
Storage	Temporary storage structures.
On-site Disposal	Landfills; land application.
Off-site Disposal	Landfills; surface impoundment; land application.
Alternative Water Supply	Cisterns; above ground tanks; deeper or upgradient wells; municipal water system; relocation of intake structure; individual treatment devices.
Relocation	Relocate residents temporarily or permanently.

Source: U.S. Environmental Protection Agency

TABLE 4-2

ALTERNATIVE REMEDIAL TECHNOLOGIES TO ADDRESS IDENTIFIED SITE PROBLEMS

<u>Leachate and Groundwater Controls</u>

o Capping

- Synthetic membranes
- Clay
- Asphalt
- Multimedia cap
- Concrete
- Chemical sealants/stabilizers

o Containment barriers

Function options

- Downgradient placement
- Upgradient placement
- Circumferential placement

Material and construction options (vertical barriers)

- Soil-bentonite slurry wall
- Cement-bentonite slurry wall
- Vibrating beam
- Grout curtains
- Steel sheet piling

Horizontal barriers (bottom sealing)

- Block displacement
- Grout injection

o Groundwater pumping (generally used with capping and treatment)

- Extraction and injection
- Extraction alone
- Injection alone

Equipment and Material Options

- Well points
- Deep wells

TABLE 4-2
(continued)

ALTERNATIVE REMEDIAL TECHNOLOGIES TO
ADDRESS IDENTIFIED SITE PROBLEMS

- Suction wells
- Ejector wells

o Subsurface Collection Drains

- French drains
- Tile drains
- Pipe drains (dual media drains)

Excavation and Removal of Waste and Soil

o Excavation and removal

- Backhoe
- Cranes and attachments
- Front end loaders
- Scrapers
- Pumps
- Industrial vacuums

o Grading

- Scarification
- Tracking
- Contour furrowing

o Capping (see Leachate and Groundwater Controls)

o Revegetation

- Grasses
- Legumes
- Shrubs
- Trees, conifers
- Trees, hardwoods

In Situ Treatment

o Hydrolysis
o Oxidation
o Reduction
o Soil aeration
o Solvent flushing

TABLE 4-2
(continued)

ALTERNATIVE REMEDIAL TECHNOLOGIES TO
ADDRESS IDENTIFIED SITE PROBLEMS

- o Neutralization
- o Polymerization
- o Sulfide precipitation
- o Bioreclamation
- o Permeable treatment beds
- o Chemical dechlorination

- o Treatment of aqueous waste streams

  Biological treatment

  - Activated sludge
  - Trickling filters
  - Aerated lagoons
  - Waste stabilization ponds
  - Rotating biological disks
  - Fluidized bed bioreactors

  Chemical treatment

  - Neutralization
  - Precipitation
  - Oxidation
  - Hydrolysis
  - Reduciton
  - Chemical dechlorination
  - Ultraviolet/ozonation

  Physcial treatment

  - Flow equalization
  - Flocculation
  - Sedimentation
  - Activated carbon
  - Kleensorb
  - Ion exchange
  - Reverse osmosis
  - Liquid-liquid extraction
  - Oil-water separator
  - Steam distillation
  - Air stripping
  - Steam stripping
  - Filtration
  - Dissolved air flotation

TABLE 4-2
(continued)

ALTERNATIVE REMEDIAL TECHNOLOGIES TO
ADDRESS IDENTIFIED SITE PROBLEMS

Contaminated Water Supplies

- o Alternative drinking water supplies
- o Municipal water supply treatment (see Treatment of aqueous waste streams - Physical Treatment)

Source: U.S. Environmental Protection Agency needs to be undertaken. As part of this analysis, site characteristics, such as geology and hydrology; existing land use; proximity to water supply wells; and depth to groundwater, also needs to be evaluated. Because this report provides only a preliminary assessment of each of the study areas, additional data is required, especially to define the site specific hydrogeological characteristics. Much of the data gathered for this investigation can be directly applied to selection of remedial alternatives, however, location of sources and a more comprehensive and consistent assessment of water quality is needed at each site. Table 4-3 identifies site characteristics typically used in the alternative screening process.

In addition to site features, waste, contaminated soil and groundwater characteristics that limit the effectiveness or feasibility of remedial technologies need to be considered. These include physical properties of the contaminant, such as volatility, solubility and density; specific chemical constituents such as chlorinated organic chemicals or metals; and properties that determine the contaminant's degree of hazard, including persistence and toxicity. Waste characteristics which may influence the selection of the most appropriate remedial measure(s) are provided in Table 4-4.

3. Vertical contaminant barriers (slurry wall, vibrating beam, etc.), and recovery wells with treatment, and recharge or discharge with pretreatment to a municipal treatment facility (dependent upon extent, characteristics, location and proximity to public water supply wells).
4. Relocation of water supply wells, and water supply treatment (dependent upon contaminant characteristics).

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5.0 RECOMMENDATIONS

- The findings of this report should be referred to the New York State Department of Environmental Conservation for State and USEPA Superfund consideration.
- Continued investigations should be conducted in New Cassel, Garden City Park, West Hicksville and, to a lesser extent, North Hicksville and New Hyde Park to: complete definition of the horizontal and vertical extent of contamination; assess the threat to public water supply; identify contaminant sources; and motivate efforts to remediate contaminant sources and groundwater contamination. Further investigation should include: installation of additional wells; determination of the cause of anomalous water level readings in New Cassel and West Hicksville; collection of additional water quality and level data at existing wells to establish the consistency of data and identification of trends; and performance of additional detailed surveys of the industrial areas in the study areas.
- On the basis of the extensive area and high level of contamination identified in New Cassel and the consequent threat to public water supply sources, consideration should be given to singling this area out for priority consideration as a site for Superfund type investigation and remediation.

- o Detailed industrial facility surveys should be performed in areas contiguous to and upgradient of wells which showed significant groundwater contamination.
- o Contaminated aquifier segments as found in Lake Success and Glen Cove, which are not being actively evaluated or remediated, should also be investigated.
- o Industrial areas of the County located within the Magothy recharge area (Hydrogeologic Zone I) that are not presently monitored for groundwater contamination should be investigated.

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