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May 1, 1990

Mr. Anthony Candela, P.E.
Senior Engineer
State Department of Environmental Conservation
SUNY, Bldg. 40
Stony Brook, New York 11794-3070

RE: WORK PLAN FOR FOLLOW-UP SOIL AND GROUNDWATER INVESTIGATION AT UNIONDALE SHOPPING CENTER SITE

Dear Mr. Candela:

Enclosed herewith please find a revised copy of the above-referenced work plan. You will note that this work plan reflects the comments expressed by your department and the Nassau County Department of Health.

At present, we are planning to begin executing this work plan on Thursday, May 3, 1990 at 8:00 a.m. The sixteen (16) shallow soil borings will be completed first, followed by the three (3) deep soil borings, and finally the two (2) downgradient wells.

Should you have any questions or concerns regarding this submittal, please call this office.

Very truly yours,

Martin O. Klein
Hydrogeologist

Kevin J. Phillips, P.E., Ph.D.
Principal, Fanning, Phillips and Molnar

MOK/KJP:ll
Enclosure

cc: Angela Pettinelli, Nassau County Health Department
Gus Fotos, Philips International
Peter Mineo, Esq., D'Amato, Forchelli, Libert, Schwartz, Mineo & Carlino

TABLE OF CONTENTS

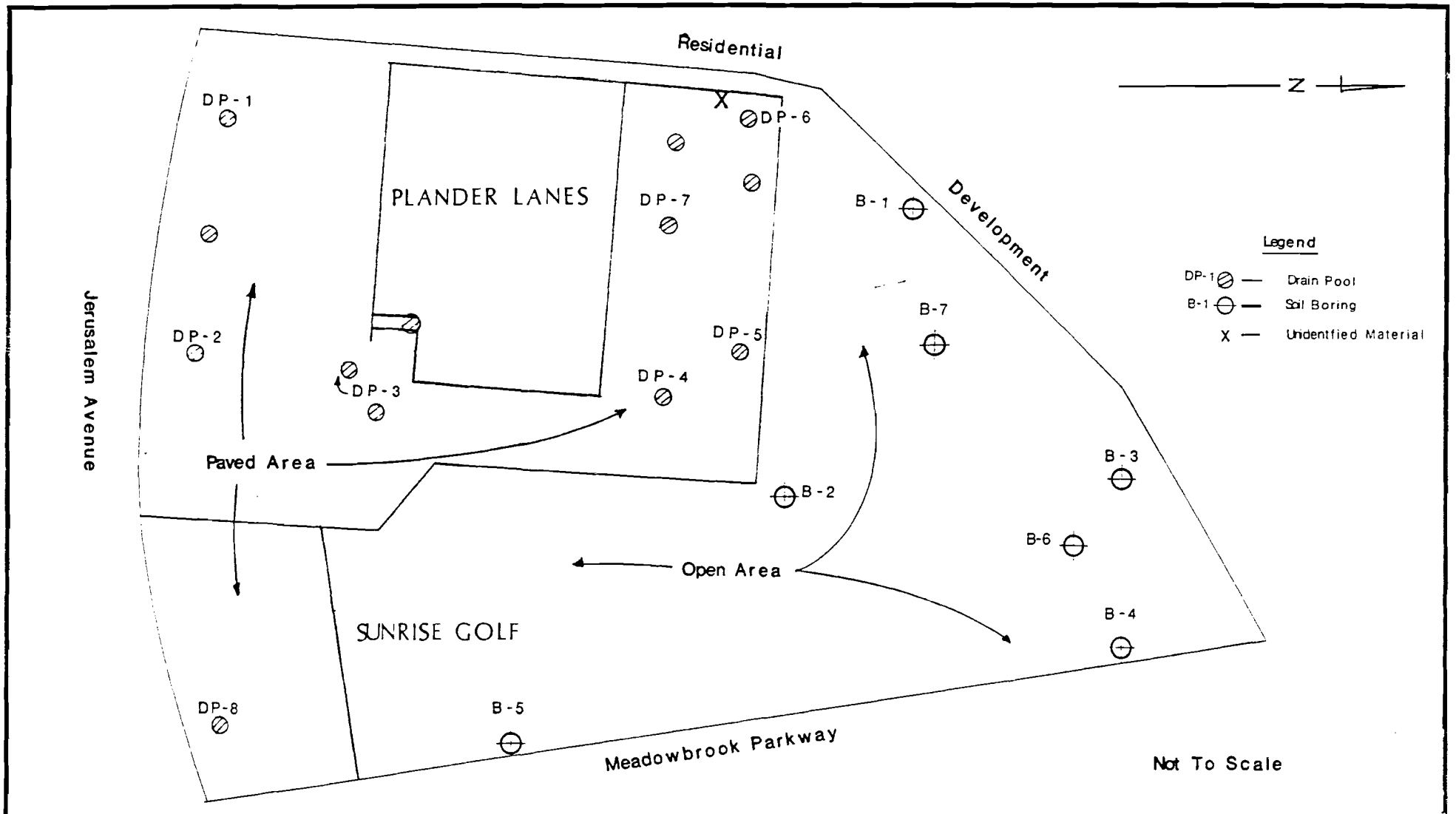
SECTION 1.0

BACKGROUND

A site investigation study was conducted for the site in 1986 (see Appendix A). A thorough review of Nassau County Health Department, New York State Department of Environmental Conservation, and the Nassau County Fire Marshal showed no evidence of hazardous waste activity. Tests on site showed little, if any, contamination and laboratory tests, directly in the fill, showed undetected levels of priority pollutant VOCs (see Figure 1.1). On April 26, 1989, a public hearing was held at Hempstead Town Hall, as part of the State Environmental Quality Review Act (SEQRA) and preparation of a Final Environmental Impact Statement (FEIS) for the proposed development of a 10.7 acre shopping center, located on Jerusalem Avenue, Uniondale, Town of Hempstead, Nassau County, New York. During the public hearing, people signed Affidavits attesting to material that was landfilled at the site which included paint cans and medical wastes.

In May 1989, a further study was undertaken to investigate this new evidence and to further study the soils of the fill in an attempt to ascertain whether contaminants were leaving the site and impacting any human population or the environment. A total of five (5) wells were installed to investigate the groundwater quality upgradient, within, and downgradient of the fill. Each well was surveyed to determine the groundwater flow direction and gradient in the aquifer. To further categorize the hydrodynamics of the fill, a paired piezometer was installed in the fill (two (2) wells were installed, 1 shallow and 1 deep in the fill).

In addition, four (4) soil samples were obtained within the fill,



F,P&M

FIGURE 1.1-BORING LOCATIONS OF OVA/GC ANALYSIS AND SAMPLING

2 in the unsaturated and 2 in the saturated zones. All groundwater and soil samples were tested by a USEPA, NYSDEC Contract Laboratory for full target compound list (TCL) parameters.

The results of the groundwater sampling indicated that there are substances present in the groundwater within the fill in both the shallow and deeper zones. Groundwater quality within the fill was categorized to be slightly tainted and exceeded the NYSDEC Class "GA" groundwater standards. However, groundwater quality directly downgradient of the fill was acceptable (within the standards).

Thus, based upon the results of the investigation, it was concluded that the site does not pose a threat to drinking water suppliers of Nassau County. We will further confirm this with two additional downgradient wells in this study. Soil samples were obtained in the middle of the fill at four (4) different depths. Low levels of PCBs, lead, pesticides and VOCs were detected at different depths within the soil borings. The concentration of the compounds in the fill were not high enough to cause a threat to human health and are below action levels of the New Jersey (ECRA) or EPA records of decision.

SECTION 2.0

SUMMARY OF WORK PLAN

Additional requests from NYSDEC and Nassau County Department of Health have precipitated this work plan. This work plan has been derived from the recommendations of the Fanning, Phillips and Molnar report entitled "Supplemental Soil and Groundwater Investigation at Uniondale Shopping Center Site, June 1989" and requirements of the NYSDEC and the NCDH (see Appendix A for NCDH and NYSDEC requirements for the work plan).

This section of the work plan will present a summary of the work plan.

Shallow Soils

A total of sixteen (16) shallow soil borings will be located on the site (as shown in Figure 2.1). The sixteen (16) shallow soil borings will be completed from a 0 to 5 foot depth. Each shallow soil boring will be composited within the entire soil profile (0 to 5 feet) and tested for metals and asbestos.

Laboratory analysis for all shallow soil borings will be performed by a USEPA contract, NYSDEC certified laboratory (NYTEST) and tested for Total Metals (the eight (8) RCRA Metals) (see Table 2.1 for summary of sampling). Asbestos samples will be obtained and tested by a NYS Certified Laboratory (North Atlantic Labs, Inc.). Appendix B presents the NYSDEC 1990 protocol for sample preservative, holding time requirements, and detection limits. The purpose of the metals and asbestos testing, within the upper 5 foot zone of the soil profile, is to determine the health effects of dust inhalation and exposure to construction workers at the site during the construction

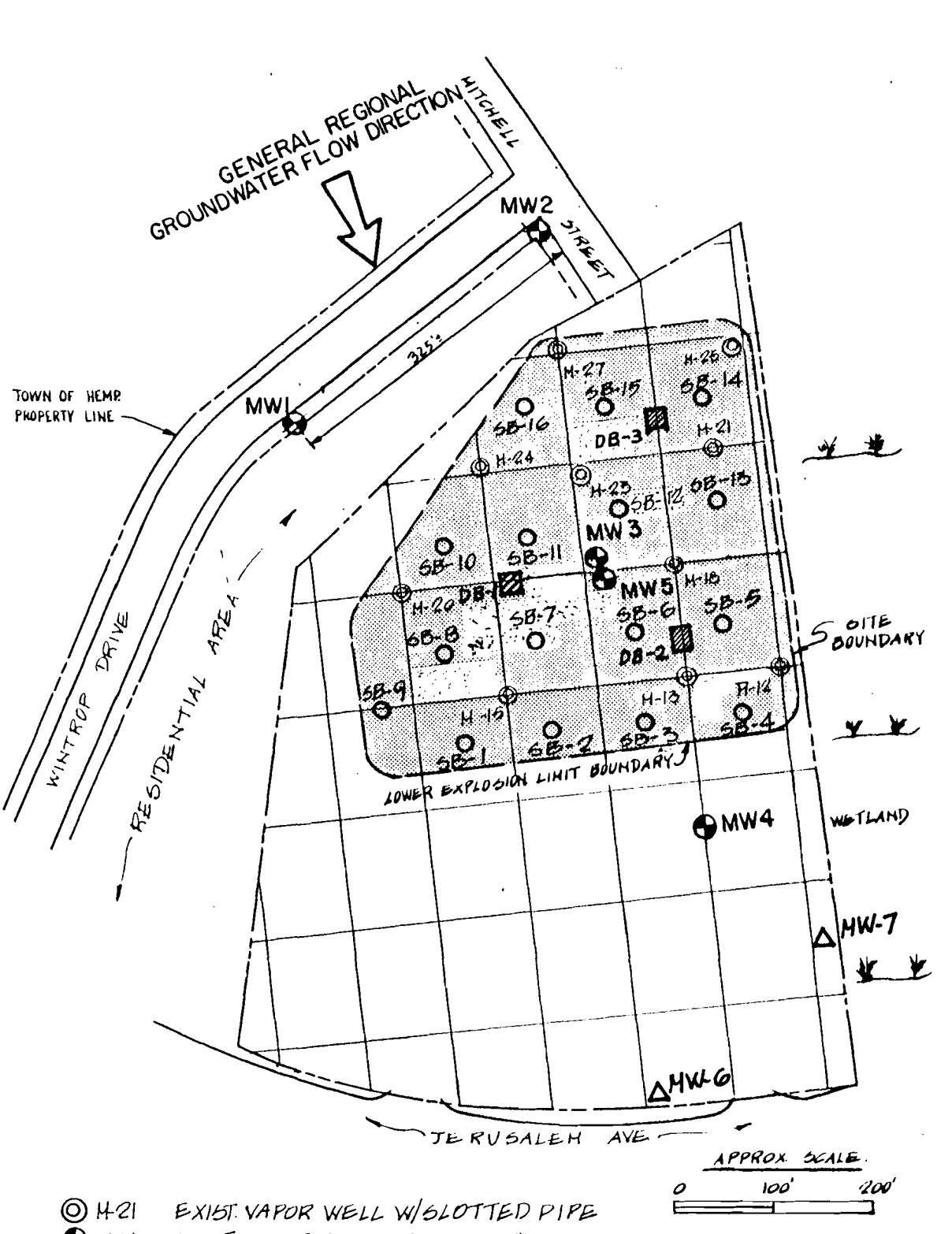


FIGURE 2.1-MONITORING WELL AND BORING LOCATIONS

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Table 2.1
Summary of Sampling
Unfondale Shopping Center
Philips International

Sample ID#	Number of Samples	Type of Sample	Depth of Sample	Analytical(1) Parameters	PID Analysis
Shallow Borings (soils)					
SB-1	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No(2)
SB-2	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-3	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-4	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-5	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-6	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-7	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-8	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-9	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-10	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-11	2	1 composite	0'5'	Total metals (8 RCRA metals)and Asbestos	No
SB-12	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-13	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-14	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-15	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
SB-16	2	1 composite	0'-5'	Total metals (8 RCRA metals)and Asbestos	No
Field Blank	1	NA	NA	Total metals (8 RCRA metals)and Asbestos	No
Deep Borings (soils)					
DB-1	1-3	discrete	0'-35'	Full TCL analysis and EP Tox	Yes
DB-2	1-3	discrete	0'-35'	Full TCL analysis and EP Tox	Yes
DB-3	1-3	discrete	0'-35'	Full TCL analysis and EP Tox	Yes
Field Blank	2	NA	NA	Full TCL analysis and EP Tox	No
Trip Blank	1	NA	NA	TCL VOCs only	No
Matrix Spike	1	discrete (split)	0'-35'	Full TCL analysis and EP Tox	Yes
Matrix Spike Duplicate	1	discrete (split)	0'-35'	Full TCL analysis and EP Tox	Yes
Monitoring Wells (aqueous)					
MW-1	1	Grab	Groundwater	Full TCL analysis, unfiltered metals, total and fecal coliform and streptococcus	No
MW-2	1	Grab	Groundwater	Full TCL analysis, unfiltered metals, total and fecal coliform and streptococcus	No
MW-3	1	Grab	Groundwater	Full TCL analysis and unfiltered metals	No
MW-4	1	Grab	Groundwater	Full TCL analysis and unfiltered metals	No
MW-5	1	Grab	Groundwater	Full TCL analysis and unfiltered metals	No
MW-6	1	Grab	Groundwater	Full TCL analysis, unfiltered metals, total and fecal coliform and streptococcus	No
MW-7	1	Grab	Groundwater	Full TCL analysis, unfiltered metals, total and fecal coliform and streptococcus	No
Field Blank	1	NA	NA	Full TCL analysis, unfiltered metals, total and fecal coliform and streptococcus	No
Trip Blank	1	NA	NA	TCL VOCs only	No
Matrix Spike	1	Grab (split)	Groundwater	Full TCL analysis, unfiltered metals, total and fecal coliform and streptococcus	No
Matrix Spike Duplicate	1	Grab (split)	Groundwater	Full TCL analysis, unfiltered metals, total and fecal coliform and streptococcus	No

* See Figure 2.1 for Sampling Locations and Appendix B for sample preservation and holding times and detection limits.
NA Indicates not applicable
(1) Analytical parameters listed as: Metals (8 RCRA) include- Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium and Silver. Full TCL include- VOCs, BNA/E, PCBs, Pesticides, cyanide and metals.
EP Tox include - Characteristic of Extraction Procedure Toxicity for Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Endrin, Lindane, Methoxychlor, Toxaphene, 2,4-D, and 2,4,5-TP Silvex.
(2) Although "No" PID is indicated for samples, the borehole will be monitored with a PID during drilling.

phase of the project and the surrounding population.

Deep Soils

In addition, a total of three (3) soil borings to a depth of approximately 35 feet in the fill area (as shown on Figure 2.1) will be completed. The locations of these borings has been determined by the NYSDEC and the NCDH. Discrete soil samples, at various depths within each of the 3 borings, will be retained for laboratory analysis as specified by the NYSDEC personnel. The samples that will be retained for analysis will be determined in the field by use of a photoionization detector (PID) and field observation. Table 2.1 was constructed to provide a summary of the soil sampling for this project, both shallow and deep soil borings.

The soil samples obtained from the three (3) deep (35') soil borings will be tested for the full target compound list parameters and extraction procedure toxicity (EP TOX) test for metals, herbicides and pesticides. Discrete soil samples will be selected for laboratory analysis by the use of a PID (MicroTIP) from each split spoon at the location of readings in excess of 5 ppm. Less than 5 ppm, no sample will be taken. Each soil sample detected with >5 ppm total organic vapors will be sent to the laboratory for TCL and EP Toxicity analysis as per NYSDEC CLP protocol. Head space analysis will be performed on each sample above 5 ppm total organic vapors. This will be done by containing a portion of each sample in a 40 ml vial. Following a 30 minute rest period, a 2 ml sample of head space vapor from each vial will be withdrawn using a dedicated air-tight syringe and injected into a portable Gas Chromatograph (OVA/GC) in the field. The results will be recorded on strip charts and in field notebooks. The NYSDEC

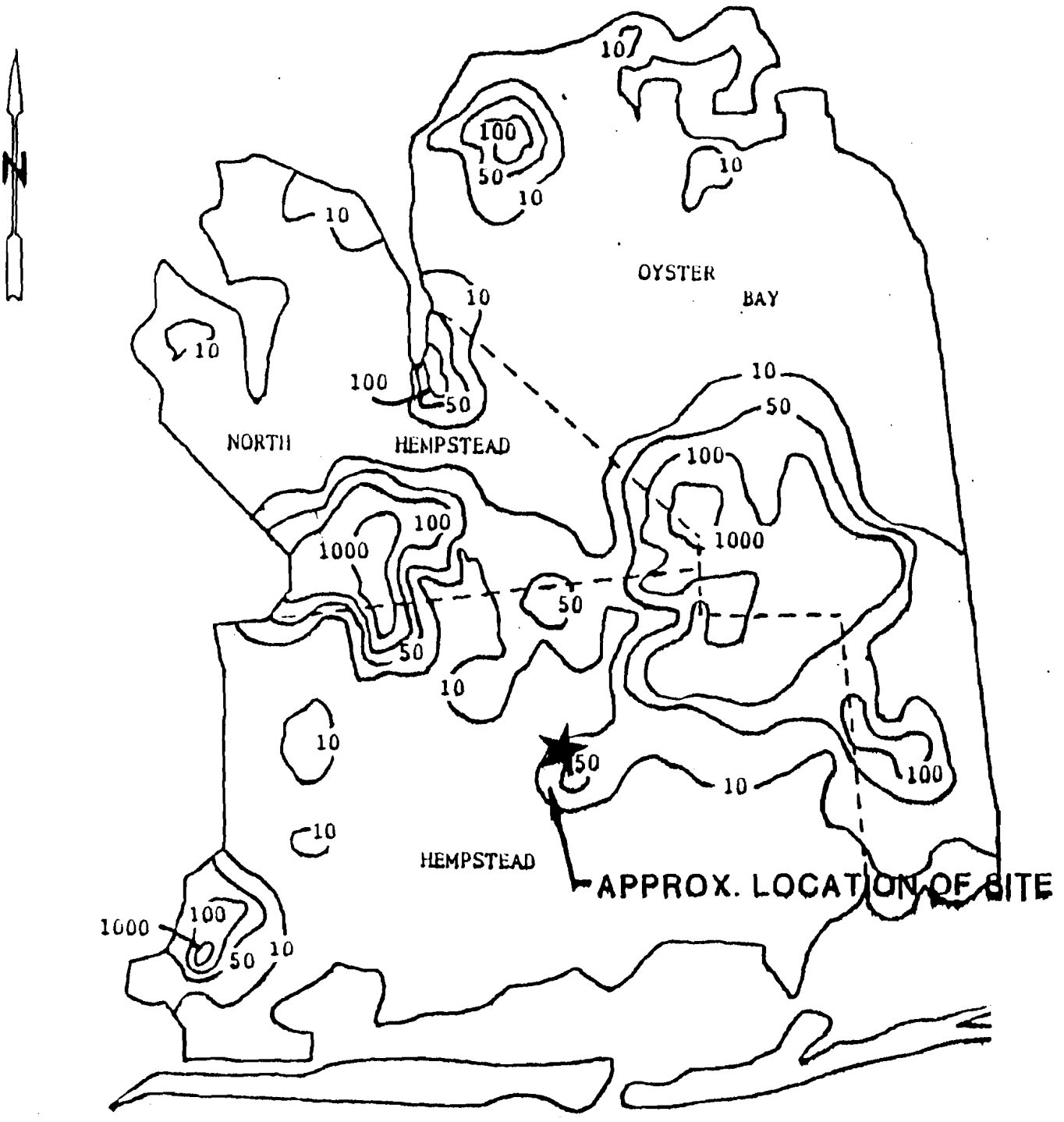
contract laboratory that will perform the sample analysis will be NYTEST Environmental, Inc.

Groundwater

The results of the groundwater testing in previous studies has indicated minor contamination of petroleum based compounds present in the fill. Note, that these levels of organics are below levels measured in 30% of the glacial aquifer in Nassau County (see Figure 2.2). The concentrations of benzene detected in the groundwater in the fill are above the NYSDEC standards for class "GA" groundwater. The direction of groundwater flow beneath the site is south to southeast, toward Meadow Brook. There are no public water supply wells downgradient of the site, thus, eliminating the path of this contamination to a receptor (public water supply). The concentration of benzene detected in the groundwater downgradient of the fill showed a significant decrease to below "GA" standards. This may be due to biodegradation, dispersion, and adsorption or chemical reaction.

Finally, the vertical gradient in the paired piezometers in the fill shows an upward movement, indicating a discharge area. This is consistent with what would be expected due to its proximity to Meadow Brook. This shows that, hydrodynamically, the water within the fill is not moving downward but rather laterally and slightly upward into Meadow Brook away from any public water supply wells.

Therefore, based upon the previous studies of the site, Fanning, Phillips and Molnar recommended that two (2) additional wells be installed on-site in a downgradient direction (as shown in Figure 2.1). These wells, and the existing wells on site and upgradient should be tested for full target compound list parameters following



N.T.S.

LEGEND:

— 10 — LEVELS ARE IN UG/L

SOURCE: NASSAU COUNTY DEPT. OF HEALTH (WATER SUPPLY BRIEFING REPORT, NOV. 1981)

FIGURE 2.2 -TOTAL VOLATILE ORGANIC CHEMICALS IN THE UPPER GLACIAL AQUIFER IN NASSAU COUNTY-1978

NYSDEC protocol. Groundwater samples tested for all parameters will be unfiltered. The groundwater from the two (2) downgradient wells and two (2) upgradient wells will also be tested for total and fecal coliform and streptacoccus by NYTEST Environmental, Inc.

All sampling will be in accordance with the Quality Assurance/Quality Control procedures, as outlined in Section 6.0 of this work plan. All sample analysis will be performed in accordance with NYSDEC contract laboratory protocol (CLP). Laboratory sample preservatives and holding time requirements, and detection limits are presented in Appendix B. Also all drilling and sampling will be performed in accordance with all NYSDEC protocol. The wells installed downgradient on the site will be developed and then sampled one week after development.

In order to maintain Quality Assurance/Quality Control (QA/QC), all sampling equipment will be steam cleaned and sampling equipment will be cleaned in accordance with USEPA and NYSDEC protocol. One field blank per activity day will be prepared and submitted to the laboratory for each day of sampling for the indicated analysis (as shown on Table 2.1). A trip blank will also be submitted for VOC analysis only for each delivery to the laboratory. A Chain of Custody will be maintained throughout the sample transportation. All daily work performed at the subject site will be documented in a field note book and daily field reports will be prepared and recorded by Fanning, Phillips and Molnar.

Based upon the results of this investigation, recommendations will be made in order to determine whether steps for remediation or further investigation is necessary.

SECTION 3.0

SOIL SAMPLING

This section of the work plan will present the soil sampling locations, procedures and soil analysis.

3.1 Soil Sampling Locations and Procedures

Shallow Soils

A total of sixteen (16) shallow soil borings will be performed at the Uniondale site (see Figure 2.1 for sampling locations). As Figure 2.1 shows (boring locations), the 16 shallow soil borings are spatially distributed throughout the site in order to provide coverage that will categorize the upper surface of the fill. The purpose of this sampling is to determine the potential risk that may exist for construction workers during the construction phase of the development. Thus, it is expected, based upon the plans for construction, that only the upper 5 feet of the fill will be disturbed and regraded.

Each shallow sampling location will be investigated by soil borings and continuous split-spoon sampling throughout the 5 foot soil profile (see Table 2.1 for a summary of the soil sampling in this zone).

The soils in the 0-5 foot zone will be composited and tested for total metals (for the 8 RCRA characteristic metals) and asbestos. Generally, the soil samples will be collected as follows:

1. The laboratory cooler will be opened and sample bottles will be inspected to ensure that all of the required bottles are present and properly labeled.

2. Collection of all 16 soil samples in the shallow borings will be performed using a clean oversized split-spoon. The split spoons will be cleaned in accordance with Section 6.0. When retrieved, the sampler will be opened and the soil will be placed into the laboratory-prepared sample vials or jars using a clean stainless steel scoop or trowel. To the extent possible, soil that has come in contact with the walls of the sampler will be discarded.
3. For each sampling event, samples will be handled with a new pair of disposable plastic surgical gloves.
4. Each sample bottle will be labeled with the following information. This information will also be recorded in a bound sampling log book or field book.
   a. Owner/client
   b. Sample number or designation, and location if possible.
   c. The date
   d. Time
   e. Type of laboratory analysis
   f. Name or initials of person collecting the sample
5. The sample bottles will be custody sealed, placed in the laboratory cooler and packed with ice or chemical ice packs to maintain the temperature 4°C.
6. The chain-of-custody forms for the analytical laboratory will be completed and signed.
7. All field blanks will be collected in accordance with the procedures described in section 6.0.
8. The coolers containing the samples will be transported to

the laboratory within 48 hours after the samples have been collected. The laboratory will be notified by the project manager in a timely manner of the impending arrival of the samples. The laboratory will be prepared to receive the samples and perform preliminary extraction analysis within regulatory agency recommended holding times.

The samples for asbestos testing will be collected in the field by North Atlantic Labs, Inc., personnel. Split spoon samples will be taken to a depth of 5 feet at 2.5 foot intervals. These samples will be composited and subjected to asbestos analysis utilizing Polarized Light Microscopy with dispersion staining. Analysis will be qualitative in nature to determine presence or absence and type of asbestos and will not yield quantitative results. Contamination of sampling equipment will be averted by subjecting the split spoon samplers to a rigorous amended water cleaning procedure between sample pulls.

To afford maximum sampler protection, the worker will be outfitted in a half mask respirator and eye protection and will wet all samples with amended water to minimize fiber release. Sampling techniques will be consistent with normal EPA sampling techniques.

The sampling personnel is to be certified as an EPA asbestos handler and duly trained in use of this particular field sampling equipment. The laboratory and its personnel performing analysis of the sample are to be certified under the New York State Environmental Laboratory Approval Program administered under the Department of Health.

Deep Soil Sampling

A total of three (3) deep soil borings to a depth of 35' will be performed at the locations as indicated in Figure 2.1. The purpose of these three (3) deep soil borings is to obtain discrete soil samples at various depths within each of the borings. The samples will be collected for laboratory analysis based upon visual inspection and results of the PID analysis as follows:

A photoionization detector will be utilized to screen continuous split spoon soil samples for total organic vapors (excluding methane). This will be done on each split spoon sample throughout each 35' boring. The purpose of utilizing the PID instead of a flame ionization detector is due to the presence of methane in the fill. As each split spoon sample is obtained, a PID analysis will be performed and the results recorded. PID results >5 ppm will be retained in laboratory prepared sample bottles. Soil head space will also be analyzed in the field by retaining a portion of each sample. Head space analysis will be performed by use of an OVA/GC in the field. These samples will also be submitted to the laboratory for analysis.

The soil sampling procedures that will be followed during this project are as follows:

1. The laboratory cooler will be opened and sample bottles will be inspected to ensure that all of the required bottles are present and properly labeled.
2. Collection of all soil samples in deep borings will be performed using a clean, over-sized split spoon. The split spoons will be cleaned in accordance with Section 6.0. When retrieved, the sampler will be opened and the soil will be

placed into the laboratory-prepared sample vials or jars using a dedicated stainless steel scoop or trowel. A field blank will be prepared on one dedicated trowel prior to sampling. To the extent possible, soil that has come in contact with the walls of the sampler, and the top portion of the sample will be discarded. A portion of each sample will be contained in one (1) 40 ml vial for head space analysis using an OVA/GC.

3. For each sampling event, samples will be handled with a new pair of disposable plastic surgical gloves.
4. Each sample bottle will be labeled with the following information. This information will also be recorded in a bound sampling log book or field book.
   a. Owner/client
   b. Sample number or designation, and location if possible.
   c. The date
   d. Time
   e. Type of laboratory analysis
   f. Name or initials of person collecting the sample
5. The sample bottles will be custody sealed, placed in the laboratory cooler and packed with ice or chemical ice packs to maintain the temperature 4°C.
6. The chain-of-custody forms for the analytical laboratory will be completed and signed.
7. All field blanks will be collected in accordance with the procedures described in section 6.0.
8. The coolers containing the samples will be transported to

the laboratory within 48 hours after the samples have been collected. The laboratory will be notified by the project manager in a timely manner of the impending arrival of the samples. The laboratory will be prepared to receive the samples and perform preliminary extraction analysis within regulatory agency recommended holding times.

3.2 Soil Sampling Analysis

Shallow Soil Samples

All sixteen (16) shallow soil borings (0-5 feet) will be composited and samples will be tested for the 8 RCRA characteristic metals (EP Toxicity metals for total metal analysis) and asbestos. All soil samples tested for metals will be collected in accordance with the QA/QC protocol outlined in Section 6.0 of this work plan and analyzed in accordance with the required qualification and quantification limits as per the New York State DEC contract laboratory requirements (see Appendix B for laboratory requirements). All soil samples tested for asbestos will be collected and analyzed in accordance with all New York State Certification requirements.

Deep Soil Borings

Discrete soil samples will be obtained from the three (3) deep soil borings based upon the PID screening. Each soil sample retained for laboratory analysis will be tested for full TCL parameters and the EP Toxicity test will be performed for metals, herbicides and pesticides. All soil samples from the deep borings will be collected in accordance with the QA/QC protocol, outlined in Section 6.0 of this work plan, and analyzed in accordance with the required qualification and quantification limits as per the NYSDEC contract laboratory requirements (see Appendix B).

SECTION 4.0

MONITORING WELL INSTALLATION PROCEDURES AND CONSTRUCTION

A total of two (2) downgradient groundwater monitoring wells will be installed at the Uniondale Site (see Figure 2.1 for locations). The monitoring well installation procedures and construction details are presented in this section of the report.

4.1 Monitoring Well Installation Procedures

The borings for the monitoring wells will be drilled with a hollow-stem auger drill rig. The augers and all drilling equipment will be steam cleaned between each well location to minimize the possibility of contaminants entering the bore hole.

4.2 Monitoring Well Construction

Each monitoring well will be constructed using a 10 foot length screen. The screens will be positioned so that they extend above and below the water table. An appropriate length of riser pipe will be attached to the screen and will extend approximately 2 feet above grade. All wells installed during this investigation will be completed and developed as described below.

Casing and Well Screen:	Four-inch I.D. threaded Schedule 40, National Sanitation Foundation (NSF) approved, PVC screens and riser pipe will be used. No solvent or glue will be used to assemble the well screen and riser casing.
Screen Slot Size:	0.10-inch machine slotted.
Storage of Casing and Screen:	The NSF PVC casing and screen lengths will not be stored on the ground. The well string will be assembled on racks or pallets in a specially designated staging area (to be determined in field).

Cleaning and Sterilization of Casing and Screen:	Prior to installation, the casing and screen will be steam-cleaned and sterilized by rinsing with isopropyl alcohol. The casing screen will then be steam cleaned again.
Bottom Cap:	A bottom cap will be installed below the well screen in all monitoring wells.
Decontamination:	All downhole equipment will be steam cleaned. This procedure will be repeated between drilling each well. The circulating system and water tank of the rig will be flushed with clean water before drilling is begun. The rinse water will be collected and disposed of properly.
Sand Pack and Sterilization:	By weight, 90 percent of the sand pack material will be larger than the screen slot size. The pack will have a uniformity coefficient $\leq$ 2.0. The sand pack will be rinsed thoroughly with distilled water prior to use. A field blank will be prepared for each sand pack by running distilled water through it. The distilled water will be tested for total and fecal coliform and streptacoccus.
Placement of the Sand Pack:	A 2" layer of sand will be placed in each bore hole prior to installing the well screen. The sand pack will extend to a minimum of 2 feet above the top of the well screen by use of a tremie. This extension will be confirmed by measuring down the annular space with a weighted tape.
Bentonite Seal:	At a minimum, a 2-foot bentonite seal will be placed in the annular space above the sand pack in each well by placing 1/4-inch-diameter bentonite pellets into the annular space by use of a tremie.
Grouting Annular Space:	A cement/bentonite/water grout mixture shall be 94 lbs./3-5 lbs./6.5 gallons, respectively. The cement-bentonite grout will be pumped into the annular space to fill the space from the top of the bentonite seal to the ground surface (grade). The grout will be tremie-piped into the annular space. Care will be taken not to disrupt the bentonite seal.
Well Development:	Each well will be developed to the point that the turbidity of the recovered well water is 50 Nephelometric Turbity Units (NTU) or less. In the event that this is not achievable, the development time will be determined in the field.
Protective Casing:	A 5-foot-long section of 6-inch I.D. steel casing

will be placed over the 4-inch well for protection. The casing will extend two feet above grade and set into the bentonite-cement grout at a minimum of 3½ feet in the annular space. A lockable cap will be affixed to the protective casing.

Well Labeling: The complete identification number of each monitoring well will be painted on the inside or cover of the protective steel casing.

Abandonment of Wells: All soil borings that are not completed as monitoring wells or wells that will be abandoned will be fully sealed in a manner appropriate for the geologic conditions to prevent contaminant migration through the bore hole. The sealing will include pressure injection with bentonite grout using a tremie-pipe and this mixture will extend the entire length of the boring to 5 feet below the ground surface. The upper 5 feet will be backfilled with appropriate native materials compacted to avoid settlement.

Well Survey: The two (2) downgradient wells will be surveyed for elevation by a New York State licensed surveyor. The well elevations will be tied into the monitoring well network existing on the site.

Groundwater Elevation Mapping: The depth to groundwater in each monitoring well will be measured using an electric-audio water level indicator with an accuracy to .01 foot. All wells in the network will be measured and a groundwater contour map calculated in order to determine the groundwater flow direction and gradient at the site.

SECTION 5.0

GROUNDWATER SAMPLING

This section of the work plan will present the groundwater sampling procedures and the groundwater analysis.

5.1 Groundwater Sampling Procedures

The groundwater sampling procedures for this project are presented below:

1. Prior to groundwater sampling, the depth to the static water level in each well will be measured with an electric water-level indicator equipped with calibrated tape to the nearest 0.01 foot and recorded. The depth to the bottom of the well from the top of the PVC casing will also be measured and recorded. To avoid cross-contamination between wells, the indicator probe will be decontaminated in accordance with the procedures described in Section 6.0.
2. The laboratory-provided sample bottle cooler will be inspected to ensure that all the required bottles are present and labeled.
3. Using a dedicated teflon bailer, the wells will be purged by removing at least 4 to 10 volumes of water. During well purging, portable meters will be used in the field to measure pH, temperature, specific conductance, and turbidity. Sample development will occur after the pH, temperature and specific conductance have stabilized, and the turbidity of the well water is 50 NTUs or less (stability will be achieved when each parameter is within plus or minus 10 percent of the previous value). Should any well not stabilize, the volume of water to be

removed from the well will be determined in the field. Sampling of the groundwater will commence following well recovery. A calibrated bucket will be used to estimate the volume of water removed from each well. Any water withdrawn from the well will be drummed and disposed of in accordance with the NYSDEC requirements.

4. A dedicated Teflon bailer equipped with a teflon check valve will be used to obtain a water sample from each well. Prior to initial use, each bailer will be cleaned in accordance with the procedures described in Section 6.0. All groundwater samples will be taken from the dedicated teflon bailers after they have been acclimated to the observation well be gently removing three bail volumes of water. The bailer will then be lowered into the well very carefully so as not to disturb the water surface, in an attempt to obtain the most representative sample of the shallow groundwater. A dedicated polypropylene line will be used to slowly lower the bailer by hand with the slack portion of the line left to lie on a tarp, or in a clean container, placed next to the well. The bailer will be lowered until it is approximately opposite the central portion of the well screen. The first three bailers of groundwater will be discarded before the samples are collected. At the completion of the sampling of a well, the bailer will be cleaned in accordance with the procedures described in Section 6.0.

5. For each well sampled, the bailer will be handled with a new pair of disposable plastic surgical gloves. Water samples will be carefully transferred from the bailer to the sample bottles to

minimize the potential for aeration of the sample.

6. Each bottle will be labeled with the following information:

   a. Owner/client
   b. Well number or
   c. Sample identification number or designation
   d. Date
   e. Time
   f. Type of laboratory analysis (i.e., Total Metals, etc.)
   g. Name of person collecting the sample

7. A separate flask or jar will be filled with well water from the bailer used to perform the field tests. The field tests include temperature, pH, and specific conductivity. The tests will be performed using portable meters. Prior to the tests, the instruments will be calibrated according to the manufacturers' specifications. The probes will then be inserted into the container while the sample is gently agitated. The readings will be recorded when the meter display stabilizes. After each use, the probes will be cleaned and prepared for further use according to Section 6.0.

8. Full and labeled sample bottles will be placed in the cooler packed with ice or chemical ice packs to maintain temperature at 4°C.

9. The chain-of-custody and recording procedures will be recorded.

A total of one sample per well or seven (7) groundwater samples will be collected during this investigation (2 upgradient, 2 within the fill, and 3 downgradient). These groundwater samples will be collected in accordance with the procedures outlined in subsection 5.1. In addition, all groundwater samples will be tested for full TCL parameters. Unfiltered groundwater samples will be obtained and analyzed for all parameters by NYTEST. The groundwater in the two (2)

downgradient wells and two (2) upgradient wells will also be tested for total and fecal coliform and streptacoccus by NYTEST.

Field blanks will be prepared for each analytical parameter for each delivery to the laboratory. A trip blank will also be present during the sampling and will be included in the cooler delivery to the laboratory. The trip blank will be tested for VOCs. In addition, a matrix spike and matrix spike duplicate will also be tested by the laboratory for one of the groundwater samples.

SECTION 6.0

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This section of the plan will discuss the quality assurance/quality control (QA/QC) procedures to be used during field activities described in this work plan. Subsection 6.1 describes the guidelines that the sampling methods generally follow. Subsection 6.2 describes the decontamination procedure for all sampling equipment. Subsection 6.3 presents the total and fecal coliform and streptacoccus testing. Subsection 6.4 presents the name and qualifications of the quality assurance officer and signature page. Subsection 6.5 presents the project and data validator, as well as the criteria by which the data shall be validated.

6.1 Sampling Methods

Sampling Methods and techniques will be in accordance with NYSDEC September 1989 Analytical Services Protocol (ASP). In situations not covered by these guidelines or regulations, the methods will be designed to be appropriate for the sample type, location and analysis to be performed.

Field blanks will be obtained during all phases of sampling. Field blanks will be prepared by pouring distilled water over a cleaned split spoon, scoop or trowel, and dedicated bailer and captured in laboratory prepared sample bottles. In addition, a field blank will also be prepared on the sand pack for the downgradient wells. Field blanks will be analyzed by the laboratory for the same parameters tested for as the samples. Trip blanks will also be submitted to the laboratory with each delivery for TCL VOC analysis

only.

Two (2) sets of matrix spikes and matrix spike duplicates will be prepared for full laboratory analysis (one for each media).

6.2 **Sampling Equipment Decontamination Procedures**

All sampling equipment (i.e., split spoons, bailers, augers, scoops, and trowels) will be decontaminated prior to use in the field. The sampling equipment will be decontaminated between samples and all augers will be steam-cleaned prior to use at new sampling locations. All sampling devices will be cleaned and prepared for field use through the following procedures:

1. Non-phosphate detergent and tap water wash;
2. Tap water rinse;
3. 10% nitric acid rinse;
4. Tap water rinse;
5. Methanol rinse (pesticide grade);
6. Distilled/deionized water rinse;
7. Air dry; and
8. All cleaned sampling equipment will be placed on and covered with plastic sheeting or wrapped in clean aluminum foil.

6.3 **Bacteriological Testing**

1. Laboratory grade distilled/deionized water will be passed through a sample of the gravel pack, collected and tested for total and fecal coliform and streptacoccus.
2. The casing and screen for each of the wells will be steam cleaned, disinfected by an isopropyl alcohol wash and steam cleaned again prior to installation.

3. NYTEST will perform the total and fecal coliform and streptacoccus testing on two (2) samples of groundwater from downgradient wells, two (2) from upgradient wells and one (1) field blank.

6.4 **Quality Assurance Officer's Resume and Signature Page**

(See next two pages.)

QUALITY ASSURANCE OFFICER

RAVI K. KORLIPARA
ENGINEER

EDUCATION

B.Tech (5 year degree)	Chemical Engineering	Regional Engineering College Warangal, India	1980
M.S.	Materials Science and Engineering	SUNY at Stony Brook	1983
Ph.D.	Mechanical Engineering	SUNY at Stony Brook	Thesis work completed 7/88

RELEVANT KNOWLEDGE AND EXPERIENCE

- Considerable experience in theoretical and mathematical modeling of dynamical systems. Experience includes theorizing and solving problems in porous media, hydrology and groundwater.
- Working knowledge of geology at the level of site auditing and groundwater studies.
- Over 20 hours of formal training in general, analytical, physical, inorganic, and organic chemistry, chemical and material balances, and chemical thermodynamics and phase equilibria.
- Theoretical and experimental experience in electrochemistry (Masters' thesis) and in corrosion.
- Chemical laboratory training in quantitative and qualitative techniques. Theoretical and experimental experience in X-ray diffractometry, scanning electron microscopy, electron microprobe and energy dispersive analysis. Theoretical knowledge in small-angle X-ray, light, and neutron scattering. Familiar with using OVA GC/MS.
- Experience in projects requiring extensive data analysis (quality, validation, and interpretation) including a Class 2 Federal and State Inactive Hazardous Waste Site on Long Island.
- Knowledge in sampling plan development methods.
- Knowledge in QA/QC and auditing procedures. Instituted a Statistical Quality Control Program in a manufacturing firm on Long Island.
- Experience in interacting with analytical laboratories and government agencies.

EMPLOYMENT HISTORY

August 5, 1988 - Present - Fanning, Phillips and Molnar

ASSOCIATIONS

American Society of Mechanical Engineers, Associate Member
National Water Well Association

QUALITY ASSURANCE OFFICER (QAO)
SIGNATURE PAGE

I, Ravi K. Korlipara, hereby certify that I am an employee of Fanning, Phillips and Molnar and that I have acted in conjunction with the project manager to develop this site specific quality assurance plan.

I understand that I shall derive my responsibility and authority from a source other than the project manager and have the authority to override the project manager's decision in areas where QA/QC elements may be compromised.

I certify that my education and experience fulfill the minimum requirements of the New York State Department of Environmental Conservation as indicated on my resume.

I agree to assist the project manager in the development of the sampling and analytical portion of the Quality Assurance Plan, interface with the data validator and develop a project specific data usability report.

Ravi K. Korlipara
Signature of QAO

RAVI K. KORLIPARA
Print Name

MAY 1, 1990
Date

6.5 Data Validator and Criteria

The Data Validator for this project will be H2M Labs, Inc. H2M Labs, Inc., has been involved in CLP analysis since 1985. The laboratory has proven its proficiency in all the CLP methodologies:

Target Compound List Purgeable Organics

Target Compound List Base/Neutral Acid Extractable

Target Compound List Pesticide/PCB's

Target Compound List Metals

Over the years our staff has gained expertise in the analytical methods, the reporting requirements and validation of the data generated. The Data Validation staff all have a technical background and have supervised or performed CLP analyses in the methodologies required. Therefore, our staff has the in-depth knowledge of the quality control requirements and the CLP deliverables.

When choosing a lab to perform data validation, it is important that the following key criteria are met:

1. The laboratory must be thoroughly familiar with CLP methods and reporting requirements.
2. Have an awareness of the practical usability of the data.
3. That the lab be a participant in the NYSDEC Contract Laboratory Program.
4. The validating laboratory should be independent of the analyzing laboratory.
5. The validating laboratory should meet with the regulatory agency prior to initiating the project to review the site specific concerns.
6. In order to facilitate the validation process, the project workplan and Q.A. Project Plan should be reviewed by the validating laboratory.
7. The validating laboratory must be willing to maintain communication with the analyzing laboratory. Telephone logs should be maintained for all communication involving the

project.

8. Provide a timely report on the reviewed data.

H2M Labs, Inc., will follow these eight guidelines when validating you data packages.

H2M Labs, Inc., is currently under contract with Engineering Science, Inc., for Data Validation Services. The purpose of this project is to provide data validation services in support of contamination assessments at selected landfill sites in New York. This project is for submission to the New York State Department of Environmental Conservation. This contract is from October 1989 through March 1990. Prime Contract Number D00230.

OUTLINE OF DATA VALIDATION PROCEDURE

Three main areas of Data Validation are included in H2M Labs, Inc., review procedure:

1. Completeness of the Data Package
2. Correctness of Data
3. Usability of Data

1. The Completeness of the Data Package includes the following:

- Review of the chain of custody information
- Case Narrative
- Q.C. Summary Forms
- Inclusion of standard and sample chromatograms and spectra
- Raw Q.C. information (instrument and method information)
- Reports
- Calibration Forms
- Method Detection Limit

2. Correctness

- Holding Times
- Reported in the correct formation in accordance with the protocol
- QC/QA criteria met
- Calculations done correctly
- Forms completed properly including qualifiers in accordance with protocol
- Calibration criteria met specifications
- Case Narrative includes all problems or deviations from protocol
- Final values compared with raw data for correctness in reported value

3. Usability

The data report submitted will include any and all deviations in the above mentioned. An assessment of the data will be made and included.

A report will be submitted to the client within two weeks of the receipt of the data package for review. This report will include the following information:

- A general assessment of the data package for completeness and correctness. This review is divided into each section of the data package.

  A detailed description of all deviations from the protocols. The reference in the protocol citing the requirement and a quote from the document will be given.
- A listing of the validator's attempts, if unable to reconstruct the reported data from the raw data.
- Telephone logs are included.

- A detailed assessment of the degree to which the data has been compromised by deviations in protocol.
- An overall appraisal of the data package.

Additional information may be included depending on the nature of the document.

The following documents are used as references for the data validation procedure:

- "Functional Guidelines for Evaluation of Inorganic Data"
- "Functional Guidelines for Evaluation of Organic Analysis" Technical Directive Document No. HQ-8410-01
- "Functional Guidelines for Evaluating Pesticide/PCB's Analyses" Technical Directive Document No. HQ-8410-01

For this project, data validation will be performed for half of all samples obtained.

SECTION 7.0

HEALTH AND SAFETY PLAN

The subject site is presently known as the site of the Uniondale Shopping Center, located in Uniondale, New York. It is presently vacant but in the past, had been utilized as a bowling alley and golf driving range. Prior to that time, the site was utilized as a cement manufacturing plant (from 1930 up to 1962). Due to the excavation of sand in the northern portion of the site a large pit was created and subsequently filled with groundwater. In 1962 a bowling alley was constructed in the southwest portion of the property while the cement plant was still in operation. By 1973, the pit had already begun to be filled in by construction and demolition debris and by 1975, a golf driving range was constructed to utilize the area of the former pit. From 1975 to 1986 the site was functioning as a bowling alley and golf driving range.

INVESTIGATIVE HISTORY

A site contamination study was conducted for the site in 1986. A thorough review of the Nassau County Health Department, NYSDEC and Nassau County Fire Marshal file showed no evidence of hazardous waste activity. Tests on site showed little, if any contamination and laboratory tests directly in the fill showed undetectable levels of priority pollutant volatile organic compounds.

On April 25, 1989, a public hearing was held at Hempstead Town Hall as part of the SEQRA process and preparation of a FEIS for the proposed development of a 10.7 acre shopping center. During a public hearing, people signed affidavits that questionable materials were landfilled including paint cans and medical wastes. In May, 1989 a

further study was undertaken to investigate this new evidence supplied to the developer and to further study the soils of the fill. A total of five (5) wells were installed to investigate the groundwater quality upgradient within and downgradient of the fill.

In addition, five soil samples were obtained within the fill, 2 in the unsaturated and 3 in the saturated zones. The results of the groundwater sampling indicated that there are substances present in the groundwater within the fill in both the shallow and deeper zones. Groundwater quality within the fill was characterized to be slightly tainted and exceeded the NYSDEC Class "GA" groundwater standards for benzene.

In summary, the results of the groundwater testing indicated minor contamination of petroleum based compounds that are present in the fill. The groundwater flow beneath the site is south to southeast towards Meadow Brook. The concentration of benzene detected in the groundwater, downgradient of the fill, showed a significant decrease to below the "GA" standards.

The results of the sampling of the soils in the fill indicated detected levels of PCBs, pesticides and metals. In addition, low concentrations of base neutral/acid extractables and VOCs were detected. Among the VOCs detected, benzene and other gasoline-type constituents were detected at low concentrations. Furthermore, methane has also been detected at relatively high concentrations in the fill zone.

PURPOSE

The purpose of this plan is to assign responsibilities, establish personnel protection standards, mandatory safety practices and

procedures, and provide for contingencies that may arise while conducting sampling and other on-site activities.

APPLICABILITY

The provisions of the Plan are mandatory for all on-site Fanning, Phillips and Molnar employees and Fanning, Phillips and Molnar subcontractors engaged on-site operations who will be exposed or have the potential to be exposed to on-site hazardous substances.

Fanning, Phillips and Molnar policy states that Fanning, Phillips and Molnar subcontractors shall provide a health and safety plan for their employees covering any exposure to hazardous materials and shall complete all work in accordance with that plan. The subcontractor may choose to use Fanning, Phillips and Molnar's Health and Safety Plan as a guide in developing its own plan or may choose to adopt in full the plan. In either case, the subcontractor shall hold Fanning, Phillips and Molnar harmless from, and indemnify, against all liability in the case of any injury. Fanning, Phillips and Molnar reserves the right to review and approve the subcontractor's plan at any time. All subcontractors will, at a minimum, follow all provisions of the Health and Safety Plan.

Inadequate health and safety precautions on the part of the subcontractor, or the belief that the subcontractor's personnel are or may be exposed to an immediate health hazard, can be the cause for Fanning, Phillips and Molnar to suspend the subcontractor's site work and ask the subcontractor's personnel to evacuate the hazard area.

Subcontractor will be responsible for operating in accordance with the most current Occupational Safety and Health Administration (OSHA) regulations 29 CFR part 1910.120 - Hazardous waste operations

and emergency response.

HEALTH AND SAFETY PLAN STANDARD OPERATING PROCEDURES (SOP)

All workers involved in site activity, including all subcontractors on site such as drillers and surveyors, will receive and review the Health and Safety Plan Standard Operating Procedures (SOP). Non-essential persons will be kept off the site unless necessary. Visiting personnel will be required to review the Health and Safety Plan SOP prior to entering the site and will utilize the necessary personnel protective equipment. Daily activities will include a review of the Health and Safety Plan between the work crew and how the plan related to the days work. Implementation of the Health and Safety Plan will be the field responsibility of the on-site hydrogeologist. A daily log of all field activities will be recorded.

SOP AIR MONITORING

A Photovac MicroTIP (PID) and Combustible Gas Indicator (CGI) will be utilized to monitor the ambient air at the site and at the specific work area daily, prior to beginning work. At each borehole and monitoring well, the location will be screened with the PID and CGI and will be continually monitored at grade level during drilling. The PID will also be utilized to monitor the air at the worker's breathing level. PID steady state readings above 5 parts per million will require upgrading safety equipment to Level C. The CGI will be utilized to determine explosive potential in the work zone. A log of events and observations will be recorded daily.

SOP PERSONAL PROTECTIVE EQUIPMENT

Level D personal protective equipment will be utilized by the drilling crew and site hydrogeologist during monitoring well

installation, soil boring, and decontamination (see Table 7.1). This will include protective clothing, eye protection, hard hats and work boots. However, sampling personnel (from North Atlantic Labs, Inc.) will be required to wear a half mask respirator and eye protection during sampling. This protective gear is for protection from possible asbestos exposure. Sampling techniques will be consistent with EPA sampling techniques. If steady state above 5 parts per million (ppm) readings are encountered with the PID during drilling, sampling, or at any other time, personnel will leave immediate area until protective equipment can be upgraded to level C to include half-face air purifying respirators with cartridges designed for organic vapor compounds along with Level C equipment. If steady state readings above 5 parts per million are recorded with the PID, additional dermal protection will be provided to all workers by utilizing disposal coveralls and gloves in conjunction with the respirators. If at any time site conditions require level A or B personal protective equipment as determined by the on-site hydrogeologist, work will cease and the Health and Safety Plan SOP will be modified for incorporation of this equipment.

Soil and aqueous sampling and decontamination procedures will be conducted with level D personal protection equipment and will utilize disposable vinyl gloves in between sampling efforts and during decontamination. If above 5 ppm steady state levels of organic vapors are detected or dusty conditions exist during sampling, personal protection equipment will be upgraded to level C with half-face air purifying respirators with cartridges designed for organic vapor compounds and, if necessary, disposable coveralls.

TABLE 7.1
SAMPLE PROTECTIVE ENSEMBLES*

LEVEL OF PROTECTION	EQUIPMENT	PROTECTION PROVIDED	SHOULD BE USED WHEN	LIMITING CRITERIA
C	Recommended: • Full facepiece, air purifying canister equipped respirator. • Chemical resistant clothing (overalls and long-sleeved jacket; hooded, one or two piece chemical splash suit; disposable chemical resistant one piece suit). • Inner and outer chemical resistant gloves. • Chemical resistant safety boots/shoes. • Hard hat. • Two way radio communications. Optional: • Coveralls • Disposable boot covers • Face shield • Escape mask • Long cotton underwear	The same level of skin protection as Level B, but a lower level of respiratory protection.	• The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin. • The types of air contaminants have been identified, concentrations measured, and a canister is available that can remove the contaminant. • All criteria for the use of air purifying respirators are met.	• Atmospheric concentration of chemicals must not exceed IDLH levels. • The atmosphere must contain at least 19.5 percent oxygen.
D	Recommended: • Coveralls. • Safety boots/shoes. • Safety glasses or chemicals splash goggles. • Hard hat. Optional: • Gloves. • Escape mask. • Face shield.	No respiratory protection. Minimal skin protection.	• The atmosphere contains no known hazard. • Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.	• This level should not be worn in the Exclusion Zone. • The atmosphere must contain at least 19.5 percent oxygen.

*Based on EPA protective ensembles.

In the event that the conditions on-site become unsafe for drilling activity, as determined by the field hydrogeologist (such as % LEL > 25), drilling will cease until the problem is remedied.

DECONTAMINATION PROCEDURE

The daily contamination procedure is as follows:

1) Establish a decontamination area
2) At this station establish a basin with detergent (Alconox or equivalent), a rinse basin with tap water and a garbage can lined with a plastic bag.
3) Wash and rinse boots
4) Remove outside gloves and discard in plastic bag
5) Remove disposable coveralls and discard in plastic bag (if applicable)
6) Spent organic vapor cartridges are to be discarded in the plastic bag.

The final closure of the decontamination area will involve double bagging all disposable clothing to be removed to an approved disposal facility. Decontamination and rinse solutions will be contained in 55 gallon drums and will be removed to an approved disposal facility. All rinse basins, etc. will be thoroughly washed, rinsed and dried prior to removal from the site.

SOP EMERGENCY EQUIPMENT AND PLAN

Emergency equipment on-site will include a first-aid kit and disposable eye wash equipment. Emergency telephone numbers for the local police, fire department, ambulance and hospital will be kept in the field book of the hydrogeologist/engineer and are listed herein.

The nearest hospital with emergency room facilities is listed, with directions, on the last page of this plan. In the event of a medical emergency, an ambulance will provide transportation to the hospital.

ON SITE AIR MONITORING

Background Readings

Before any field activities commence, the background levels of organic vapors on the site will be read and noted. Daily background readings shall take place in the vicinity of the work to commence on that day.

Air Monitoring Frequency

The following schedule should be followed for air monitoring activities as specified for each activity.

Activity: Soil Boring

Air Monitoring Equipment	Monitoring Frequency* (in the Breathing Zone)
PID	Monitor every 10 min.
CGI	Monitor every 10 min.

RESPIRATORY PROTECTION

Type of Cartridges/Limits of Cartridges

If air purifying respirators are authorized, organic vapor and high efficiency dust and mist cartridges will be used. Organic vapor and high efficiency dust and mist cartridges will provide protection up to 50 ppm. However, if steady air concentrations in the work zone exceed 50 ppm evacuate the site.

During asbestos sampling, laboratory personnel will be outfitted in a half mask respirator (MSHA and NIOSH approved).

* Air monitoring will be conducted in the breathing zone and the monitoring schedule can be modified based upon the discretion of the hydrogeologist and/or upon site field conditions.

WORK LIMITATIONS

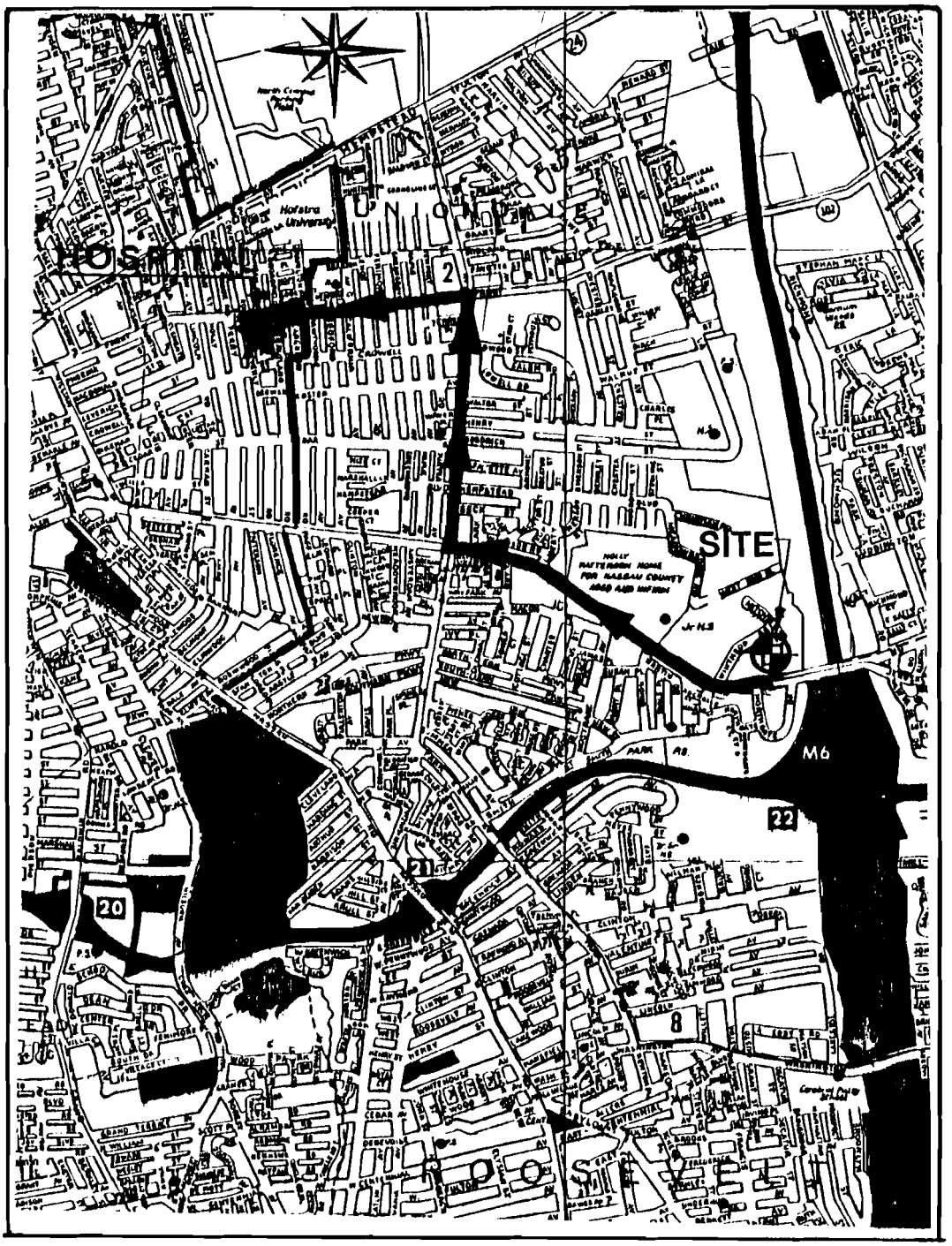
In general, field work will be conducted during daylight hours only. At least two personnel will be in the field at all times. The Project Manager must grant special permission for any field activities conducted beyond daylight hours. All personnel working in the field must have completed the Hazardous Material Sites Training Course (or its equivalent).

EMERGENCY PHONE NUMBERS
(Area code in Nassau County is 516)

Fire Department	911
Police Department	911
Ambulance	911
Poison Control Center	542-2323
Hempstead General Hospital	560-1200
Directions to Hospital:	Take Jerusalem Ave. West, make a right onto Uniondale Ave, head north and make a left onto Front Street. It is approximately 6 to 8 blocks on the left (see Figure 7.1 for map showing route to hospital).
Fanning, Phillips and Molnar	737-6200

CONTACT PERSONNEL AT FANNING, PHILLIPS AND MOLNAR

Kevin Phillips - Project Manager
Martin O. Klein - Project Hydrogeologist/Health and Safety Officer
Andrew P. Ritchie - Project Engineer



Scale in Miles (approx.)

0 1 2

F,P&M

FIGURE 7.1 – ROUTE TO HOSPITAL FROM SITE

SECTION 8.0

FOLLOW-UP SOIL AND GROUNDWATER INVESTIGATION REPORT OUTLINE

Section		Title
1.0		Introduction
2.0		Summary of Sampling (QA/QC)
3.0		Sampling Results
	3.1	Soils
	3.2	Groundwater
4.0		Discussion and Conclusions (Determination of Potential Risk)
	4.1	Discussion
	4.2	Conclusions
5.0		Recommendations

APPENDIX A
NYSDEC AND NCDH REQUIREMENTS

FANNING, PHILLIPS & MOLNAR
Consulting Engineers
909 MARCONI AVENUE
HONKONKOMA, NEW YORK 11779

RICHARD FANNING, P.E. (1931-1980)
KEVIN J. PHILLIPS, P.E., Ph.D.
GARY A. MOLNAR, P.E.

516/737-0200
718/767-3337
TELECOPIER 516/737-2410

February 16, 1990

Mr. Anthony Candela
Senior Engineer
Regional Hazardous Waste Division
NYS Department of Conservation
SUNY Bldg. 40
Stony Brook, NY 11794-3070

Dear Mr. Candela:

In a meeting today with Ms. Angela Petenelli, of the Nassau County Health Department, we discussed the Supplemental Geohydrology Work Plan for the Uniondale Shopping Center site sent to you on Monday, February 12.

At this meeting, the following was tentatively agreed upon:

1. The main concern of the Nassau County Health Department was airborne contaminants (asbestos, and heavy metals) during the site preparation phase.

2. Because the fill is not anticipated to be excavated i.e. the foundation will be fricition piles, the area of concern is 0-5'.

3. Sixteen borings in the top 5' of fill was tentatively agreed upon.

4. Fanning, Phillips and Molnar will prepare a health and safety plan including air sampling for asbestos during the construction period if asbestos shows up in the 16 borings.

In addition, virus testing will be included in the 2 down gradient wells.

As the February 26 conference with Judge Joseph Goldstein of the New York State Supreme Court is only 6 days away, we would appreciate at your earliest convenience to review this new material in conjunction with the previous plan of study and comment as quickly as possible.

Very truly yours,

Kevin J. Phillips

Kevin J. Phillips, P.E., Ph.D.
Principal, Fanning, Phillips
and Molnar

KJP:ds

cc: Mr. Gus Fotos
Peter Mineo, Esq.

New York State Department of Environmental Conservation
Region 1 Headquarters
SUNY, Building 40, Stony Brook, NY 11790-2356
(516) 751-4078

Thomas C. Jorling
Commissioner

February 27, 1990

Mr. Kevin J. Phillips, P.E., Ph.D
Fanning, Phillips and Molnar
909 Marconi Avenue
Ronkonkoma, NY 11779

RE: Uniondale Shopping Center Site

Dear Mr. Phillips:

We have reviewed the supplemental geohydrology workplan (February 1990) for the above referenced site.

DEC recommends the following field work to be performed in addition to the work tentatively agreed upon by you and Ms. Angela Petenelli of the Nassau County Health Department.

1. 3 soil borings ≈ 35' deep in fill area as shown on the attached figure. Discrete soil sampling at various depths within each of 3 borings (i.e. no compositing allowable). Samples to be collected for analysis will be determined in the field with the help of OVA/HNu meter and by field observation.

2. Soil samples should be analyzed for the target compound list (including PCB's) and EP Toxicity.

3. 2 additional downgradient wells as you agreed upon. Locations are shown on the figure.

4. Sampling of all on site wells for TCL including total metals' analysis (i.e. no filteration of samples).

5. A Quality Assurance Project Plan in accordance with New York State CLP (Contract Laboratory Protocols).

6. For all sample analysis, use laboratories acceptable to Division of Hazardous Waste Remediation, NYSDEC. Workplan should include drilling and sampling protocols which are in accordance with those of NYSDEC including those mentioned above.

7. All soil borings should be grouted with cement/bentonite grout from bottom of the soil boring upwards to ground level.

If you have any questions, please feel free to contact me at (516) 751-4078, Ext. 386.

Very truly yours,

Girish Desai
Assistant Sanitary Engineer
Div. of Hazardous Waste Remediation

GD:pl

cc: A. Candela
L. Evans
G. Aiello
A. Petenelli
J. Swartout

APPENDIX B
NYTEST ENVIRONMENTAL, INC.
NYSDEC 1990 PROTOCOL SAMPLE PRESERVATION AND HOLDING TIME REQUIREMENTS AND DETECTION LIMITS

SECTION II

SAMPLE PRESERVATION AND HOLDING TIME REQUIREMENTS

NYDEC
1990 protocol

Table 4 Required Containers, Preservatives, and Holding Times (Continued)

Parameter Name	Container[1]	Preservative[2,3]	Maximum Holding Time[4]
Aqueous Samples (Continued)			
$CBOD_5$	P,G	Cool, 4° C	24 hours
COD	P,G	Cool, 4° C, H_2SO_4 to pH < 2	26 days
Chloride	P,G	Cool, 4° C	26 days
Color	P,G	Cool, 4° C	24 hours
Cyanide, Total	P,G	Cool, 4° C, NaOH to pH > 12	12 days
Cyanide, Amenable to Chlorination	P,G	Cool, 4° C, NaOH to pH > 12, 0.6 g ascorbic acid[5]	12 days[6]
Fluoride	P only	Cool, 4° C	26 days
Hardness	P,G	HNO_3 to pH < 2	6 months
Kjeldahl Nitrogen	P,G	Cool, 4° C, H_2SO_4 to pH < 2	26 days
Organic Nitrogen	P,G	Cool, 4° C, H_2SO_4 to pH < 2	26 days
Metals[7], except Chromium^{+6} and Mercury	P,G	HNO_3 to pH < 2	6 months
Chromium^{+6}	P,G	Cool, 4° C	24 hours
Mercury	P,G	HNO_3 to pH < 2	26 days

Table I - Required Containers, Preservatives, and Holding Times (Continued)

Parameter Name	Container[1]	Preservative[2,3]	Maximum Holding Time[4]
Aqueous Samples (Continued)			
Silica	P only	Cool, 4° C	26 days
Specific Conductance	P,G	Cool, 4° C	26 days
Sulfate	P,G	Cool, 4° C	26 days
Sulfide	P,G	Cool, 4° C,add zinc acetate plus NaOH to pH > 9	5 days
Surfactants (MBAS)	P,G	Cool, 4° C	24 hours
Turbidity	P,G	Cool, 4° C	24 hours
Organic Tests[8]:			
Purgeable Halocarbons	G, Teflon lined septa	Cool, 4° C	7 days
Purgeable Aromatics	G, Teflon lined septa	Cool, 4° C	7 days
Acrolein and Acrylonitrile	G, Teflon lined septa	Cool, 4° C, 0.008% $Na_2S_2O_3$[5], Adjust to pH 4 - 5[9]	7 days
Phenolics[10]	G, Teflon lined cap	Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	5 days after VTSR until extraction; 40 days for analysis[12]

Table I - Required Containers, Preservatives, and Holding Times (Continued)

Parameter Name	Container[1]	Preservative[2,3]	Maximum Holding Time[4]
Aqueous Samples (Continued)			
Haloethers[10]	G, Teflon lined cap	Cool, 4° C, 0.008% $Na_2S_2O_3$[5]	5 days after VTSR until extraction; 40 days for analysis[12]
Chlorinated Hydrocarbons[10]	G, Teflon lined cap	Cool, 4° C, 0.008% $Na_2S_2O_3$[5],	5 days after VTSR until extraction; 40 days for analysis[12]
Chlorinated Dioxins and Furans[10]	G, Teflon lined cap	Cool, 4° C, 0.008% $Na_2S_2O_3$[5],	5 days after VTSR until extraction; 40 days for analysis[12]
Pesticides[10]	G, Teflon lined cap	Cool, 4° C, Adjust pH to 5 - 9[14]	5 days after VTSR until extraction; 40 days for analysis[12]
Radiological Tests:			
Alpha, beta and Radium	P,G	HNO_3 to pH < 2	6 months

Soil/Sediment/Solid Samples

The same containers and holding times as listed for aqueous samples are to be used for soil/sediment/solid samples. Preservation for all analyses is limited to cooling to 4° C.

7. Samples should be filtered immediately on-site before adding preservative for dissolved metals.

8. Guidance applies to samples to be analyzed by GC, LC or GC/MS for specific compounds.

9. The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.

10. When the extractable analytes of concern fall within a single chemical catagory, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical catagories, the sample may be preserved by cooling to 4° C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6 - 9; samples preserved in this manner may be held for five days before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re the requirement for thiosulfate reduction of residual chlorine), and footnotes 12, 13 (re the analysis of benzidine).

11. If 1,2-diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0 ± 0.2 to prevent rearrangement of benzidine.

12. This does not supercede the contract requirement of a 30 day reporting time.

13. Extracts may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.

14. For the analysis of diphenylnitrosamine, add 0.008% sodium thiosulfate and adjust the pH to 7 - 10 with NaOH within 24 hours of sampling.

15. The pH adjustment may be performed upon receipt in the laboratory and may be omitted if the samples are extracted with 72 hours of collection. For the analysis of aldrin, add 0.008% sodium thiosulfate.

SECTION I

SUPERFUND-CLP ORGANICS

Superfund Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL)*

Volatiles	CAS Number	Quantitation Limits** Low Water µg/L	Low Soil/Sediment µg/Kg
1. Chloromethane	74-87-3	10	10
2. Bromomethane	74-83-9	10	10
3. Vinyl chloride	75-01-4	10	10
4. Chloroethane	75-00-3	10	10
5. Methylene chloride	75-09-2	5	5
6. Acetone	67-64-1	10	10
7. Carbon Disulfide	75-15-0	5	5
8. 1,1-Dichloroethylene	75-35-4	5	5
9. 1,1-Dichloroethane	75-35-3	5	5
10. 1,2-Dichloroethylene(total)	540-59-0	5	5
11. Chloroform	67-66-3	5	5
12. 1,2-Dichloroethane	107-06-2	5	5
13. 2-Butanone	78-93-3	10	10
14. 1,1,1-Trichloroethane	71-55-6	5	5
15. Carbon tetrachloride	56-23-5	5	5
16. Vinyl acetate	108-05-4	10	10
17. Bromodichloromethane	75-27-4	5	5
18. 1,2-Dichloropropane	78-87-5	5	5
19. cis-1,3-Dichloropropene	10061-01-5	5	5
20. Trichloroethene	79-01-6	5	5
21. Dibromochloromethane	124-48-1	5	5
22. 1,1,2-Trichloroethane	79-00-5	5	5
23. Benzene	71-43-2	5	5
24. trans-1,3-Dichloropropene	10061-02-6	5	5
25. Bromoform	75-25-2	5	5
26. 4-Methyl-2-pentanone	108-10-1	10	10
27. 2-Hexanone	591-78-6	10	10
28. Tetrachloroethene	127-18-4	5	5
29. Toluene	108-88-3	5	5
30. 1,1,2,2-Tetrachloroethane	79-34-5	5	5

Superfund Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL)*

Volatiles (continued)	CAS Number	Quantitation Limits** Low Water µg/L	Low Soil/Sediment[a] µg/Kg
31. Chlorobenzene	108-90-7	5	5
32. Ethyl Benzene	100-41-4	5	5
33. Styrene	100-42-5	5	5
34. Total Xylenes	1330-20-7	5	5

[a] Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 125 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation Limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, as required by the protocol, will be higher.

Superfund Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL)*

Semivolatiles	CAS Number	Quantitation Limits** Low Water µg/L	Low Soil/Sediment[b] µg/Kg
35. Phenol	108-95-2	10	330
36. bis(2-Chloroethyl) ether	111-44-4	10	330
37. 2-Chlorophenol	95-57-8	10	330
38. 1,3-Dichlorobenzene	541-73-1	10	330
39. 1,4-Dichlorobenzene	106-46-7	10	330
40. Benzyl alcohol	100-51-6	10	330
41. 1,2-Dichlorobenzene	95-50-1	10	330
42. 2-Methylphenol	95-48-7	10	330
43. 2,2'-oxybis(1-Chloro-priopane	108-60-1	10	330
44. 4-Methylphenol	106-44-5	10	330
45. N-Nitroso-di-n-propylamine	621-64-7	10	330
46. Hexachloroethane	67-72-1	10	330
47. Nitrobenzene	98-95-3	10	330
48. Isophorone	78-59-1	10	330
49. 2-Nitrophenol	88-75-5	10	330
50. 2,4-Dimethylphenol	105-67-9	10	330
51. Benzoic acid	65-85-0	50	1600
52. bis(2-Chloroethoxy) methane	111-91-1	10	330
53. 2,4-Dichlorophenol	120-83-2	10	330
54. 1,2,4-Trichlorobenzene	120-82-1	10	330
55. Naphthalene	91-20-3	10	330
56. 4-Chloroaniline	106-47-8	10	330
57. Hexachlorobutadiene	87-68-3	10	330
58. 4-Chloro-3-methylphenol (p-chloro-m-cresol)	59-50-7	10	330
59. 2-Methylnaphthalene	91-57-6	10	330
60. Hexachlorocyclopentadiene	77-47-4	10	330
61. 2,4,6-Trichlorophenol	88-06-2	10	330
62. 2,4,5-Trichlorophenol	95-95-4	50	1600
63. 2-Chloronaphthalene	91-58-7	10	330

Superfund Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL)*

Semivolatiles (continued)	CAS Number	Quantitation Limits** Low Water µg/L	Low Soil/Sediment[b] µg/Kg
64. 2-Nitroaniline	88-74-4	50	1600
65. Dimethyl phthalate	131-11-3	10	330
66. Acenaphthylene	208-96-8	10	330
67. 2,6-Dinitrotoluene	606-20-2	10	330
68. 3-Nitroaniline	99-09-2	50	1600
69. Acenaphthene	83-32-9	10	330
70. 2,4-Dinitrophenol	51-28-5	50	1600
71. 4-Nitrophenol	100-02-7	50	1600
72. Dibenzofuran	132-64-9	10	330
73. 2,4-Dinitrotoluene	121-14-2	10	330
74. Diethylphthalate	84-66-2	10	330
75. 4-Chlorophenyl phenyl ether	7005-72-3	10	330
76. Fluorene	86-73-7	10	330
77. 4-Nitroaniline	100-01-6	50	1600
78. 4,6-Dinitro-2-methylphenol	534-52-1	50	1600
79. N-nitrosodiphenylamine	86-30-6	10	330
80. 4-Bromophenyl phenyl ether	101-55-3	10	330
81. Hexachlorobenzene	118-74-1	10	330
82. Pentachlorophenol	87-86-5	50	1600
83. Phenanthrene	85-01-8	10	330
84. Anthracene	120-12-7	10	330
85. Di-n-butyl phthalate	84-74-2	10	330
86. Fluoranthene	206-44-0	10	330
87. Pyrene	129-00-0	10	330
88. Butyl benzyl phthalate	85-68-7	10	330
89. 3,3'-Dichlorobenzidine	91-94-1	20	660
90. Benz(a)anthracene	56-55-3	10	330
91. Chrysene	218-01-9	10	330
92. bis(2-Ethylhexyl)phthalate	117-81-7	10	330
93. Di-n-octyl phthalate	117-84-0	10	330
94. Benzo(b)fluoranthene	205-99-2	10	330

Semivolatiles (continued)	CAS Number	Quantitation Limits** Low Water µg/L	Quantitation Limits** Low Soil/Sediment[b] µg/Kg
95. Benzo(k)fluoranthene	207-08-9	10	330
96. Benzo(a)pyrene	50-32-8	10	330
97. Indeno(1,2,3-cd)pyrene	193-39-5	10	330
98. Dibenz(a,h)anthracene	53-70-3	10	330
99. Benzo(g,h,i)perylene	191-24-2	10	330

[b] Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Semi-Volatile TCL Compounds are 60 times the individual Low Soil/Sediment CRDL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

Superfund Target Compound List (TCL) and Contract Required Quantitation Limits (CRQL)*

Pesticides/PCBs	CAS Number	Quantitation Limits** Low Water µg/L	Low Soil/Sediment[c] µg/Kg
100. alpha-BHC	319-84-6	0.05	8.0
101. beta-BHC	319-85-7	0.05	8.0
102. delta-BHC	319-86-8	0.05	8.0
103. gamma-BHC (Lindane)	58-89-9	0.05	8.0
104. Heptachlor	76-44-8	0.05	8.0
105. Aldrin	309-00-2	0.05	8.0
106. Heptachlor epoxide	1024-57-3	0.05	8.0
107. Endosulfan I	959-98-8	0.05	8.0
108. Dieldrin	60-57-1	0.10	16.
109. 4,4'-DDE	72-55-9	0.10	16.
110. Endrin	72-20-8	0.10	16.
111. Endosulfan II	33213-65-9	0.10	16.
112. 4,4'-DDD	72-54-8	0.10	16.
113. Endosulfan sulfate	1031-07-8	0.10	16.
114. 4,4'-DDT	50-29-3	0.10	16.
115. Endrin ketone	53494-70-5	0.10	16.
116. Methoxychlor	72-43-5	0.5	80.
117. alpha-Chlordane	5103-71-9	0.5	80.
118. gamma-Chlordane	5103-74-2	0.5	80.
119. Toxaphene	8001-35-2	1.0	160.
120. AROCLOR-1016	12674-11-2	0.5	80.
121. AROCLOR-1221	11104-28-2	0.5	80.
122. AROCLOR-1232	11141-16-5	0.5	80.
123. AROCLOR-1242	53469-21-9	0.5	80.
124. AROCLOR-1248	12672-29-6	0.5	80.
125. AROCLOR-1254	11097-69-1	1.0	160.
126. AROCLOR-1260	11096-82-5	1.0	160.

[c] Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Pesticide TCL compounds are 15 times the individual Low Soil/Sediment CRDL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation Limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculate on dry weight basis, as required by the protocol, will be higher.

SUPERFUND-CLP INORGANICS

Superfund Target Compound List (TCL) and Contract Required Quantitation Limit

Parameter	Contract Required Quantitation Level (µg/L)
1. Aluminum	200
2. Antimony	60
3. Arsenic	10
4. Barium	200
5. Beryllium	5
6. Cadmium	5
7. Calcium	5000
8. Chromium	10
9. Cobalt	50
10. Copper	25
11. Iron	100
12. Lead	5
13. Magnesium	5000
14. Manganese	15
15. Mercury	0.2
16. Nickel	40
17. Potassium	5000
18. Selenium	5
19. Silver	10
20. Sodium	5000
21. Thallium	10
22. Vanadium	50
23. Zinc	20
24. Cyanide	10

1: Any analytical method specified in Exhibit D, CLP-Inorganics may be utilized as long as the documented instrument or method detection limits meet the Contract Required Quantitation Level (CRQL) requirements. Higher quantitation levels may only be used in the following circumstance:

If the sample concentration exceeds two times the quantitation limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the contract required quantitation level. This is illustrated in the example below:

For lead:
Method in use = ICP
Instrument Detection Limit (IDL) = 40
Sample concentration = 85
Contract Required Quantitation Level (CRQL) = 5

The value of 85 may be reported even though instrument detection limit is greater than Contract Required Quantitation Limit. The instrument or method detection limit must be documented as described in Exhibit E.

2: These CRQL are the instrument detection limits obtained in pure water that must be met using the procedure in Exhibit E. The quantitation limits for samples may be considerably higher depending on the sample matrix.

SECTION IV
RCRA Target Compound List (TCL) and
Contract Required Quantitation Limit

Parameter	CAS Number	Contract Required Quantitation Level (µg/L)
A. Ignitability (° C or ° F)	NA	NA
B. Corrosivity (pH units)	NA	NA
C. Reactivity		
1. Total Releasable Cyanide as HCN		100,000
2. Total Releasable Sufide as H_2S		100,000
D. Extraction Procedure Toxicity; (EP Tox) (concentrations in extract)		
1. Arsenic		1,000
2. Barium		10,000
3. Cadmium		100
4. Total Chromium		1,000
5. Lead		1,000
6. Mercury		50
7. Selenium		100
8. Silver		1,000
9. gamma-BHC (Lindane)	58-89-9	100
10. 2,4-Dichlorophenoxyacetic acid; (2,4-D)	94-75-2	1,000
11. Endrin	72-20-8	5
12. Methoxychlor	72-43-5	1,000
13. 2,4,5-Trichlorophenoxy-propionic acid; (2,4,5-TP; Silvex)	93-72-1	100
14. Toxaphene	8001-35-2	100

Parameter	CAS Number	Contract Required Quantitation Level (µg/L)
E. Toxcity Charactaristic Leaching Procedure (TCLP) (concentrations in extract)		
Metals		
1. Arsenic		1,000
2. Barium		10,000
3. Cadmium		100
4. Total Chromium		1,000
5. Lead		1,000
6. Mercury		50
7. Selenium		100
8. Silver		1,000
Volatiles		
1. Acetone	67-64-1	10
2. Acrylonitrile	107-13-1	1,000
3. Benzene	71-43-2	10
4. 2-Butanone (Methylethylketone)	78-93-3	10
5. n-Butyl alcohol	71-36-6	1,000
6. Carbon disulfide	75-15-0	100
7. Carbon tetrachloride	56-23-5	10
8. Chlorobenzene	108-90-7	10
9. Chloroform	67-66-3	10
10. 1,2-Dichloroethane	107-06-2	10
11. 1,1-Dichloroethylene	75-35-4	10
12. Ethyl acetate	141-78-6	10
13. Ethyl benzene	100-41-4	10
14. Ethyl ether	60-29-7	10
15. Methanol	67-56-1	10
16. Methylene chloride	75-09-2	10
17. 4-Methyl-2-pentanone (Methyl iso-butyl ketone)	108-10-1	10