OFF-SITE GROUNDWATER INVESTIGATION WORK PLAN 100 COMMERCIAL STREET PLAINVIEW, NEW YORK

PREPARED FOR
KENSINGTON & RESSLER
400 MADISON AVENUE
NEW YORK, NY 10017-1910

PROJECT NO. COMM 95-02

MARCH 1996

H2M GROUP
Engineers • Architects • Scientists • Planners

HOLZMACHER, McLENDON & MURRELL, P.C.
575 Broad Hollow Road
Melville, New York 11747-5076

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2.0 SUMMARY OF CONTAMINATION AND HYDROGEOLOGY

This section of the OSGI Work Plan provides a brief summary of the known nature and extent of groundwater contamination and site-specific hydrogeology.

2.1 Nature and Extent of Groundwater Contamination

As part of a 1995 Investigation, H2M installed and sampled two shallow groundwater monitoring wells (MW-3 and MW-4) (See Figure 1.2). Well MW-7, installed by others for an upgradient source area investigation, was also sampled. The groundwater sample collected from MW-3 contained 12 micrograms per liter (ug/l) PCE. The groundwater sample collected from MW-4 contained total 1,2-dichloroethene (1,2-DCE), 1,1,1-trichloroethane (TCA), trichloroethene (TCE), and PCE at 27, 22, 31, 310 ug/l, respectively. Target Compound List (TCL) Volatile Organic Compounds (VOCs) were not detected in the groundwater sample collected from MW-7.

Studies by Eikon Planning and Development Corporation (Eikon) indicated the presence of a leaching pool located in the northwest corner of the property whose bottom sediments have been impacted by PCE. The bottom sediments from the leaching pool contained 500 milligrams per kilogram (mg/kg) PCE after a remedial action had been conducted by Eikon.

2.2 Hydrogeology

Based upon the boring logs prepared during the drilling of Wells MW-3 and MW-4, the site is underlain to a depth of approximately 114 feet below ground surface (bgs) predominantly by sand and gravelly sand. These lithologies are consistent with a glacial outwash origin typically found in the Upper Glacial aquifer (Smolensky, et. al., 1989). Reportedly, the top of the Magothy aquifer occurs between 320 to 420 feet bgs in the vicinity of the site.

A potentiometric surface map was prepared for the Upper Glacial aquifer using data collected from Wells MW-3, MW-4, and MW-7 (see Figure 1.2). The resulting groundwater flow direction was east southeast with a gradient of 0.0075 feet per foot. A potentiometric surface map prepared by others for April 25, 1994 using data from nearby monitoring wells resulted in a groundwater flow direction to the east with a gradient of 0.0044 feet per foot. The variation in groundwater flow direction is due to the site's location near the groundwater flow divide of Long Island.

sampling locations, if required. Additionally, the water-elevation data collected from the off-site monitoring wells will be used to confirm the groundwater flow direction and gradient in the vicinity of the site.

To provide an on-site baseline, Wells MW-3 and MW-4 will also be sampled. Four groundwater and appropriate QA/QC samples (discussed in Sections 5.0 and 6.0) will be analyzed for TCL VOCs.

All non-disposable sampling and drilling equipment will be decontaminated by steam cleaning prior to each use. The WLI will be decontaminated prior to each use either by steam cleaning or by the triple rinse procedure. All decontamination water will be disposed of on the site.

4.2 Permanent Well Installation and Sampling

Two permanent off-site groundwater monitoring wells will be drilled, installed, developed, and sampled to act as confirmation sampling points. Additionally, Wells MW-3 and MW-4 will be re-sampled to provide an on-site baseline of groundwater conditions. The contractor for drilling and related well installation activities will be a New York State licensed monitoring well driller. The driller will be made aware of the nature of the drilling activities and will be experienced in soil/groundwater investigations of this nature. All field activities will be conducted under the direction of a qualified H2M hydrogeologist. The well borings will be drilled and sampled utilizing a HSA drill rig. All drilling equipment will be decontaminated prior to use at each drilling location.

Prior to commencement of drilling, site-specific underground structures, overhead structures, and other surface features which may impede drilling will be identified. Appropriate utilities will be contacted for mark outs. All appropriate Town of Oyster Bay permits will be acquired prior to commencing drilling activities. All drill cuttings will be transported to the site and placed on and covered by plastic sheeting near the MW-3 location.

The two groundwater monitoring wells will be constructed with 4-inch polyvinyl chloride (PVC) flush-joint risers with a 10- to 15-foot section of 0.010 inch slot-size PVC well screen. The final selected design for the wells will be based upon the results of the first phase of the investigation. The wells will be installed in accordance with NYSDEC specifications for wells in unconsolidated formations. Groundwater is expected to be encountered at approximately 100-ft bgs. However, the depth at which groundwater is first encountered may vary due to the topographic variations in the vicinity of the site.

The annular space around the well screens will be filled with a sand filter pack extending from 6-inches below the bottom of the screen to a height of 2 feet above the top of screen. A 2-foot seal of bentonite pellets will be placed above the filter pack. The bentonite pellets will be hydrated for 30-60 minutes prior to installation of the cement/bentonite grout. The depth to the bottom and top of each seal will be measured in the borehole to the nearest 0.1 foot using a

1. Prior to the purging of the wells for sample collection, a static water level measurement to the nearest hundredth foot will be recorded in each monitoring well.

2. To ensure a representative sample from the monitoring well, purging of the well is required. In general, the groundwater standing in the well casing prior to the sample collection will be similar in quality to that in the surrounding aquifer or local groundwater, but it may not be representative.

3. A volume of water equal to at least three times that standing in the screened casing will be purged from the well before sample collection. If the monitoring well has a low yield, standing water will be fully evacuated and a sample collected upon recovery to 80 percent of static water level. A decontaminated PVC bailer shall be used to remove the required volume of groundwater. Prior to the sampling event, all sampling equipment shall be decontaminated. All water removed during the evacuation process shall be disposed of on site.

4. A dedicated, pre-cleaned, polyethylene, disposable bailer will be attached to dedicated polypropylene rope or nylon line. The appropriate sample bottles will be filled directly from the bailer as soon as it is removed from the well. The sample containers will be immediately placed on ice in a cooler under strict chain of custody procedures.

5. The well cap shall be secured and the above process shall be repeated at the next monitoring well.

All groundwater samples will be analyzed for TCL VOCs. The groundwater results will be compared to the Class GA Groundwater Standards presented in the NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1): Ambient Water Quality and Guidance Values, October, 1993.

Decontamination

The driller will prepare a decontamination station whose perimeter is diked to prevent ground contamination from wash waters running out of the area. All drilling equipment shall be decontaminated in this area.

5.0 ANALYTICAL PROCEDURES AND LABORATORY TESTING

The groundwater and QA/QC samples will be analyzed at H2M Labs, Inc. in Melville, New York. H2M Labs, Inc. is a NYSDOH-ELAP-CLP certified laboratory, proficient in all aspects of the 1991 Analytical Services Protocol including the ability to perform continuous liquid-liquid extraction. All groundwater and QA/QC groundwater samples will be analyzed for TCL VOCs. All appropriate laboratory procedures including the specific parameters, laboratory procedures, analytical methods, laboratory data processing and reporting, and laboratory QA/QC procedures are available from H2M upon request.

targeted compounds are used by the laboratory to evaluate if matrix interference effects exist.

FIGURES

FIGURE 1.1

100 COMMERCIAL ST. OSGI

SITE LOCATION MAP

SCALE: 1" = 2000'

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1.0 INTRODUCTION

Holzmacher, McLendon & Murrell, P.C. (H2M) conducted a limited groundwater investigation at 100 Commercial Street in Plainview, New York (see Figure 1.1). The data collected to date at the site indicated that tetrachloroethene (PCE) contamination was present in soils beneath Leaching Pool No. 1 and that PCE was detected in groundwater samples collected from downgradient of the leaching pool (see Figure 1.2).

H2M has prepared this Off-Site Groundwater Investigation (OSGI) Work Plan to evaluate the vertical and lateral extent of halogenated solvents dissolved in the groundwater downgradient of the 100 Commercial Street site. The information gathered during the investigation will be presented to the New York State Department of Environmental Conservation (NYSDEC). Analytical data will be collected to achieve these objectives using methods in accordance with NYSDEC protocols and procedures.

2.0 SUMMARY OF CONTAMINATION AND HYDROGEOLOGY

This section of the OSGI Work Plan provides a brief summary of the known nature and extent of groundwater contamination and site-specific hydrogeology.

2.1 Nature and Extent of Groundwater Contamination

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A potentiometric surface map was prepared for the Upper Glacial aquifer using data collected from Wells MW-3, MW-4, and MW-7 (see Figure 1.2). The resulting groundwater flow direction was east southeast with a gradient of 0.0075 feet per foot. A potentiometric surface map prepared by others for April 25, 1994 using data from nearby monitoring wells resulted in a groundwater flow direction to the east with a gradient of 0.0044 feet per foot. The variation in groundwater flow direction is due to the site's location near the groundwater flow divide of Long Island.

3.0 FIELD SAMPLING PLAN

To evaluate both the vertical and lateral extent of groundwater contamination downgradient of the 100 Commercial Street site, a two-phased investigation approach has been designed. The first phase will consist of installing and sampling eight temporary groundwater sampling points downgradient of the site. At each sampling location, groundwater samples will be collected from two distinct horizontal levels. Once the initial data from the first phase have been evaluated, the second phase of the investigation will consist of the installation and sampling of two off-site permanent groundwater monitoring wells to provide confirmatory data for the first-phase results. Additionally, the two on-site monitoring wells will be sampled. To ensure access, all drilling locations will be located in public right-of-ways. The appropriate Town of Oyster Bay permits will be acquired to allow for the drilling in the right-of-ways.

3.1 Temporary Sampling Point Investigation

Based upon the results of the previous site investigations conducted at the site, eight temporary groundwater sampling point locations have been selected (see Figure 3.1.1). The sampling procedures are presented in Section 4.0. The sampling points have been selected to provide coverage of the expected downgradient horizontal extent of the plume. To evaluate the vertical extent of halogenated solvents in the groundwater, discrete groundwater samples will be collected from approximately 5 and 30 feet beneath the groundwater table. The sampling locations and depth intervals were selected to provide a reasonable estimation of the volume of potentially impacted groundwater.

16 groundwater samples and appropriate QA/QC samples (discussed in Sections 5.0 and 6.0) will be submitted to H2M Labs for TCL VOC analyses in a report-only type format. The initial analytical results from the groundwater samples will be available for review within two weeks of sample submission to the laboratory. To evaluate the data, H2M will prepare isoconcentration maps of the two horizons.

3.2 Permanent Groundwater Monitoring Well Investigation

Based upon the analytical results of the first-phase of groundwater sampling and consultation with the client and the NYSDEC, H2M will install and sample two permanent off-site groundwater monitoring wells. The location of the wells will be selected to confirm the analytical results of the temporary sampling points and provide future

sampling locations, if required. Additionally, the water-elevation data collected from the off-site monitoring wells will be used to confirm the groundwater flow direction and gradient in the vicinity of the site.

To provide an on-site baseline, Wells MW-3 and MW-4 will also be sampled. Four groundwater and appropriate QA/QC samples (discussed in Sections 5.0 and 6.0) will be analyzed for TCL VOCs.

4.0 INVESTIGATION PROCEDURES AND METHODOLOGIES

This section of the OSGI Work Plan outlines the procedures and methodologies which will be used to collect the groundwater samples from the temporary sampling points and the drilling, installation, and sampling of the two permanent off-site groundwater monitoring wells. Prior to all drilling activities, markouts will the conducted to ensure that no subsurface utilities are encountered or damaged.

4.1 Temporary Point Groundwater Sampling

The temporary groundwater sampling points will be conducted utilizing the hollow stem auger (HSA) technique to advance the borehole and the HydroPunch sampling device (HSD) to collect discrete groundwater samples. The HSD is composed of a drive point attached to a hollow 1.75-inch diameter sealable tube. The tube acts as a sample chamber and is isolated from the environment by two rubber O rings and two check valves.

In order to collect groundwater samples, each borehole will be advanced until groundwater is first encountered. A decontaminated HSD will be inserted through the annulus of the augers and advanced via the drive hammer into the undisturbed formation ahead of the lead auger. Once the desired sampling depth is achieved, the HSD will be opened by pulling back on the body of the tool, exposing a short section of screen. The groundwater present in the desired sampling location will fill the 1,200 milliliter chamber by hydrostatic pressure. Once the chamber is filled, the tool is withdrawn from the borehole. Increased hydrostatic head within the tool closes upper and lower check valves on the chamber, thereby retaining the water sample within the body of the sampler. Once at the surface, the desired sample volume is decanted into the appropriate sample bottles. This sampling procedure will be repeated at a depth of 30 feet below first encountered groundwater. By using the HSD, high-quality, discrete groundwater samples will be collected for TCL VOC analyses.

The depth to water below ground surface will be measured at each sampling point with an electronic water level indicator (WLI). These data will be used to determine if the site is in a groundwater flow regime dominated by horizontal flow or if a vertical flow component exists. Each boring will be backfilled with soil cuttings once the desired samples and data have been collected. Excess cuttings will be transported to the site where they will be placed on and covered by plastic sheeting. The ground surface will be repaired with appropriate material (i.e., asphalt, concrete, etc.).

All non-disposable sampling and drilling equipment will be decontaminated by steam cleaning prior to each use. The WLI will be decontaminated prior to each use either by steam cleaning or by the triple rinse procedure. All decontamination water will be disposed of on the site.

4.2 Permanent Well Installation and Sampling

Two permanent off-site groundwater monitoring wells will be drilled, installed, developed, and sampled to act as confirmation sampling points. Additionally, Wells MW-3 and MW-4 will be re-sampled to provide an on-site baseline of groundwater conditions. The contractor for drilling and related well installation activities will be a New York State licensed monitoring well driller. The driller will be made aware of the nature of the drilling activities and will be experienced in soil/groundwater investigations of this nature. All field activities will be conducted under the direction of a qualified H2M hydrogeologist. The well borings will be drilled and sampled utilizing a HSA drill rig. All drilling equipment will be decontaminated prior to use at each drilling location.

Prior to commencement of drilling, site-specific underground structures, overhead structures, and other surface features which may impede drilling will be identified. Appropriate utilities will be contacted for mark outs. All appropriate Town of Oyster Bay permits will be acquired prior to commencing drilling activities. All drill cuttings will be transported to the site and placed on and covered by plastic sheeting near the MW-3 location.

The two groundwater monitoring wells will be constructed with 4-inch polyvinyl chloride (PVC) flush-joint risers with a 10- to 15-foot section of 0.010 inch slot-size PVC well screen. The final selected design for the wells will be based upon the results of the first phase of the investigation. The wells will be installed in accordance with NYSDEC specifications for wells in unconsolidated formations. Groundwater is expected to be encountered at approximately 100-ft bgs. However, the depth at which groundwater is first encountered may vary due to the topographic variations in the vicinity of the site.

The annular space around the well screens will be filled with a sand filter pack extending from 6-inches below the bottom of the screen to a height of 2 feet above the top of screen. A 2-foot seal of bentonite pellets will be placed above the filter pack. The bentonite pellets will be hydrated for 30-60 minutes prior to installation of the cement/bentonite grout. The depth to the bottom and top of each seal will be measured in the borehole to the nearest 0.1 foot using a

weighted tape. The remaining annular space will be grouted with a bentonite/cement slurry using the tremie method. A cement/bentonite surface seal will be constructed by filling the annular space of the borehole and will extend from approximately three feet below-grade to grade where a flush-mounted well manhole will be installed. A water-tight locking cap will be attached to the top of the PVC casing. A flush-to-grade steel cover assembly will be set in grout around the well casing.

The groundwater monitoring wells will be developed by bailing and pumping. During purging, the pump will be moved up and down through the saturated section of the screened interval to surge the well. Specific conductivity, pH, and temperature measurements will be taken of the discharge until both parameters stabilize to confirm adequate development. Stabilization will be established when two consecutive well-volume readings are within 10 percent of one another. Turbidity of the discharge will also be monitored and well development will continue until a measurement of less than 50 nephelometric turbidity units (NTU) is achieved or until turbidity stabilizes. Depth to groundwater measurements will be made before and after well development. All observations made during development will be recorded on well sampling development forms. The development water will be disposed of on site.

Once the two groundwater monitoring wells have been installed and developed, the top of casing elevation of each newly installed well will be surveyed to the nearest 0.01 foot to datum used during the site-specific datum. The horizontal location of each well will be surveyed to the corners of existing building and property boundaries. A synoptic round of depths to groundwater, measured from the top of casing, will be collected from the wells.

Based on the survey and depths to groundwater, a potentiometric surface map of the shallow Upper Glacial aquifer will be prepared. The direction of groundwater flow, as well as the gradient of the potentiometric surface, will be determined from this map.

Groundwater Sampling

Following well construction, development, and an equilibrium period of one week, groundwater samples will be collected from the newly installed wells as well as MW-3 and MW-4. Upon opening the monitoring wells, a PID will be used to screen for total VOCs in the ambient atmosphere and in the headspace of the well. PID values will be recorded and compared to ambient background readings. The following procedure will be followed for groundwater sampling:

1. Prior to the purging of the wells for sample collection, a static water level measurement to the nearest hundredth foot will be recorded in each monitoring well.

2. To ensure a representative sample from the monitoring well, purging of the well is required. In general, the groundwater standing in the well casing prior to the sample collection will be similar in quality to that in the surrounding aquifer or local groundwater, but it may not be representative.

3. A volume of water equal to at least three times that standing in the screened casing will be purged from the well before sample collection. If the monitoring well has a low yield, standing water will be fully evacuated and a sample collected upon recovery to 80 percent of static water level. A decontaminated PVC bailer shall be used to remove the required volume of groundwater. Prior to the sampling event, all sampling equipment shali be decontaminated. All water removed during the evacuation process shall be disposed of on site.

4. A dedicated, pre-cleaned, polyethylene, disposable bailer will be attached to dedicated polypropylene rope or nylon line. The appropriate sample bottles will be filled directly from the bailer as soon as it is removed from the well. The sample containers will be immediately placed on ice in a cooler under strict chain of custody procedures.

5. The well cap shall be secured and the above process shall be repeated at the next monitoring well.

All groundwater samples will be analyzed for TCL VOCs. The groundwater results will be compared to the Class GA Groundwater Standards presented in the NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1): Ambient Water Quality and Guidance Values, October, 1993.

Decontamination

The driller will prepare a decontamination station whose perimeter is diked to prevent ground contamination from wash waters running out of the area. All drilling equipment shall be decontaminated in this area.

All drilling equipment will be steam cleaned prior to work and in between drilling locations. An on-site potable water supply will be used for steam cleaning and other purposes as necessary. The well screen and casing will be decontaminated by steam cleaning unless the well materials have been cleaned and sealed in plastic at the factory. The decontamination rinsate will be disposed of on site.

All non-drilling equipment (including pumps, bailers, etc.) shall be decontaminated for field use either by steam cleaning or according to the following procedures:

- Non-phosphate detergent and tap water wash and scrubbing.
- Tap water rinse.
- Distilled/deionized water rinse.

5.0 ANALYTICAL PROCEDURES AND LABORATORY TESTING

The groundwater and QA/QC samples will be analyzed at H2M Labs, Inc. in Melville, New York. H2M Labs, Inc. is a NYSDOH-ELAP-CLP certified laboratory, proficient in all aspects of the 1991 Analytical Services Protocol including the ability to perform continuous liquid-liquid extraction. All groundwater and QA/QC groundwater samples will be analyzed for TCL VOCs. All appropriate laboratory procedures including the specific parameters, laboratory procedures, analytical methods, laboratory data processing and reporting, and laboratory QA/QC procedures are available from H2M upon request.

6.0 QUALITY ASSURANCE/QUALITY CONTROL PLAN

The overall QA/QC Plan objective is to produce data at the highest quality level. In order to ensure that data collected in the field is consistent and accurate, forms will be utilized for repetitive data collection, such as depth to water in wells, well locations, etc. These field forms include Well Logging, Field Sampling and Water Level Data Records.

Table 6.1 presents the types and frequency of QA/QC samples which be utilized during the investigation. The purpose of the QA/QC samples is to ensure that the analytical data are precise, accurate, representative, complete, and comparable.

Blind Duplicate Samples

Blind duplicate groundwater samples will be collected during both the temporary sampling point and permanent monitoring well phases of the work. Each sample will be assigned a fictitious identification to ensure the applicability of the method. The analytical results between the two sets of samples/blind duplicates will be compared to evaluate whether the data reported by the laboratory are precise, accurate, representative, and comparable.

Trip Blanks

One trip blank per each day of TCL VOC sample collection will be utilized during the OSGI. The analytical results from the trip blanks will be used to evaluate the impact to the groundwater analytical results by sample transport, shipping, and field conditions.

Field Blanks

Two field blanks (equipment rinsate blanks) will be collected and analyzed to determine if the field decontamination procedures were effective. One field blank will be collected by pouring analyte-free water through the HSD sample chamber into the appropriate glassware. The second field blank will be collected by pouring analyte-free water through a new disposable bailer into the appropriate glassware.

Matrix Spike/Matrix Spike Duplicate Samples

One set of Matrix Spike/Matrix Spike Duplicate (MS/MSD) groundwater samples will be collected and analyzed during the OSGI. The MS/MSD samples are spiked in the laboratory with known concentrations of a targeted compound. The concentrations of the

targeted compounds are used by the laboratory to evaluate if matrix interference effects exist.

7.0 HEALTH AND SAFETY PLAN

The primary health and safety concerns while conducting the OSGI are inhalation or dermal-contact exposure to hazardous materials and physical hazards. H2M has prepared a site-specific Health and Safety Plan (HASP) (see Appendix A). All field personnel (including subcontractors) shall abide by the H2M HASP during all phases of the OSGI.

Most of the work associated with this investigation will be conducted along roads within public right-of-ways. To ensure field personnel and public safety, all work areas will be blocked by high-visibility traffic cones and caution tape where appropriate.

FIGURES

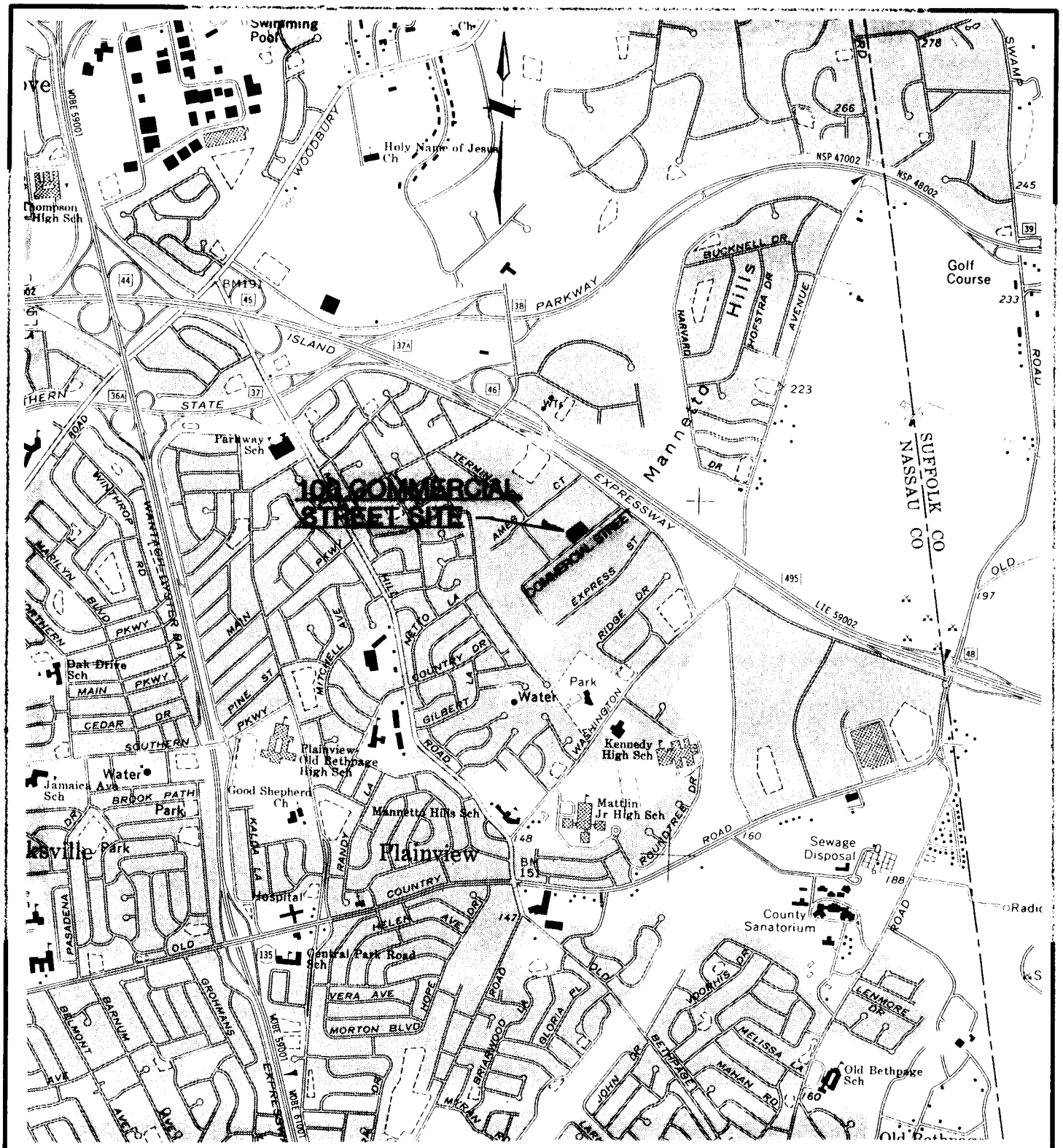

FIGURE 1.1

100 COMMERCIAL ST. OSGI

SITE LOCATION MAP

SCALE: 1" = 2000'

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MELVILLE, N.Y.
TOTOWA, N.J.

M:\CADD\COMM\9501\FIGURE2 2-23-96 1:01:46 pm

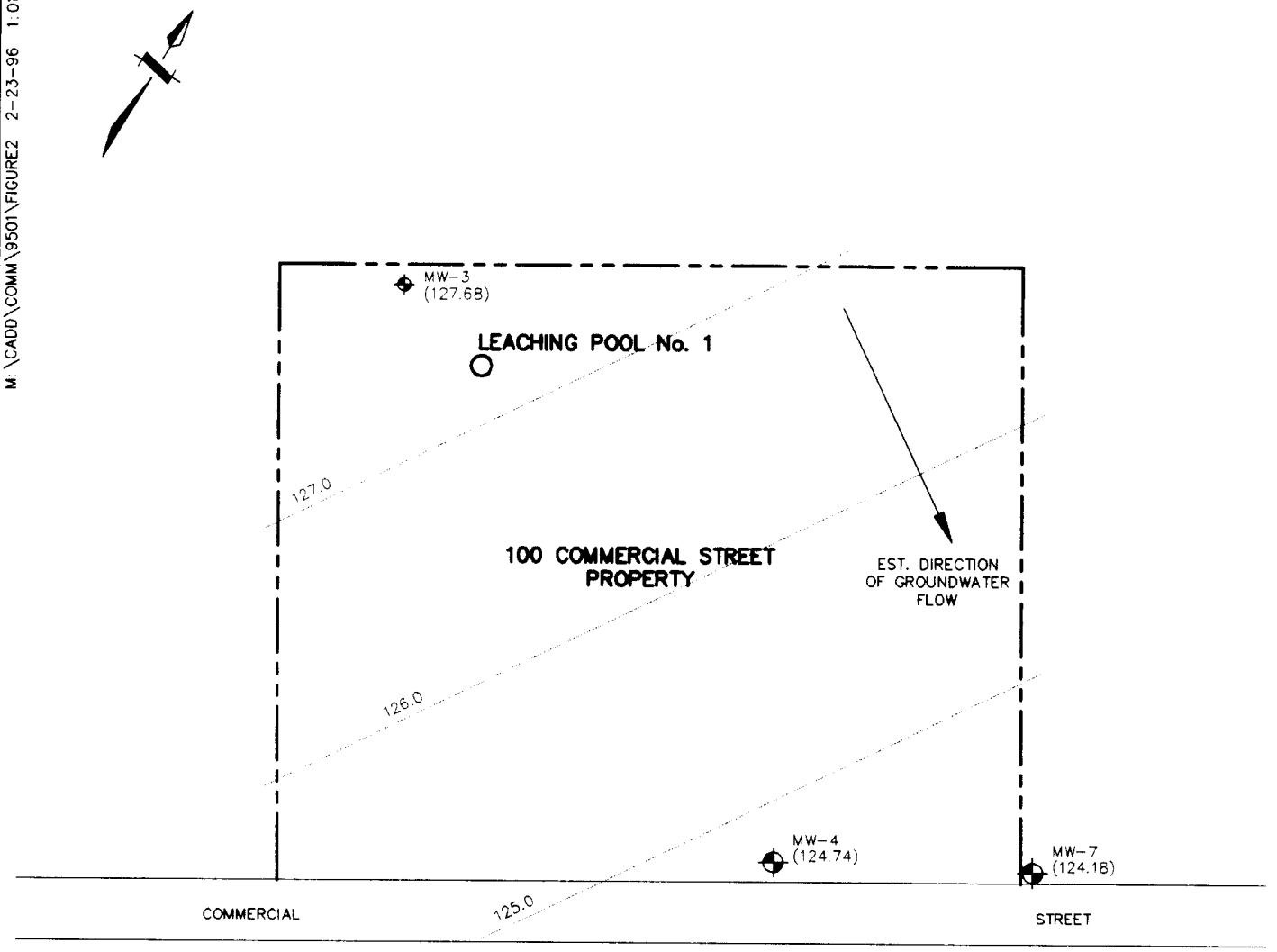

FIGURE 1.2

SITE VICINITY MAP WITH POTENTIOMETRIC SURFACE ON AUGUST 23, 1995

EXPLANATION

100' 50' 0 100'

SCALE: 1" = 100'

MW-3 (127.68) LOCATION MONITORING WELL WITH GROUNDWATER ELEVATION

127.0 POTENTIOMETRIC SURFACE LINE

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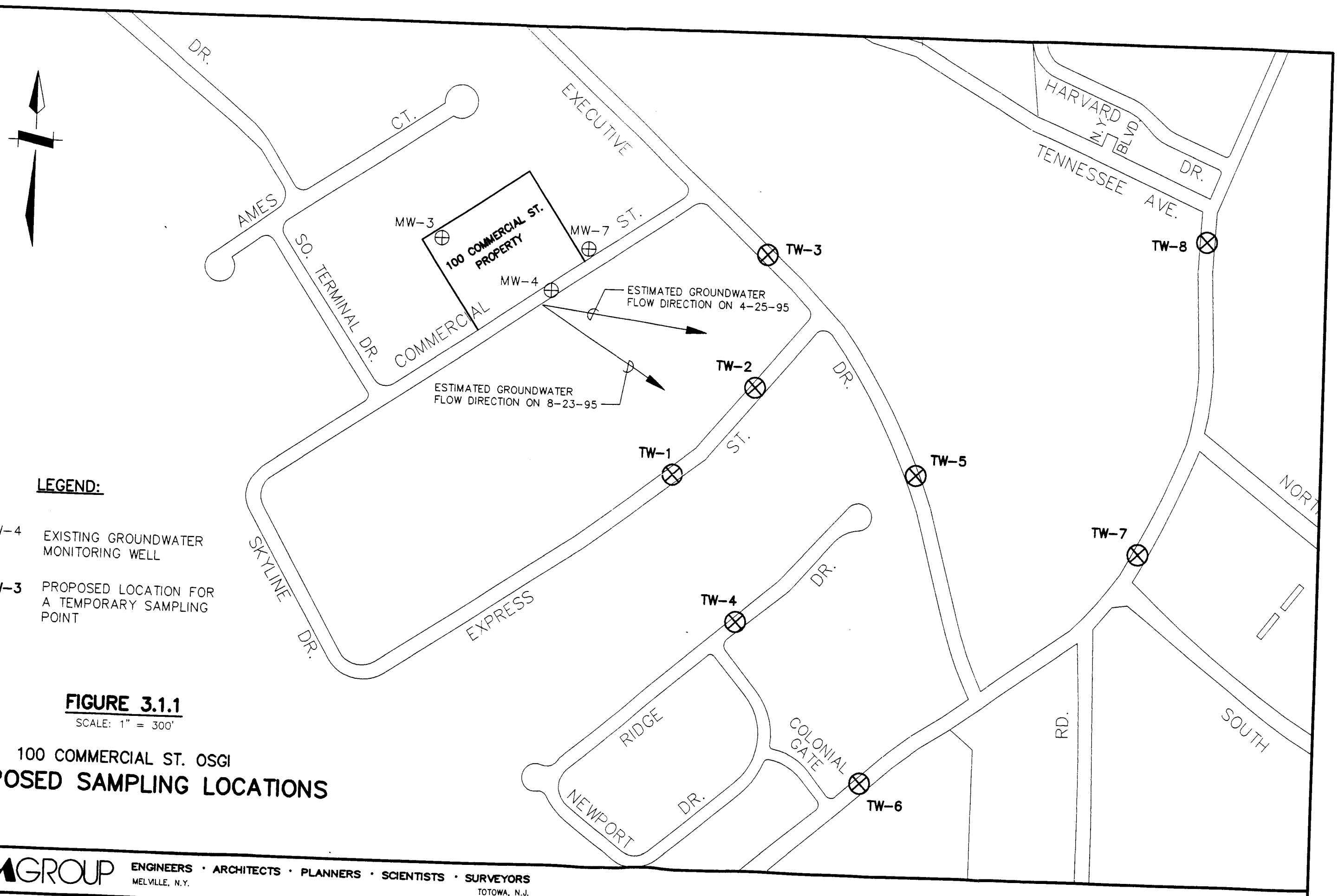

LEGEND:

⊕ MW-4 EXISTING GROUNDWATER MONITORING WELL

⊗ TW-3 PROPOSED LOCATION FOR A TEMPORARY SAMPLING POINT

FIGURE 3.1.1

SCALE: 1" = 300'

100 COMMERCIAL ST. OSGI

PROPOSED SAMPLING LOCATIONS

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TABLES

TABLE 6.1
100 COMMERCIAL OSGI WORK PLAN
QA/QC SAMPLES

Task Identification	Field Samples	Trip Blanks	Field Blanks	Blind Duplicates	Matrix Spikes	Matrix Spike Duplicates
Collection of groundwater samples from eight temporary sampling points.	16	1	1	1	1	1
Collection of groundwater samples from two off-site Wells, MW-3, and MW-4.	4	1	1	1	1	1

APPENDIX A
OFF-SITE GROUNDWATER INVESTIGATION HEALTH AND SAFETY PLAN
100 COMMERCIAL STREET PLAINVIEW, NEW YORK

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OFF-SITE GROUNDWATER INVESTIGATION
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1.0 PURPOSE

The purpose of this Health and Safety Plan (HASP) is to establish a protocol for protecting H2M, its agents, and other personnel involved in subsurface investigation activities from situations which may arise while performing field activities associated with the 100 Commercial Street site located in Plainview, New York. This plan has been prepared in accordance with the United States Environmental Protection Agency (US EPA) document, "Emergency and Remedial Response Division's Standard Operating Safety Guides", November 1984. This plan establishes personnel protection standards, mandatory operations procedures, and provides contingencies for situations that may arise while field work is being conducted at the site. All H2M field personnel will be required to abide by these procedures. H2M's subcontractor personnel will be provided with a copy of this plan for their consideration.

Personnel performing the environmental field work involving chemical substances may encounter conditions that are unsafe or potentially unsafe. In addition to the potential risks associated with the physical, chemical, biological and toxicological properties of the material(s) which may be encountered, other types of hazards (i.e., electricity, water, temperature, heavy equipment, falling objects, loss of balance, tripping, etc.) can have an adverse effect on the health and safety of personnel. It is important that personnel protective equipment (PPE) and safety requirements be appropriate to protect against potential and/or known hazards. PPE will be selected based on the type(s), concentration(s), and routes of personnel exposure from hazardous substances at a site. In situations where the type of materials and possibilities of contact are unknown or the potential hazards are not clearly identifiable, a more subjective (but conservative) determination will be made of the PPE required for initial safety.

2.0 SITE CONDITIONS

The 100 Commercial Street property is located in Plainview, New York. Studies by Eikon Planning and Development Corporation (Eikon) indicated the presence of a leaching pool located in the northwest corner of the property whose bottom sediments have been impacted by tetrachloroethene (PCE). The bottom sediments from the leaching pool contained 500 milligrams per kilogram (mg/kg) PCE after a remedial action had been conducted by Eikon.

As part of 1994 Investigation, H2M installed and sampled two shallow groundwater monitoring wells (MW-3 and MW-4). Additionally, a third well (MW-7), installed for an upgradient source area investigation, was sampled. The groundwater sample collected from MW-3 contained 12 micrograms per liter (ug/l) PCE. The groundwater sample collected from MW-4 contained total 1,2-dichloroethene (1,2-DCE), 1,1,1-trichloroehtane (TCA), trichloroethene (TCE), and PCE at 27, 22, 31, 310 ug/l, respectively. TCL VOCs were not detected in the groundwater sample collected from MW-7.

Based upon these data, H2M has been contracted to conduct an Off-Site Groundwater Investigation (OSGI) to evaluate the nature and extent of halogenated solvents in the groundwater downgradient of the subject site.

2.1 Proposed Field Activities

Work to be conducted under this HASP includes the collection of groundwater samples from the temporary sampling points and from two permanent off-site groundwater monitoring wells. The temporary groundwater sampling points will be conducted using the hollow stem auger (HSA) technique to advance the borehole and the HydroPunch discrete groundwater sampling device to collect discrete groundwater samples. The two permanent off-site groundwater monitoring wells will be drilled and installed using the HSA drilling technique. All work will be conducted within public right-of-ways (i.e., roads).

3.0 PERSONNEL SAFETY

Personnel involved in field operations must often make complex decisions regarding safety. To make these decisions correctly requires more than elementary knowledge. For example, selecting the most effective PPE requires not only expertise in the technical areas of respirators, protective clothing, air monitoring, physical stress, etc., but also experience and professional judgment. Only competent, qualified personnel having the technical judgment to evaluate a particular situation and determine the appropriate safety requirements will perform field investigations at the site. These individuals, through a combination of professional education, on-the-job experience, specialized training, and continual study, have the expertise to make sound decisions.

3.1 Education and Training

All personnel involved in field work will be trained to carry out their designated field operations. Training will be provided in the use of all equipment, including respiratory protection apparatus and protective clothing; safety practices and procedures; general safety requirements; first aid; and hazard recognition and evaluation. Each individual involved with the field work must provide documentation of training and medical surveillance, as per 29 CFR 1910.120. In addition, each individual must sign an appendix to the Health and Safety Plan, indicating they have read and understood its contents (as included in Appendix A-1).

3.2 Health and Safety Manager

The Health and Safety Manager shall be responsible for overall implementation and coordination of the Health and Safety Program for field personnel at the site. Responsibilities include providing adequate manpower, materials, equipment, and time needed to safely accomplish the tasks under the site investigation. The Health and Safety Manager is also responsible for taking appropriate corrective actions when unsafe acts or practices arise. The Health and Safety Manager for the investigation project is Richard J. Baldwin, C.P.G. of H2M.

3.3 Site Health and Safety Officer

A designated individual(s) will perform the function of the project Site Health and Safety Officer. Christopher J. Flynn will serve as the Site Health and Safety Officer during the site work. At all times the Site Health and Safety Officer will report directly to the Health and

Safety Manager. As a minimum, the Site Health and Safety Officer will be responsible for the following:

1. Conducting an initial site safety meeting for field personnel.

2. Assuring that all personnel protective equipment is available and properly utilized by all field personnel at the site.

3. Assuring that all personnel are familiar with standard operating safety procedures and additional instructions contained in the Health and Safety Plan.

4. Assuring that all personnel are aware of the hazards associated with the field operations.

5. Inspecting the work site for hazards before field operations.

6. Determining personal protection levels including clothing and equipment for personnel and periodic inspection of protective clothing and equipment.

7. Monitoring of site conditions prior to initiation of field activities, and at various intervals during on-going operations as deemed necessary for any changes in site hazard conditions. (Monitoring parameters include, but are not limited to, volatile organic contaminant (VOC) levels in the atmosphere and weather conditions).

8. Executing decontamination procedures.

9. Monitoring the work parties for signs of stress such as cold exposure, heat stress, or fatigue.

10. Prepare reports pertaining to incidents resulting in physical injuries or exposure to hazardous materials.

Mr. Flynn may designate another qualified H2M employee as Site Health and Safety Officer. All designees will be familiar with all aspects of the HASP and their responsibilities. At all times the Site Health and Safety Officer shall report directly to the Health and Safety Manager.

4.0 LEVELS OF PROTECTION

Anyone entering the investigation site must be protected against potential hazards. The purpose of the personal protection clothing and equipment is to minimize exposure to hazards while working on site. Careful selection and use of adequate PPE should protect the respiratory system, skin, eyes, face, hands, feet, head, body and hearing of all personnel.

The appropriate level of protection is determined prior to the initial entry on site based on available information and preliminary monitoring of the site. Subsequent information may warrant changes in the original level selected. Appropriate equipment to protect personnel against exposure to known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded.

4.1 Level A Protection

The highest degree of protection is used in a Level A situation. It should be worn when the highest available level of respiratory, skin and eye protection is needed. This level of protection is placed in effect when there is no historic information about the site and it is assumed that the worst possible conditions exist. Situations requiring Level A PPE are not anticipated during the field work.

4.1.1 Personal Protective Equipment

a. Pressure demand, self-contained breathing apparatus, approved by the Occupational Safety and Health Administration (OSHA) and National Institute of Occupational Safety and Health (NIOSH).

b. Fully encapsulating chemical-resistant suit.

c. Coveralls.*

d. Long cotton underwear.*

e. Gloves (outer), chemical-resistant.

f. Gloves (inner), chemical-resistant.

g. Boots, chemical-resistant, steel toe and shank. (Depending on suit construction, worn over or under suit boot.)

h. Hard hat* (under suit).

i. Disposable protective suit, gloves and boots* (worn over fully-encapsulating suit).

j. Two-way radio communications (intrinsically safe).

*Optional

4.1.2 Criteria for Selection

Meeting any of the criteria listed below warrants use of Level A protection:

a. The chemical substance(s) has been identified and requires the highest level of protection for skin, eyes and the respiratory system based on:

(1) Measured (or potential for) high concentrations-of atmospheric vapors, gases, or particulates; or

(2) Site operations and work functions involving high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates.

b. Extremely hazardous substances are known or suspected to be present and skin contact is possible.

c. The potential exists for contact with substances that destroy skin.

d. Operations must be conducted in confined, poorly ventilated areas until the absence of hazards requiring Level A protection is demonstrated.

e. An oxygen deficient atmosphere where the oxygen level is less than 20.9 percent (%) by volume as measured with an oxygen meter. This condition, existing alone, could result in a down grade to EPA Level B PPE.

f. Total atmospheric readings on photoionization detector indicate readings above 500 parts per million (ppm) of calibration gas equivalents (cge) of unidentified substances.

4.1.3 Limiting Criteria

a. Fully encapsulating suit material must be compatible with the substances involved.

4.1.4 Minimum Decontamination Procedure

Station 1: Segregated equipment drop.

Station 2: Outer garment, boots and gloves wash and rinse.

Station 3: Outer boot and glove removal.

Station 4: Tank change.

Station 5: Boots, gloves and outer garment removal.

Station 6: SCBA removal.

Station 7: Field wash.

4.2 Level B Protection

Level B protection will be used by all personnel entering confined spaces and/or if the conditions outlined in Section 4.2.2 are encountered. Situations requiring Level B PPE are not anticipated during the field work.

4.2.1 Personal Protective Equipment

a. Pressure-demand, self-contained breathing apparatus or cascade supplied air system (OSHA/NIOSH approved).

b. Chemical-resistant clothing (coveralls and long-sleeved jacket; coveralls, hooded, one or two-piece chemical-splash suit; disposable chemical-resistant coveralls).

c. Coveralls.*

d. Gloves (outer), chemical-resistant.

e. Gloves (inner), chemical-resistant.

f. Boots, chemical-resistant, steel toe and shank.

g. Boots (outer), chemical resistant (disposable*).

h. Hard hat (face shield*).

i. Two-way radio communications (intrinsically safe).

*Optional

4.2.2 Criteria for Selection

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

a. The type(s) and atmospheric concentration(s) of toxic substances have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection than is required with Level A. These would be atmospheres:

(1) With concentrations immediately dangerous-to life and health (IDLH); or

(2) Exceeding limits of protection afforded by a full-face, air-purifying mask; or

(3) Containing substances for which air-purifying canisters do not exist or have low removal efficiency; or

(4) Containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.

b. The atmosphere contains less than 20.9 percent oxygen.

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

d. Total atmospheric concentrations in the breathing zone of unidentified vapors or gases range from 50 ppm to 500 ppm (calibration gas equivalence units) on monitoring instruments, and vapors are not suspected of containing high levels of chemicals toxic to skin.

4.2.3 Limiting Criteria

a. Use only when the vapor or gases present are not suspected of containing high concentrations of chemicals that are harmful to skin or capable of being absorbed through skin contact.

b. Use only when it is highly unlikely that the work being done will generate high concentrations of vapors, gases, or particulates or splashes of material that will affect exposed skin.

4.2.4 Minimum Decontamination Procedures

Station 1: Equipment drop.

Station 2: Outer garment, boots and gloves wash and rinse.

Station 3: Outer boot and glove removal.

Station 4: Tank change.

Station 5: Boot, gloves and outer glove removal.

Station 6: SCBA removal.

Station 7: Field wash.

4.3 Level C Protection

Level C protection will be used by all personnel if the conditions outlined in Section 4.3.2 are encountered.

4.3.1 Personal Protective Equipment

a. Full-face, air purifying, canister-equipped respirator (MSHA and NIOSH approved).

b. Chemical-resistant clothing (coveralls; hooded, two-piece chemical splash suits; chemical-resistant hood and apron; disposable chemical-resistant coveralls).

c. Coveralls.*

d. Gloves (outer), chemical-resistant.

e. Gloves (inner), chemical-resistant.

f. Boots, chemical-resistant, steel toe and shank.

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

h. Hard hat (face shield*).

i. Escape mask.*

j. Two-way radio communications (intrinsically safe).

*Optional

4.3.2 Criteria for Selection

Meeting all of these criteria permits use of Level C Protection:

a. 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.

b. Atmospheric contaminant concentrations do not exceed IDLH levels.

c. Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.

d. Job functions have been determined not to require self-contained breathing apparatus.

e. Total vapor readings register between 5 ppm cge and 50 ppm cge above background on instruments.

f. Air will be monitored periodically.

g. Cartridges are available and are approved by NIOSH and MSHA for the specific chemical(s) encountered.

4.3.3 Limiting Criteria

a. Atmospheric concentration of chemicals must not exceed IDLH levels.

b. The atmosphere must contain at least 20.9 percent oxygen.

c. Must have sufficient information available regarding specific compounds, and their concentrations, likely to be encountered.

4.3.4 Minimum Decontamination Procedures

Station 1: Equipment drop.

Station 2: Outer boot and glove removal.

Station 3: Canister or mask change.

Station 4: Boots, gloves and outer garment removal.

Station 5: Face piece removal.

Station 6: Field wash.

4.4 Level D Protection

Level D protection has been selected for personnel for this project. Should conditions change, re-evaluation of personnel protection will be conducted.

4.4.1 Personal Protective Equipment

a. Coveralls.

b. Gloves.*

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

d. Boots (outer), chemical/resistant (disposable).*

e. Safety glasses or chemical splash goggles.*

f. Hard hat (face shield*).

g. Escape mask.*

*Optional

4.4.2 Criteria for Selection

Meeting any of these criteria allows use of Level D protection:

a. No hazardous air pollutants have been measured.

b. Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

c. Extensive information on suspected hazards/risks are known.

4.4.3 Limiting Criteria

a. The atmosphere must contain at least 20.9 percent oxygen.

4.4.4 Minimum Decontamination Procedure

Station 1: Equipment drop.

Station 2: Hand and face wash.

4.5 Duration of Work Period

The anticipated duration of the work period will be established prior to daily activities. The work will only be performed during daylight hours. Other factors that may limit the length of time personnel can work include:

a. Air supply consumption (SCBA-assisted work);

b. Suit/ensemble, air purifying chemical cartridge, permeation and penetration by chemical contaminants; and

c. Ambient temperature and weather conditions.

d. Contractual requirements.

4.5.1 Air Supply Consumption

The duration of the air supply must be considered before any SCBA-assisted work activity (Levels A and B) commences. Although the anticipated operating time of an SCBA is clearly indicated on the breathing apparatus the following variables should be considered and work actions and operating time adjusted accordingly:

Work Rate: The actual in-use duration of SCBA's may be reduced by one-third to one-half during strenuous work, e.g. drum handling, major lifting or any task requiring repetitive speed of motion.

Fitness: Well conditioned individuals generally utilize oxygen more efficiently and can extract more oxygen from a given volume of air than unfit individuals, thereby slightly increasing the SCBA operating time.

Body Size: Larger individuals generally consume air at a higher rate than smaller individuals, thereby decreasing the SCBA operating time.

Breathing Patterns: Quick, shallow or irregular breaths consume air more rapidly than deep, regular spaced breaths. Heat induced anxiety and lack of acclimatization may induce hyperventilation, resulting in decreased SCBA operating times.

4.5.2 Suit/Ensemble, Air Purifying Chemical Cartridge, Permeation and Penetration

The possibility of chemical permeation or penetration of chemical protective clothing (CPC) ensembles and air purifying respirator (APR) chemical cartridges during the work mission is always a matter of concern and may limit mission duration. It should be remembered that no single clothing material is an effective barrier to all chemicals or all combinations of chemicals, and no material is an effective barrier to prolonged chemical exposure. Manufacturer recommendations should be followed.

In addition, when performing work in Level C respiratory protection, care should be taken to inspect the respirators prior to usage. The chemical cartridges should be changed, at a minimum, on a daily basis, or when the cartridge becomes dirty, damaged or when breakthrough is suspected.

4.5.3 Ambient Temperature

The ambient temperature has a major influence on work period duration as it effects both the worker and the protective integrity of ensembles (see Section 11.4.1) as well as the operation of the monitoring equipment. When ambient temperatures rise or fall to a level which may hinder personnel performance or becomes a threat to personal safety, consideration should be given to stop work and recommence work when temperatures or conditions are less severe.

5.0 AMBIENT AIR MONITORING

Based on site-specific air monitoring data, elevated levels of VOCs in the atmosphere are not anticipated during site activities. The presence of VOCs will be evaluated using a photoionization detector (PID). Background air quality monitoring will be performed continuously in the Exclusion Zone and the Contamination Reduction Zone (see Section 7.0). Periodic air monitoring will be conducted in the Support Zone. If necessary, the level of personal protection required will be upgraded based upon ambient air monitoring results.

6.0 DETERMINATION OF THE SITE-SPECIAL LEVEL OF HAZARD

Categories of personnel protection required depend on the degree of hazard and probability of exposure by a route of entry into the body. For this site, the most probable potential route of entry is via inhalation of gases and dermal adsorbtion of contaminants released from field activities.

Based upon the known site history and disposal practices, the appropriate level of protection for the field operations at the site is Level D. The determination of Level D protection is based on the fact that field work will be performed in open, well-ventilated areas and that the potential for accidents and injuries due to obstructions caused by and/or magnified by the use of level A, B, or C protection (i.e., slip/trip hazards) is greater than the potential for problems associated with exposure from contaminants using level D protection. Level C protection will be used if ambient air monitoring results warrant a protective equipment upgrade (above Level D conditions). The Site Health and Safety Officer will be responsible for requesting an upgrade in the level of personnel protection. The final decision will be made by the Health and Safety Manager in conjunction with the Project Manager.

A PID will be used to monitor air quality throughout the course of field work. If necessary (based upon field equipment readings), the work zone will be evacuated and consideration will be given to upgrading the level of protection. An upgrade to the appropriate level of protection for field personnel will be required before re-entering the work zone if hazardous conditions persist.

In addition to potential chemical hazards, there also exists potentially greater physical hazards associated with the activities at the facility. Due to the nature of the OSGI, heavy equipment including drill rigs and trucks will be on site throughout the project. Therefore, all personnel should always be aware of vehicular traffic while working. All work must be performed in strict accordance with OSHA regulations. Hard hats must be worn at all times around heavy equipment and/or in the vicinity of suspended loads.

7.0 DESIGNATED WORK ZONES

Work zones will be determined prior to commencement of a specific field activity. An area large enough to encompass the activity will be delineated as the work/exclusion zone. Only qualified field personnel with the proper PPE involved in the field activity will be allowed into the designated zone. Within the work/exclusion zone, ambient air quality will be periodically monitored using a PID to determine any changes from background air quality. If subsequent measurements suggest a significant change in air quality, the work area will be immediately evacuated. An upgrade to the appropriate level of PPE for field personnel will be required before re-entering the work zone.

8.0 DECONTAMINATION STATIONS

Decontamination stations will be located in fixed areas to be used for the cleaning of all heavy equipment, vehicles, tools and supplies required for the completion of field operations. Personnel decontamination procedures for the appropriate levels of protection are described in Section 4.0.

9.0 SITE ACCESS CONTROL

Vehicular access to the drilling locations is readily attainable. Appropriate traffic controls and barricades will used in areas of vehicular and pedestrian traffic.

10.0 PERSONAL HYGIENE

The following personal hygiene rules must be followed while performing work at the site:

1. Eating, drinking, chewing gum or tobacco, smoking, or any other practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the work area.

2. Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activities.

3. Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

4. No excessive facial hair (i.e., beards), which interferes with a satisfactory fit of the mask-to-face seal, is allowed on personnel required who wear respiratory protective equipment.

5. Contact with contaminated or suspected contaminated surfaces will be avoided. Whenever possible, walking through puddles, mud and discolored surfaces; kneeling on ground; leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground will be avoided.

6. Medicine and alcohol can increase the effects from exposure to toxic chemicals. Prescribed drugs will not be taken by personnel on site where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverage intake will be prohibited during all on-site field operations.

11.0 CONTINGENCY PLAN

Section 11.0 shall serve as the investigation Contingency Plan. It has been developed to identify precautionary measures, possible emergency conditions, and emergency procedures. The plan shall be implemented by the Site Health and Safety Officer.

11.1 Emergency Medical Care and Treatment

This section addresses emergency medical care and treatment of field personnel, resulting from possible exposures to toxic substances and injuries due to accidents. The following items will be included in emergency care provisions (see Appendix A-2):

a. Name, address and telephone number of the nearest medical treatment facility will be conspicuously posted. Directions for locating the facility, plus the travel time, will be readily available.

b. Names and telephone numbers of ambulance service, police and fire departments, and procedures for obtaining these services will be conspicuously posted.

c. Procedure for prompt notification of the H2M Site Health and Safety Officer.

d. Emergency eyewash fountains and first aid equipment will be readily available on site and located in an area known to all personnel.

e. Specific procedures for handling personnel with excessive exposure to chemicals or contaminated soil.

f. Readily available dry-chemical fire extinguisher.

11.2 Off-Site Emergency Medical Care

The Site Health and Safety Officer shall pre-arrange for access to emergency medical care services at a convenient and readily accessible medical facility and establish emergency routes. The Site Health and Safety Officer shall establish emergency communications with emergency response services.

11.3 Personnel Accidents

Bodily injuries which occur as a result of an accident during the operation at the site will be handled in the following manner:

a. First aid equipment will be available on site for minor injuries. If the injuries are not considered minor, proceed to the next step.

b. The local first aid squad rescue unit, a paramedic unit, the local hospital and the Site Health and Safety Officer shall be notified of the nature of the emergency.

c. The injured employee shall be transported by the local emergency vehicle to the local hospital.

d. A written report shall be prepared by the Site Health and Safety Officer detailing the events and actions taken during the emergency within 48 hours of the accident.

e. See Appendix A-2 for a list of emergency contacts in the Plainview area.

11.4 Personnel Exposure

In the event that any person is splashed or otherwise excessively contaminated by chemicals, the following procedure will be undertaken:

a. Disposable clothing contaminated with observable amounts of chemical residue is to be removed and replaced immediately.

b. In the event of direct skin contact in Level D, the affected area is to be washed immediately with soap and water, or other solutions as directed by medical personnel.

c. The Site Health and Safety Officer or other individuals who hold a current first aid certificate will determine the immediate course of action to be undertaken. This may involve using the first aid kit and/or eyewash stations.

11.4.1 Weather

Adverse weather conditions are an important consideration in planning and conducting site operations. Hot or cold weather can cause physical discomfort, loss of efficiency, and

personal injury. Of particular importance is heat stress resulting when protective clothing decreases natural body ventilation. One or more of the following will help reduce heat stress:

a. Provide plenty of liquids. To replace body fluids (water and electrolytes) lost because of sweating, use a 0.1 percent salt water solution, more heavily salted foods, or commercial mixes. The commercial mixes may be preferable for those employees on a low sodium diet.

b. Provide cooling devices to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency. Long cotton underwear help absorb moisture and protect the skin from direct contact with heat absorbing protective clothing.

c. Install mobile showers and/or hose down facilities to reduce body temperature and cool protective clothing.

d. In extremely hot weather, conduct non-emergency response operations in the early morning or evening.

e. Ensure that adequate shelter is available to protect personnel against heat, cold, rain, snow, etc.

f. In hot weather, rotate shifts of workers wearing impervious clothing.

11.4.2 Heat Stress

If field operations are conducted in the warm summer months, heat related fatigue will be closely monitored. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceeds 85 degrees Fahrenheit, workers should be monitored for heat stress after every work period. The following screening mechanism will be used to monitor for heat stress:

Heart rate (HR) will be periodically measured by the radial pulse for 30 seconds during a resting period. The HR should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 33 percent. If the pulse rate is 100 beats per minute

at the beginning of the next rest period, the following work cycle should be shortened by 33 percent.

Heat-related illnesses range from heat fatigue to heat stroke, the most serious. Heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing may have to be cut off. Less serious forms of heat stress require prompt attention or they may lead to a heat stroke. Unless the victim is obviously contaminated, decontamination should be omitted or minimized and treatment begun immediately. Heat-related problems can be categorized into:

Heat Rash:	Caused by continuous exposure to hot and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat as well as being a nuisance.
Heat Cramps	Caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Signs: muscle spasm and pain in the extremities and abdomen.
Heat Exhaustion	Caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.
Heat Stroke:	The most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

Some of the symptoms of heat stress are: hot dry skin, fever, nausea, cramps, red or spotted skin, confusion, lightheadedness, delirium, rapid pulse, convulsions and unconsciousness. For workers suffering from heat stress, the following actions should be taken:

1. Remove the victim to a cool area
2. Loosen clothing
3. Thoroughly soak the victim in cool water or apply cold compresses

4. Call for medical assistance.

11.4.3 Cold Stress

If field operations are conducted in the cold winter months, cold stress will be monitored. Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit air with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18 degrees Fahrenheit.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

Frost Nip or

Incipient Frostbite. Characterized by suddenly blanching or whitening of skin.

Superficial Frostbite. Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

Deep Frostbite. Tissues are cold, pale and solid; extremely serious injury.

Hypothermia. Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperatures. Its symptoms are usually exhibited in five stages: (1) shivering; (2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body temperature to less than 95 degrees Fahrenheit; (3) unconsciousness, glassy stare, slow pulse and slow respiratory rate; (4) freezing of the extremities; and finally, (5) death.

11.5 Fire

The telephone number to the local fire department will be posted along with other emergency numbers conspicuously on-site at all times. (see Appendix A-2). In the event of a

fire occurring at the site, the following actions will be undertaken by the Site Health and Safety Officer and the designated fire control personnel:

a. Evacuate all unnecessary personnel from the area of the fire and site, if necessary.

b. Contact the local fire and police departments informing them of the fire and any injuries if they have occurred.

c. Contact the local hospital of the possibility of fire victims.

d. Contact the Site Health and Safety Officer, Health and Safety Manager, and the H2M Project Manager.

11.6 Personnel Protective Equipment Failure

If any site worker experiences a failure or alteration of PPE that affects the protection factor, that person and his/her buddy shall immediately leave the Exclusion Zone. Re-entry shall not be permitted until the equipment has been repaired or replaced to the satisfaction of the Site Health and Safety Officer.

12.0 SUMMARY

The Health and Safety Plan establishes practices and procedures to be followed so that the welfare and safety of workers is protected. It is important that personal equipment and safety requirements be appropriate to protect against the potential or known hazards at a site. Protective equipment will be based upon the type(s), concentration(s), and routes of personal exposure from substances at the site, as well as the potential for hazards due to heavy equipment use, vision impairment, weather, etc. All site operation planning incorporates an analysis of the hazards involved and procedures for preventing or minimizing the risk to personnel. The following summarizes the rules which must be obeyed:

a. The Health and Safety Plan will be made available to all personnel doing field work on site. All personnel must sign this plan, indicating they have read and understood its terms.

b. All personnel will be familiar with standard operating safety procedures and additional instructions contained in the Health and Safety Plan.

c. All personnel going on site will be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures and communications.

d. Any required respiratory protective devices and clothing will be worn by all personnel going into work areas.

H2MGROUP

APPENDIX A-1

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT FORM

H2MGROUP

I acknowledge that I have read and understand the provisions of this Health and Safety Plan, and that I will, to the best of my ability, abide by the terms of this plan:

Name	Date	Name	Date

APPENDIX A-2

EMERGENCY RESPONSE INFORMATION

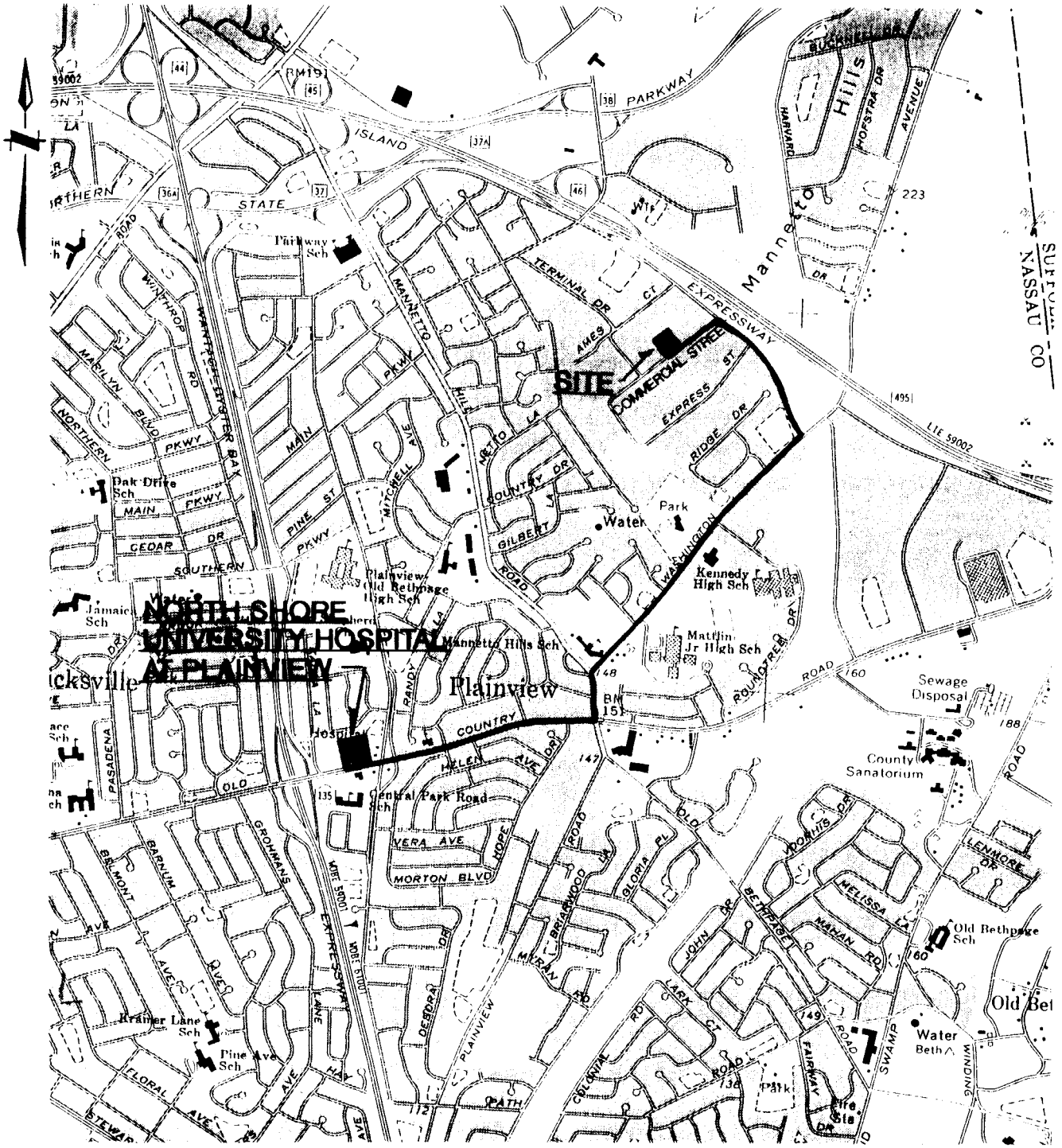
H2MGROUP

EMERGENCY TELEPHONE NUMBERS

All Emergency Rescue Services (Police, Fire, Ambulance)	911
Plainview Fire Department (emergency)	(516) 938-1515
Police Department (non-emergency)	(516) 755-1843
NYSDEC Emergency Spill Response:	(516) 444-0320
North Shore University Hospital at Plainview (non-emergency)	(516) 681-8900
H2M Project Manager: Richard J. Baldwin	(516) 756 - 8000, ext. 611
Health & Safety Manager: Richard J. Baldwin	(516) 756 - 8000, ext. 611

DIRECTIONS TO HOSPITAL:

From the front of the 100 Commercial Street property turn left (northeast) onto Commercial Street. Go approximately 800 feet and turn right (southeast) onto Executive Drive. Take Executive Drive for approximately 0.4 miles and turn right (southwest) onto Washington Avenue. Follow Washington Avenue approximately 0.8 miles and turn left (south) onto Manetto Hill Road. Take Manetto Hill Road for approximately 600 feet and turn right (west) onto Old Country Road. The North Shore University Hospital of Plainview is approximately 0.6 miles up Old Country road on the right-hand side. The hospital route map is attached.



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