PHASE II INVESTIGATION WORK PLAN

MAGNUSONIC DEVICES INACTIVE HAZARDOUS WASTE SITE

HICKSVILLE, NASSAU COUNTY, NEW YORK

SITE NO. 130031

PREPARED BY:

RICHARD D. GALLI, P.E., P.C.

FEBRUARY 29, 1988

PHASE II WORKPLAN

MAGNUSONIC DEVICES

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PHASE II WORKPLAN

MAGNUSONIC DEVICES

1.0 - INTRODUCTION

This document is a plan for the investigation of the Magnusonic Devices Site, 290 Duffy Avenue, Hicksville, Nassau County, New York, according to the guidelines of New York State Department of Environmental Conservation (NYSDEC) for a Phase II Investigation. Attached are Appendix A, a site Health and Safety Plan, and Appendix B, the Laboratory QA/QC Manual.

1.1 - Purpose of the Investigation

The investigation described in this document was planned in response to a Draft Order on Consent to the Town of Hempstead from the New York State Department of Environmental Conservation (DEC) which was proposed on August 5, 1986.

The purposes of the field investigation and subsequent study are as follows:

*Determine if groundwater and soil have been contaminated.
*Determine the nature of contamination at the site, including horizontal and vertical distribution.
*Evaluate impacts from any contamination.

In order to accomplish the stated objectives, a site investigation will be performed. Emphasis will be placed on identifying and quantifying the site's hydrogeologic and chemical characteristics utilizing site specific data gathered in the recent past in conjunction with data gathered during the implementation of this work plan. These data will be used to prepared a Site Hazard Ranking Score (HRS) which the NYSDEC can use to rate and/or prioritize the site as hazardous or nonhazardous.

1.2 - Site Description

The site located at 290 Duffy Avenue, Hicksville, New York (see Figure 1), consists of approximately 5 acres. In 1984, the site was listed by the New York State Department of Environmental Conservation ("NYSDEC") as a "suspected inactive hazardous waste disposal site".

Prior to its purchase by International Clinical Laboratories, Inc., (ICL) in December, 1986, the site was owned by Mr. Milton S. Stevens and occupied by Magnusonic Devices, Inc. ("MDI") (EPA No. NYD005923560) (NYSDEC Site Code No. 130031). MDI manufactured computer tape heads and generated hazardous and nonhazardous wastes. Manufacturing processes at MDI consisted of 1) head housings, 2) photo etching of thin sheet metal (brass and copper) laminates in the fabrication of miniature coil wound cores, 3) electro-plating tape heads for magnetic shielding and wear resistance with copper and chrome, 4) various assembly operations, some of which are: coil, winding, laminating, soldering, potting, lapping, and polishing, and 5) various electrical and mechanical inspection operations to maintain product quality. After MDI ceased operations, stored hazardous wastes were removed from the site by the licensed haulers Chem Pollution Control and Envirite.

NYSDEC documents indicate that during the period 1981-1985 MDI discharged solvents and metals in concentrations in excess of regulated limits into two leaching pools at the back of the facility. Numerous violations of their unfiled State Pollutant Discharge Elimination System Permit (SPDES) were cited by the NYSDEC. Discharged chemicals may have included volatile halogenated solvents, lead, copper, nickel, Freon TF, 1,1,2 trichloroethane, methylene chloride,

acetone, trichloroethylene and possibly other organic compounds.

Until early 1986, MDI utilized a physical-chemical treatment system which handled rinsewaters from their plating and chemical milling operations and discharged the treated wastewaters into the two leaching pools in the rear of the building. At that time, the facility was hooked up to the Nassau County Sewer System. Their industrial wastewater discharge did not have a Pretreatment Permit.

The wastewater treatment facility was located at the rear and northwest corner of the building. A hazardous waste drum storage area in an indoor 15' x 25' bermed and caged area was located adjacent to the wastewater treatment facility. The floor of this area was constructed of level concrete without any drains or sumps.

The plating area was located in the southeast corner of the building. The floor of the plating room was contaminated with heavy metals and was disposed of as a hazardous waste during closure of the former hazardous waste management operations. The floor was constructed of concrete and had one drain which drained to a storm catch basin, but the drain reportedly plugged more than five (5) years ago. Several soil samples will be taken from this storm drain, which is on the east side of the building.

The developer etch area was located in the western rear portion of the building. The concrete floor was badly etched from the use of ferric chloride in the developing process, however the concrete floor corings taken showed that the floors were nonhazardous and did not require disposal as a hazardous waste.

Typical hazardous materials/wastes utilized or generated by MDI included the following:

*Ferric Hydroxide Sludge
*Ferric Chloride
*Developer Solution
*Chrome and Copper Plating Solutions
*Coolants and Hydraulic Oils
*Solvents - 1,1,1 Trichloroethane,
Freon TF, Acetone

1.3 - Site Geology

Beneath the site area are unconsolidated sediments of Pleistocene and Cretaceous age. The area is directly underlain by glacial outwash deposits consisting of coarse sand and gravel. These deposits comprise the upper glacial

aquifer and are believed to be approximately 50-75 feet thick.

Underlying the upper glacial aquifer is the Gardiners Clay. This deposit may be 10 to 15 feet thick under the site area and acts as a barrier to the vertical movement of water because of its low hydraulic conductivity. The second major bearing unit underlying the site area is the Cretaceous Magothy Formation, which is hydraulically linked to the upper glacial aquifer. It is believed to be approximately 800 feet thick in the site area. The Magothy aquifer directly overlies the clay member of the Cretaceous Raritan Formation. The clay in turn overlies and confines the Lloyd Sand member of the Raritan Formation, which constitutes the deep confined aquifer in the site area. Underlying the members of the Raritan Formation is crystalline bedrock of Precambrian age.

2.0 - GEOPHYSICAL STUDY

An extensive system of monitoring well clusters (described in the following section) will be used to establish dissolved species concentrations and the apparent sources of any contamination. Site stratigraphy and water table

contours have been established in the area by the United States Geological Survey (USGS).

3.0 - MONITORING WELLS

3.1 - Locations, Depths and Numbers of Monitoring Wells

Monitoring wells will be installed to define the stratigraphy, groundwater chemistry, and flow patterns beneath the site. A total of eight wells will be installed in cluster arrangements at the approximate locations as shown in Figure 2. Four wells (MW1, MW2, MW3 and MW4) will be shallow wells and four (MW5, MW6, MW7, and MW8) will be deep wells. The four existing wells onsite (OW1, OW2, OW3, and OW4) will only be used to measure depth to groundwater.

The wells are positioned for the following reasons:

MW - 1,5	To obtain upgradient and background water quality data
MW - 2,6	To obtain downgradient water quality
MW - 3,7	To obtain downgradient water quality
MW - 4,8	To obtain downgradient water quality

OW - 1	To obtain upgradient groundwater depth
OW - 2	To obtain downgradient groundwater depth
OW - 3	To obtain downgradient groundwater depth
OW - 4	To obtain downgradient groundwater depth

The following sections address the proposed well locations, screened depths, and method of installation, and serve as guidelines to be followed in the actual field investigation. If a well siting or the installation technique fails to achieve the intent of the drilling program, the field geologist or engineer will change the well location or method of installation as necessary. All such changes, if any, will be documented and the NYSDEC notified prior to implementation of any such change.

At each cluster site, two wells will be completed in the upper glacial aquifer to sample both shallow groundwater and deeper groundwater. Average well depths will be about 70 to 100 feet for the shallow and deeper wells, respectively. In this way, information will be obtained to

establish vertical water chemistry profiles, hydraulic gradients, and water table elevations.

Shallow wells will be screened in the water table with a portion of the screen extending above the water table in order to intercept potential floating contaminants. The deep wells will be screened at depths between 90 to 100 feet below grade.

3.2 - Installation

During installation of the monitoring wells, care will be taken to prevent introducing contaminants into a borehole and to prevent cross-contamination between boreholes. Upon completion of drilling at each well site, all equipment (auger flights, bits, split-spoon sampler, tremie tube, etc.) will be thoroughly brushed and steam-cleaned on site at a location remote from the construction area. Steam-cleaning is preferred over the use of solvents in order to eliminate the possibility of contamination from the use of such solvents.

A 6-inch I.D. hollow-stem auger will be used to advance each boring. In each borehole, a two-inch diameter slotted PVC well screen and riser casing assembly will be installed in 10-foot or 5-foot long sections. Each screen will be 10

feet long. The wells will be 70 feet for shallow wells and 100 feet for deep ones. Each well will be installed in a separate borehole. This will provide head differential measurements between deep and shallow screened zones at such sites and provide greater separation of groundwater sampling zones. A filter pack of compatible clean gravel will be placed around the well screen. The remaining annulus will be sealed with bentonite/cement grout to grade surface to assure that groundwater samples are representative of the screened interval. This procedure will be used for wells screened below the water table. A bentonite slurry pre-hydrated with fresh water will be used above the sand bed in place of the usual bentonite pellet plug. For wells screened across the water table, the usual bentonite pellet plug will be used (see Figures 3 and 4). Finally, a flush man protective box hole will be left around the well and guard pipes. This hole, 2 feet square and 2 feet deep, will be filled with concrete which will be sloped away from the well to prevent ponding of water adjacent to the pipe. It is estimated that two weeks will be needed to complete installation of the wells. A project schedule is included in Figure 5.

Auger cuttings from borings will be stored on the Magnusonic Devices site until it is determined if this material is hazardous. All cuttings will be screened in the field using a HNu meter to detect the emission of volatile organic

compounds. A selection of cuttings will be sampled and subjected to analysis by the Extraction Procedure Toxicity Test. The plan for sampling auger cuttings consists of recovering a composite sample from each of two locations considered to represent potential worst cases. Unless otherwise indicated by field observations (by our engineer and NYSDEC representative) composite auger cuttings will be selected from borings at MW6 and MW8. Each of these samples will be collected directly into a clean sampling jar for laboratory analysis. During the analysis period auger cuttings will be drummed or kept covered with plastic sheeting depending upon whether International Clinical Laboratories is using the site and the security of the location. Should results indicate that the cuttings are hazardous, they will be disposed of properly as hazardous waste.

3.3 - Well Development

Upon completion of all wells, each will be developed by surging and pumping with a centrifugal pump. Whenever possible, wells will be pumped from the surface. It is anticipated that most pumping can be conducted directly through fittings to the top of the well. Deeper water elevations may require either drawn-down tubes inserted into the well for pumping or the use of bailers.

For pumped development the standard procedure will be to pump for 15 minutes. After 15 minutes a surge will be created in which the suspended water column will be allowed to fall back into the well to loosen fine material surrounding the screen. This procedure will be modified as required by field conditions and will be approved by NYSDEC representatives onsite.

Pumping will continue until the discharge water is cleared of sand, silt and other associated sediment and yields water adequate for sampling purposes. This discharge water will be placed in drums and stored on site. Representative water samples will be submitted for laboratory analysis to determine if the drummed water is contaminated. If it is contaminated, it will be disposed of as a hazardous material.

All equipment used for well development will be disassembled as necessary and thoroughly steam-cleaned before being introduced into another well.

3.4 - Water Elevations

Water elevations in all wells will be measured before and after development. All wells will be surveyed to the nearest hundredth of a foot.

4.0 - SAMPLING & ANALYSIS PLAN

This section describes the procedures and methods to be employed in obtaining soil, sediment, leachate and groundwater samples. All sampling events will be recorded in a field log by the Field Engineer and all samples properly labeled and preserved. Chain-of-custody procedures will be maintained continuously by the Engineer and laboratory personnel.

The chain-of-custody record form to be used between field sampling and sample delivery to the analytical laboratory is included in Figure 6. Proposed chemical analyses to be performed on the samples is outlined in Table 3, and information regarding water analysis methods and sample preservation and holding times in included in Table 2.

4.1 - Geologic Soil Samples

Geologic soil samples will be obtained during drilling of the deeper boreholes at all well sites with a split-spoon sampler. Sampling will proceed at intervals of five feet, or less as determined by changes in lithology, throughout the entire depth of the boreholes. Samples will be used to

stratigraphically log the boreholes and will be classified on site using the Unified Soil Classification System by the field geologist. Blow counts will be recorded for each sample to aid in the physical characterization of the strata. Sampling equipment will be thoroughly steam-cleaned between boreholes and split-spoons will be brushed clean of any excess material and stored in potable water between sampling events at a borehole. Grain size analyses will be provided by the drilling contractor for all samples.

Each sample will be "sniffed" on site for volatile organics with the HNu and prior to removal from the split-spoon sampler in order to:

1. Investigate the possible presence of volatile organic substances.
2. Maintain the proper level of personnel protection as outlined in the site Health and Safety Plan.
3. Screen samples for the presence of volatile substances prior to grain size analysis.

A portion of each sample will be transferred to a partitioned core box or to jars for grain size analysis. A second portion will be labeled and stored in an airtight glass jar for future inspection and analysis if necessary.

4.2 - Exploratory Boring

Exploratory borings (B-1 through B-10) will be advanced to a depth of about twenty-five (25) feet to sample soils around the leaching pools, the storm drain on the east side of the building and the rear of the north parking lot adjacent to the Long Island Rail Road property. Split-spoon samples will be obtained from the underlying natural sediment to determine if any contamination exists. Split-spoon samples will be obtained at five foot intervals. Borings B-1 through B-9 will be drilled to a depth of 25 feet. Boring B-10 will be drilled through the bottom of the storm drain on the east side of the building to a depth of 10 feet beneath the storm drain bottom. Each split-spoon sample will be tested with an HNu. The sample with the highest reading will be transferred to an airtight jar for laboratory analysis. Each split-spoon sample will be transferred with the use of a stainless steel trowel or spatula to a separate precleaned wide-mouth glass sampling jar provided by the laboratory. The jar will be immediately capped and labeled. The samples will be submitted for analysis. The split-spoon will be steam-cleaned between uses.

4.3 - Groundwater Sampling

All wells will be bailed for groundwater samples after well installation has been completed. Samples should be collected from the wells in a one to two day period. Prior to collecting a sample, five standing water column volumes will be purged from the well. Purged water from monitoring wells MW-1 through MW-8 will be disposed of as described in Section 3.3. Water levels will be recorded before and after sampling.

A precleaned dedicated teflon bailer will be lowered slowly into the well and samples will be removed until the necessary volume of water is obtained for sampling purposes. For the shallow wells, samples will be taken starting from the upper portion of the water column. For the deeper wells, samples will be taken starting from the bottom of the well. The full bailer will be tipped so that water flows in a continuous stream into the sample containers. All samples will be placed in the appropriate precleaned containers according to the method of analysis.

These sample storage containers will be supplied by the analytical laboratory. Table 2 lists the various analytical

methods, required method of preservation, and maximum holding times before analysis.

Samples to be analyzed for volatile organics will be transferred to VOA sampling vials with teflon-lined screw caps. No gas bubbles will be trapped in the vial during bottling.

All sample containers will be tightly capped, labeled, and stored in an insulated ice chest. Sampling events will be logged into a field notebook. Chain-of-custody forms will be completed and transferred to the laboratory personnel upon delivery of the samples. Samples will be transferred to the analytical laboratory within 24 hours of sample collection. A total of eight (8) groundwater samples will be submitted for the analytical scan as shown in Table 3. One additional duplicate (split) sample will be submitted by NYSDEC for the same analysis. One distilled water field blank (trip blank) will be analyzed for volatile organics.

At the time of sampling, field measurements of pH, conductivity and temperature will be made.

4.4 - Laboratory Analysis

Samples will be analyzed by H2M Labs., Inc., a laboratory employing the standard procedures described in Superfund and Contract Laboratory Protocol, June 1986. Samples will be analyzed for the parameters given in Table 3. The analytical methods are listed in Table 2 and include atomic absorption spectrophotometry for metals; gas chromatography and mass spectrometry for organics; and spectrophotometry for total phenols.

Soil and sediment samples will be maintained without addition of chemical preservatives. Prior to analysis, soil and sediment samples will be extracted according to the methods outlined in SW-846, "Test Methods for Evaluating Solid Waste", second edition.

4.7 - Data Analysis

Various data comparisons will be made to assess chemical concentrations in the Magnusonic Devices' soil and ground-water samples. Upgradient well water samples will be compared with downgradient samples to examine for and account for any background contamination levels. Ground-

water samples from different depths at the same location will be compared to assess the downward movement of any contamination encountered. Soil contaminant levels will also be contrasted.

Finally, a risk assessment will be performed as input to the Hazard Ranking System. Risk assessment will include a comparison of water analysis results with drinking water standards or other applicable standards.

5.0 - QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Many aspects of the QA/QC Plan have been described in Sections 1.0 to 4.0 of this Work Plan. Already incorporated into this document are the following:

- Sampling Design
- Parameter Table
- Task Schedule
- Sampling Procedure

Appendix B contains H2M Labs, Inc.'s Laboratory Quality Assurance/Quality Control Manual.

5.1 - Project Organization

The organization of the project is described below.

The Phase II Investigation will be performed by the firm of Richard D. Galli, P.E., P.C., consulting engineers, through its Long Island office in Northport, New York.

Richard D. Galli, P.E., will serve as Project Manager, responsible for overall conduct of the program and coordination. Dean Anson will serve as Field Supervisor and will be responsible for supervision of well installation and for collection of environmental samples. Richard Barbour will serve as Project Hydrogeologist and direct the risk assessment and HRS score preparation using analytical results of sub-contractors. Quality Assurance of analytical data including any performance audits will be performed by Dean Anson. Overall QA/QC for the program will be the responsibility of Richard D. Galli, P.E., and Richard Barbour.

5.2 - Data Quality Requirements and Assessments

The minimum detection levels required will be those published by the US EPA for the method. The precision of

the analyses will be assessed from laboratory control charts or equivalent data representing the periodic variation in the results of analysis of a single concentration of analyte. Upper and lower control limits will be set at two standard deviations above and below the line representing mean recovery.

Accuracy will be assessed by accuracy control charts or equivalent data representing the variation between spiked or check samples and found concentrations. Check sample concentration ranges should bracket the expected range of environmental sample concentrations. Upper and lower control levels will be established at 3 standard deviations of the slope value, respectively above and below the mean slope value, or equivalent.

5.3 - Field Calibration

The field instrumentation utilized will consist of a photoionization detector (HNu) and a pH/conductivity meter. The pH meter will be calibrated on a daily basis using two buffer solutions of known values bracketing the environmental sample value.

A one-point calibration will be performed on an hourly basis during use. The conductivity meter will be calibrated using distilled water and a daily reference check.

5.4 - Data Validation

The analytical laboratory will be required to perform "check", or known concentration, analyses as well as to spike and analyze representative media samples. Analytical data will be validated by reviewing all check samples and laboratory spike samples for acceptable levels of recovery. Laboratory duplicates and blind sample duplicates will be reviewed for consistency and acceptable precision levels. Detection limits will be reviewed for acceptability. Instrument calibrations will be reviewed by inspection of tuning spectra from the GC/MS System. Chain-of-custody forms will be examined for documentation or transmittal errors.

5.5 - System Audits

A system audit of the analytical laboratory will be conducted during the period of actual sample analysis. This audit will be performed by Dean Anson and will include an on-site review of the laboratory's operation systems and

physical facilities. Particular attention will be paid to the laboratory's calibration and analysis protocols. During the system audit, laboratory documentation will be extensively examined. The use of documented operating procedures will be inspected, and the existence and use of equipment log books will be noted. The purpose of the audit is to verify that the laboratory QA/QC plan is implemented and to determine that corrective actions are taken when problems are detected.

5.6 - Corrective Actions

Deficiencies, errors and significant defects discovered during system audits or data validation will require corrective action. Corrective action will be implemented by revision of the analytical procedure, re-calibration of instrument systems or re-instruction of analysts where indicated. Corrective action will include, where possible, the re-analysis of samples which remain within published holding times. Such re-analysis will occur under strict adherence to the analytical protocols specified.

5.7 - QA/QC Report

The final project report will contain a section addressing significant findings discovered during system audits or data

validation, and the corrective actions taken. The overall quality of the data will be assessed and the comparability and representativeness of the results will be discussed.

TABLE 1

MAGNUSONIC DEVICES WELL CLUSTERS

WELL NUMBER	ESTIMATED DEPTH OF WELL (FEET)	ESTIMATED NUMBER OF GEOLOGIC SAMPLES
MW-1	70	--
MW-2	70	--
MW-3	70	--
MW-4	70	--
MW-5	100	20
MW-6	100	20
MW-7	100	20
MW-8	100	20
OW-1	70	--
OW-2	70	--
OW-3	70	--
OW-4	70	--

MW = Monitoring Well

OW = Observation Well (previously installed)

TABLE 2

REQUIRED WATER ANALYSIS METHODS,

PRESERVATION AND HOLDING TIME

Parameters	EPA Method	Preservation	Maximum Holding Time
Total Phenols	420.1	Cool, 4°C, H_2SO_4 to pH<2	28 days
Volatile Organic Aromatics	624	Cool 4°C[2]	7 days
Purgeable Halocarbons	625	Cool, 4°C[2]	7 days
Base/Neutral Acid Extractable organics	610/625	Cool, 4°C, store in dark[2]	7 days until extractions; 40 days after extraction
Heavy Metals	200 Series	HNO_3 to pH<2	6 months
pH	150.1	None	Analyze immediately
Conductivity (Total Dissolved Solids)	--	None	Analyze immediately
Temperature	--	None	Analyze immediately

1. Adapted from: "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act", 40 CFR - Part 136.

2. In the presence of residual chlorine, $Na_2S_2O_3$ will be added.

TABLE 3

LABORATORY ANALYSIS

Groundwater samples collected during the field program will be delivered to H2M Labs, Inc., a NYSDEC certified laboratory for analyses, except for pH and total dissolved solids, which will be performed in the field. The following analyses will be performed:

1. pH
2. Total Dissolved Solids
3. Lead
4. Nickel
5. Freon
6. 1,1,2, Trichloroethane
7. Methylene Chloride
8. Acetone
9. Trichloroethylene
10. 1,1,1 Trichloroethane
11. Copper
12. Total Phenols
13. Toluene
14. Cadmium
15. Chromium (Total)
16. Iron
17. Silver
18. Zinc
19. Total Nitrogen
20. Total Volatile Organics

Soil samples collected during drilling will be analyzed and be delivered to H2M Labs, Inc. for the following: Total dissolved solids and pH will be performed in the field.

Physical Parameters

1. Grain size distribution
2. Permeability

Chemical Parameters

1. Lead
2. Nickel
3. pH
4. Freon
5. 1,1,2 Trichoroethane
6. Methylene Chloride
7. Trichloroethylene
8. 1,1,1 Trichloroethane
9. Acetone
10. Copper
11. Total Phenols
12. Toluene
13. Cadmium
14. Chromium (Total)
15. Iron
16. Silver
17. Zinc
18. Total Volatile Organics
19. Total Nitrogen
20. Total Dissolved Solids

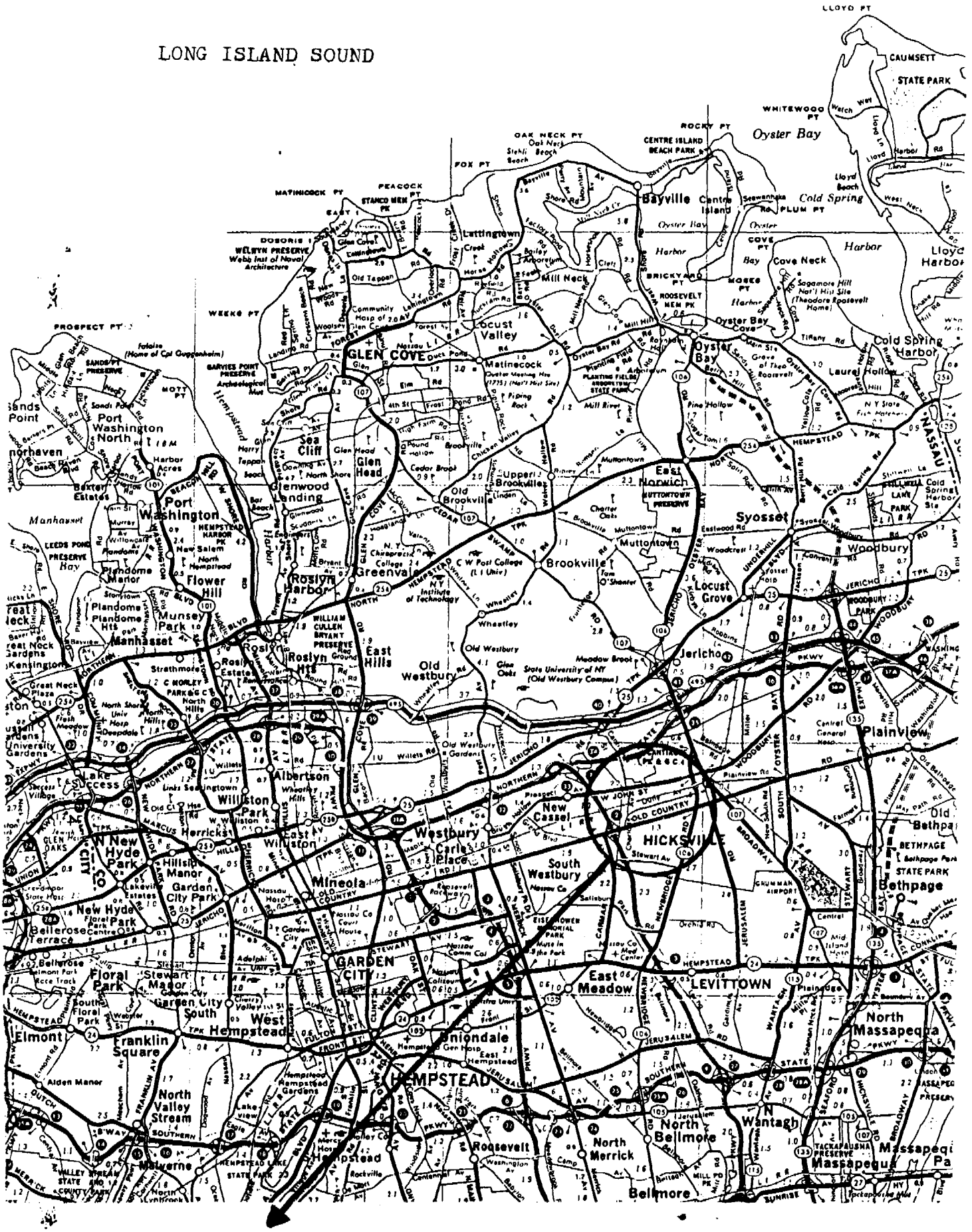


Figure 1 Location Map

DEEP MONITORING WELL DESIGN

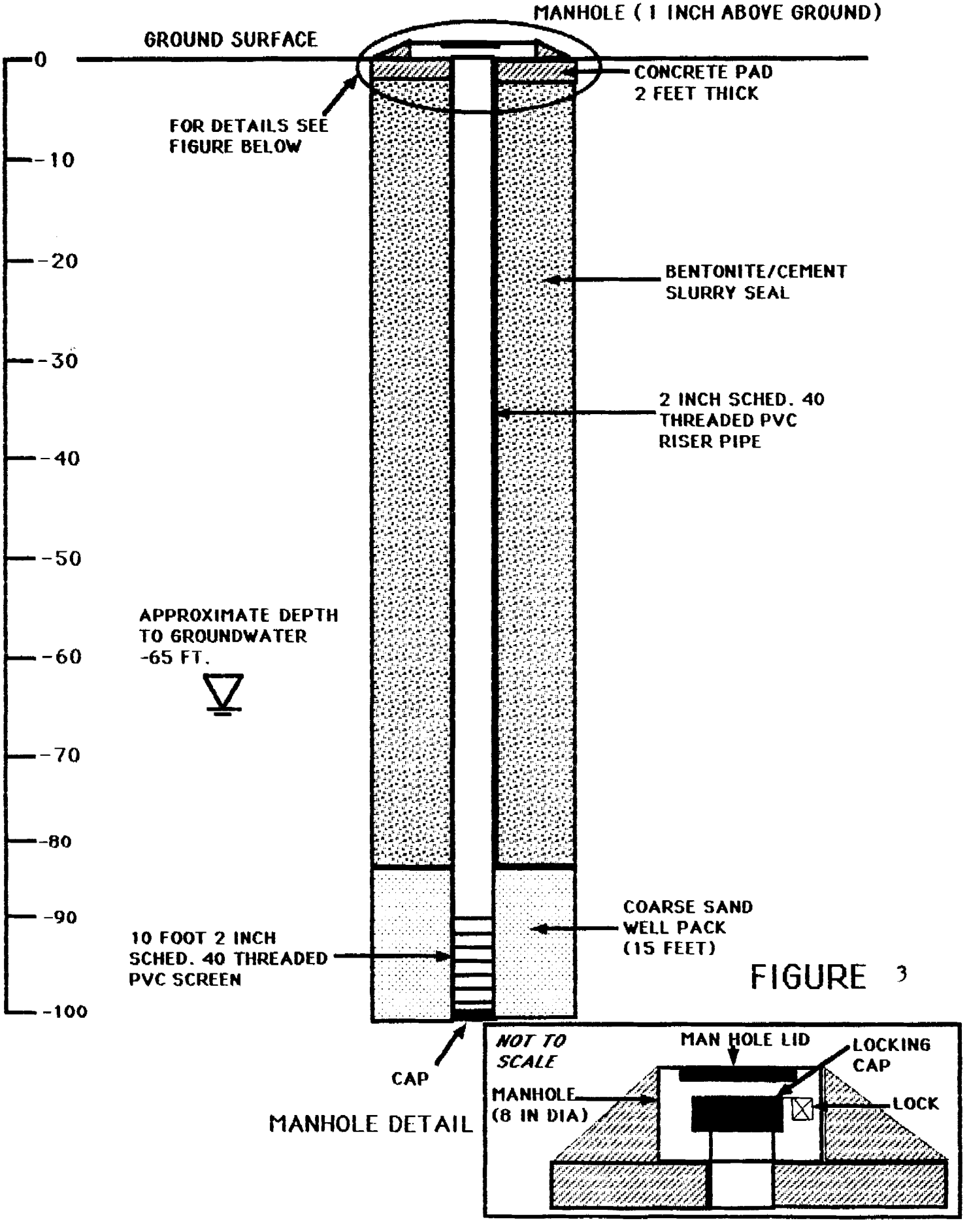
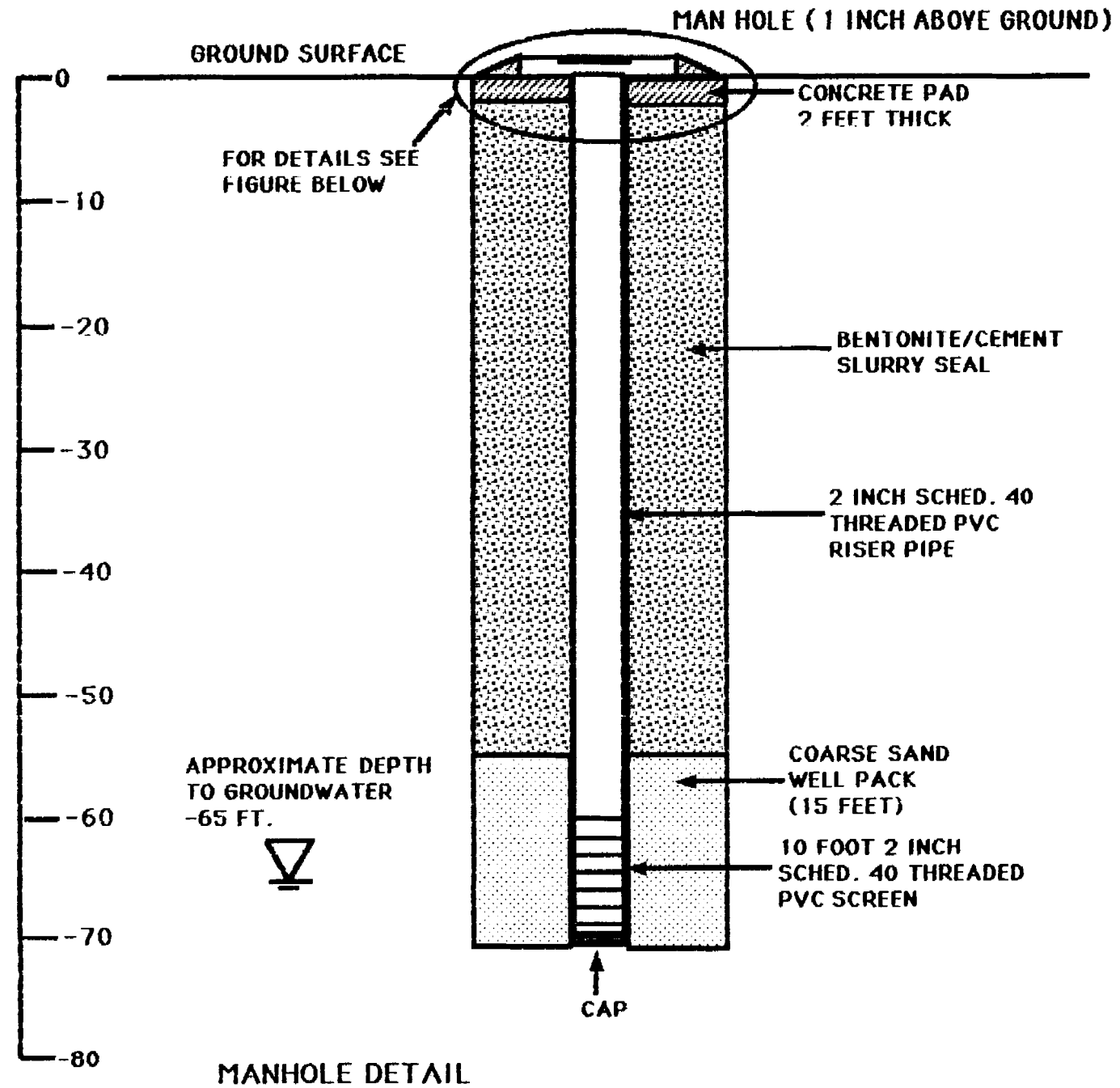


FIGURE 3

MANHOLE DETAIL

SHALLOW MONITORING WELL DESIGN



MANHOLE DETAIL

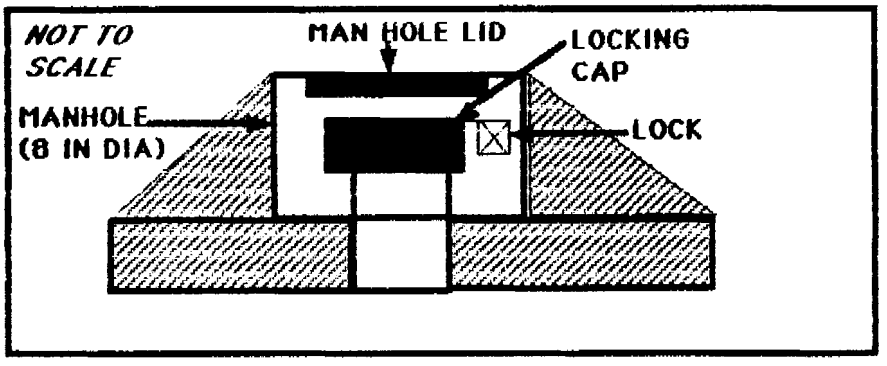
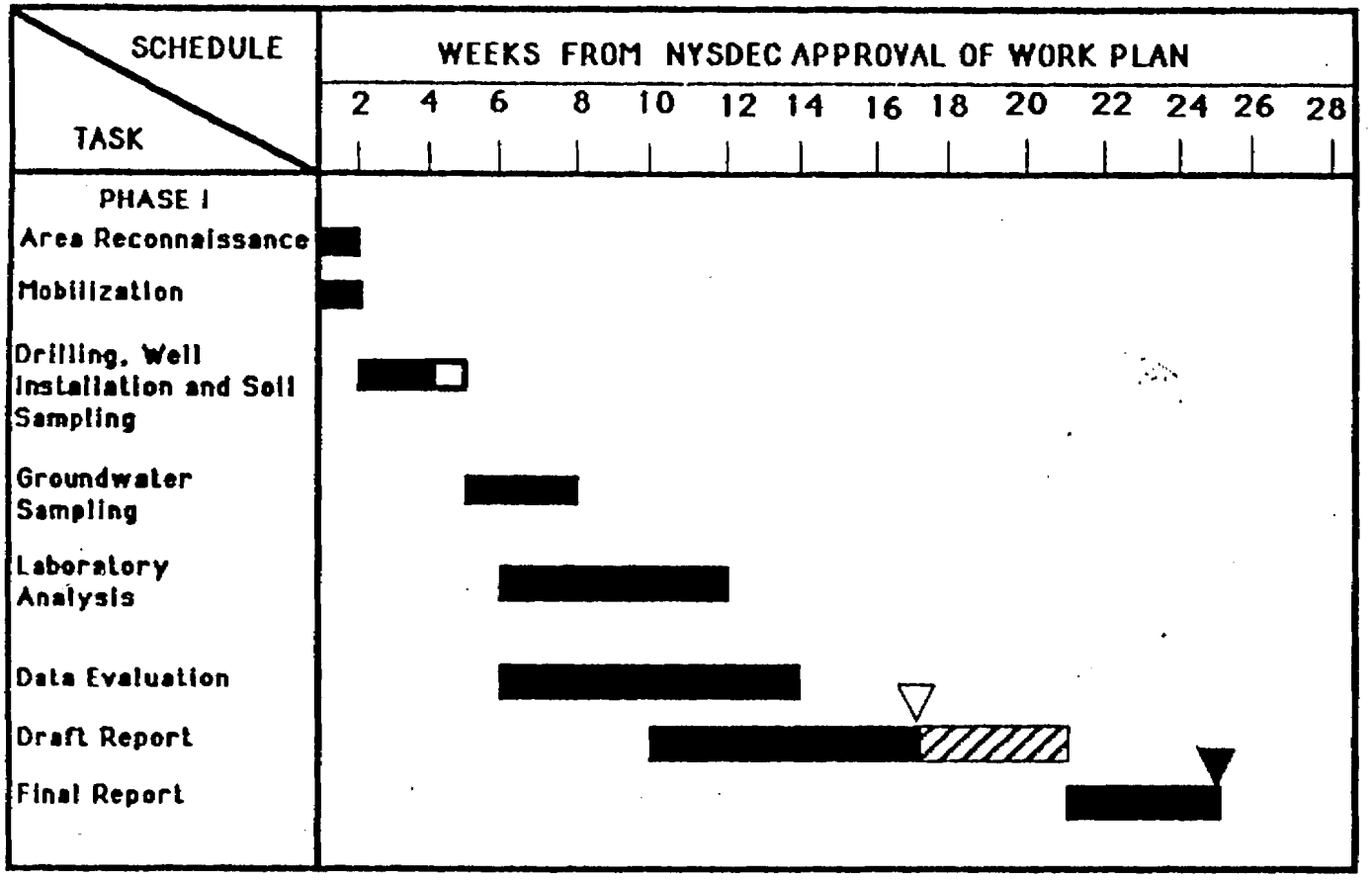


FIGURE 4

WORK SCHEDULE



▽ DRAFT REPORTS ▼ FINAL REPORTS ▨ NYSDEC REVIEW PERIOD

□ CLEAN, BACKFILL AND SAMPLE SOILS OF FORMER LEACHATE POOL

FIGURE 5

Richard D. Galli, P.E., P.C.
Environmental Engineering Services
17 BURNS CT., GREENLAWN, N.Y. 11740

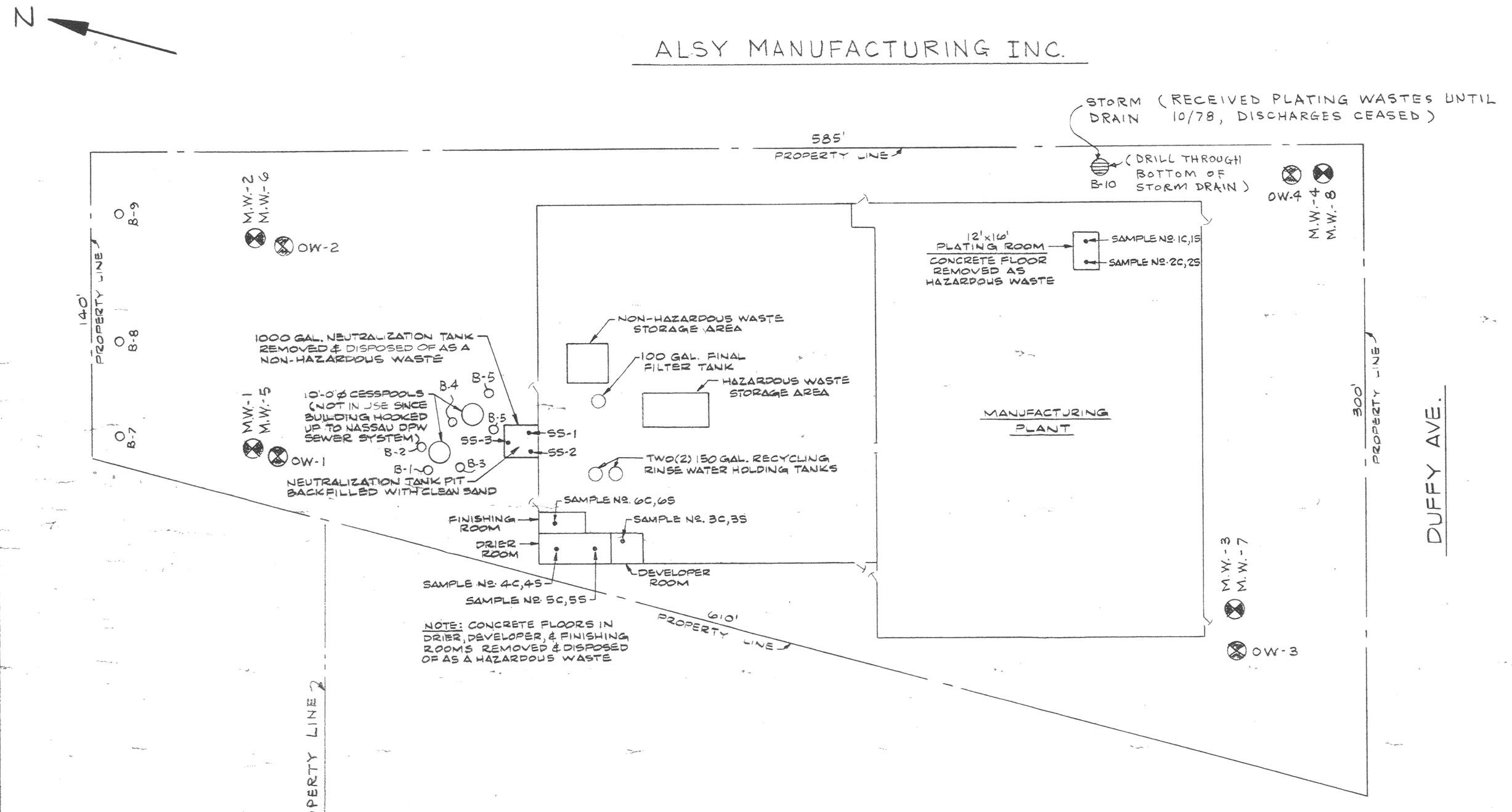
CHAIN - OF - CUSTODY

PROJECT NO.	PROJECT NAME					NUMBER OF CONTAINERS								REMARKS
SAMPLERS NAME:				SIGNATURE:										
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION									

SAMPLE RELINQUISHED BY:		SAMPLE RECEIVED IN GOOD CONDITION BY:	
NAME:	DATE:	NAME:	DATE:
SIGNATURE:	TIME:	SIGNATURE:	TIME:
NAME:	DATE:	NAME:	DATE:
SIGNATURE:	TIME:	SIGNATURE:	TIME:
NAME:	DATE:	NAME:	DATE:
SIGNATURE:	TIME:	SIGNATURE:	TIME:

Figure 6

ALSY MANUFACTURING INC.



PLOT PLAN

SCALE: 1" = 30'-0"

SITE PLAN

APPROX. SCALE: 1" = 500'

NOTES:

1. EACH MONITORING WELL LOCATION IS A WELL NEST.
2. MONITORING WELL #1,2,3&4 ARE PROPOSED SHALLOW WELLS. #5,6,7&8 ARE PROPOSED DEEP WELLS.
3. ⊗ - SYMBOL FOR MONITORING WELL NEST OR OBSERVATION WELLS.
4. ALL EXISTING WELLS OW-1, OW-2, OW-3 & OW-4 WILL BE UTILIZED FOR DETERMINATION OF GROUND WATER ELEVATION.

FIGURE 2

RICHARD D. GALLI P. E.
CONSULTING ENGINEERING SERVICES
GREENLAWN N.Y.

PROJECT: MAGNUSONIC DEVICES INC.
290 DUFFY AVE. HICKSVILLE, N.Y.

TITLE: PLOT PLAN

DWN BY: E.W. DATE: 1-29-88
CHK BY: R.L. SCALE: 1"=30'-0"
DWG NO. 12

APPENDIX A

INTERNATIONAL CLINICAL LABORATORIES, INC.

HICKSVILLE, NEW YORK

HEALTH AND SAFETY PLAN

Prepared by:

Richard D. Galli, P.E., P.C.

DECEMBER 1987

Health and Safety

Purpose

The purpose of this Health and Safety Plan (HASP) is to assign responsibilities, establish the minimum personnel protection standards and operating procedures and provide for contingencies that may arise while remedial investigations are being performed at ICL's property at Hicksville, New York.

Richard D. Galli (RDG) will be responsible for providing all material, equipment and labor required by the HASP. RDG shall ensure that the protocols of the HASP are followed by all personnel involved in the work, including employees and agents of Contractors, Subcontractors and Owner.

This HASP establishes the minimum level of personnel protection to be provided by RDG. RDG will implement additional measures if necessary to protect personnel involved in the work and the public at large.

Conditions at the site are not expected to warrant either Level B or Level C protection. Regardless, all workers present on site will be familiar with proper protection procedures and this HASP.

Hazard Evaluation

Air monitoring shall be conducted with two portable gas monitors: CGS-20M as manufactured by ENMET Corporation and Photovac Tip II Air Analyzer as manufactured by Photovac International, Inc.

The CGS-20M incorporates triple-detection capabilities. It identifies toxic levels of carbon monoxide and hydrogen sulfide gas (referred to as "toxic gas"); Combustible gases; and oxygen deficiency. The CGS-20M utilizes both audio and visual alarms to inform personnel of a potentially hazardous situation.

The Tip II utilizes a photoionization detector to sense impurities in air. The Tip II does not distinguish between pollutants; the direct reading represents a composite of all the ionizable pollutants present.

Prior to opening any man-hole (MH) or storm drain (SD) cover, the air directly above the cover shall be monitored with the CGS-20M and the TipII. If no hazard is present, then the cover shall be removed. After removing the cover, all workers shall step away from the opening for several minutes to let the pool "breath". Air monitoring shall be conducted while approaching the opening until a hazard is detected or until measurements can be obtained at the opening. If no hazard is detected, then soil/sludge sampling may commence.

If the air monitoring indicates a hazard, the area will be immediately evacuated. Guidelines that will be followed before continuing are noted in Table 1. If conditions warrant it, Level B & C protection will be worn.

Table I

Atmospheric Hazard Guidelines

Hazard	Monitoring Equipment	Measured Level	Action
Explosive atmosphere	Combustible gas indicator (CGS-20M)	<10% LEL[1]	Continue investigation
		10%-25% LEL	Continue onsite monitoring with extreme caution as higher levels are encountered
		>25% LEL	Explosion hazard. Withdraw from area immediately.
Oxygen	Oxygen concentration meter (CGS-20M)	<19.5%	Can continue investigation if wearing self-contained breathing apparatus. NOTE: Combustible gas readings are not valid in atmospheres with oxygen <19.5%.
		19.5%-25%	Continue investigation with caution.
		>25%	Fire hazard potential. Discontinue investigation. Consult a fire safety specialist.
Organic gases and vapors	Photoionization Detector (Tip II)	Background	Continue investigation
		5ppm total organics	Can continue investigation if wearing Level C[2] protection
		5-500 ppm	Can continue investigation if wearing Level B[3] protection

Note: 1. LEL = lower explosive limit
2. Level C Protection outlined in Table 2.
3. Level B protection outlined in Table 3.

Personnel Protection

Conditions at the site are not expected to warrant either Level B or Level C protection. Regardless, all workers present on-site will be familiar with proper protection procedures and this Health and Safety Plan.

If conditions warrant it, Level B or C protection will be worn. General descriptions of Level C & B protection are presented in Tables 2 and 3, respectively. If it is necessary to wear Level B or C protection the work area shall be separated into three Zones: Exclusion Zone, Contamination Reduction Zone and Support Zone. No one but protected personnel shall be in the Exclusion and Contamination Reduction Zone. An entrance/exit point shall be designated and monitored to ensure that no unauthorized personnel enter the area. Everyone that enters the area shall be logged in the field note book with the length of time spent in the area and the task performed noted.

All workers shall wear gloves when handling soil/sludge samples and apparatus. Gloves shall also be worn while cleaning the sampling equipment.

If any personnel must be lowered into a leaching pool, they shall be outfitted with Level B protection. Personnel at grade will be constantly monitoring the worker in the pool for signs of fatigue, heat stress or any other possible hazard. A heat stress casualty prevention plan is presented.

Table 2

Level C Protection

1. Full-face or half-mask, air purifying, canister equipped respirators (NIOSH approved) for those contaminants present.
2. Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls).
3. Coveralls*.
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots (outer), chemical-resistant steel toe and shank*.
7. Boot-covers, outer, chemical-resistant (disposable)*.
8. Hard Hat.
9. Escape mask*.
10. Two-way radios (worn under outside protective clothing).
11. Face shield*.

*Optional, as applicable

Table 3

Level B Protection

1. Pressure-demand, full-facepiece self-contained breathing apparatus (SCBA), or pressure-demand supplied air respirator with escape SCBA (NIOSH approved).
2. Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).
3. Coveralls*.
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots, outer, chemical-resistant steel toe and shank.
7. Boot-covers, outer, chemical-resistant (disposable).
8. Hard hat.
9. Two-way radios (worn inside encapsulating suit).
10. Face shield*.

*Optional, as applicable

Personnel Safety/Hygiene

The safety practices to be followed by all on-site personnel include:

1. If Level B or C protection must be worn: eating, drinking, chewing gum or tabacco, smoking or any practice that increase the probability of hand-to mouth transfer and ingestion of material is prohibited in the Exclusion or Contamination Reduction Zone.

2. Hands and face must be thoroughly washed before eating, drinking or any other activities.

3. No excessive facial hair, which interferes with a satisfactory fit of the mask to face seal, is allowed for personnel to wear respiratory protective equipment.

Personnel Training

At the start of the job, before engaging in any work, all personnel will be briefed on the following:

1. The person in charge as safety officer.

2. Boundaries and entry and exit point locations of the work zones, if established.

3. Use of personnel protection equipment.

4. Principles of personnel hygiene.

5. Location of first-aid equipment.

6. Evacuation procedures to be followed in case of emergencies.

7. Heat stress symptoms. All personnel will be advised to watch for signs of heat stress.

New personnel will be briefed on the same points prior to starting work at the site.

Decontamination Procedures

If Level B or C protection is worn, decontamination procedures shall be performed in the Contamination Reduction Zone. All disposable garments and spent cartridges/canisters from respiratory equipment will be removed and disposed of in drums.

Potentially contaminated equipment will be cleaned before leaving the site.

Emergency Contingency Plan

In the event of physical injury, the safety officer or any other qualified person will initiate first aid and, if necessary, call the ambulance. If a chemical exposure is encountered, a physician will be informed, as specifically as possible, of the chemical(s) to which the person has been exposed and the toxicological properties of the chemical(s).

In case of any emergency, the following resources might need to be contacted:

A. Local Resources

B. Hazardous Waste Spilled

New York State Department of Environmental Conservation	1-800-457-7362
Suffolk County Department of Health	(516) 451-4627
Night and Weekend Emergencies	(516) 360-5555

Heat Stress Casualty Prevention Plan

A. Identification and Treatment

1) Heat Exhaustion

Symptoms: Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim is very pale, his skin is clammy, and he may perspire profusely. The pulse is weak and fast, his breathing is shallow. He may faint unless he lies down. This may pass, but sometimes it remains and death could occur.

First-Aid: Immediately remove the victim to a shady or cool area with good air circulation. Remove all protective outer wear. Call a physician. Treat the victim for shock. (Make him lie down, raise his feet 6-12 inches, and keep him warm but loosen all clothing.) If the victim is conscious, it may be helpful to give him sips of a salt water solution (1 teaspoon of salt to 1 glass of water). Transport victim to a medical facility.

2) Heat Stroke

Symptoms: This is the most serious of heat casualties due to the fact that the body excessively overheats. Body temperatures often are between 107 -110 F. First there is often pain in the head, dizziness, nausea, oppression, and a dryness of the skin and mouth. Unconsciousness follows quickly and death is imminent if exposure continues. The attack will usually occur suddenly.

First-Aid: Immediately evacuate the victim to a cool and shady area. Remove all protective outer wear and all personal clothing. Lay him on his back with the head and shoulders slightly elevated. It is imperative that the body temperature be lowered immediately. This can be accomplished by applying cold wet towels, ice bags, etc., to the head. Sponge off the bare skin with cool water or rubbing alcohol, if available, or even place him in a tub of cool water. The main objective is to

cool him without chilling him. Give no stimulants. Transport the victim to a medical facility as soon as possible.

B. Prevention of Heat Stress

1) One of the major causes of heat casualties is the depletion of body fluids. On the site there will be plenty of fluids available. Personnel should replace water and salts loss from sweating. Salts can be replaced by either a 0.1% salt solution, more heavily salted foods, or commercial mixes such as Gatorade. The commercial mixes are advised for personnel on low sodium diets.

2. A work schedule will be established so that the majority of the work day will be during the morning hours of the day before ambient air temperature levels reach their highs.

3. A work/rest guideline will be implemented for personnel required to wear Level B protection, if this situation arises. This guideline is as follows:

Ambient Temperatures	Maximum Wearing Time
Above 90 F	1/2 hour
80 - 90 F	1 hour
70 - 80 F	2 hours
60 - 70 F	3 hours
50 - 60 F	4 hours
40 - 50 F	5 hours
30 - 40 F	6 hours
Below 30 F	8 hours

A sufficient period will be allowed for personnel to "cool down". This may require shifts of workers during operations.

Statement of Qualifications

For Analytical Laboratory Services

1987

H2M GROUP

H2M LABS, INC.

Environmental Testing Laboratories

Melville, N.Y. Riverhead, N.Y. Fairfield, N.J.

H2M LABORATORY

TABLE OF CONTENTS

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

A chart of the project organization within H2M Laboratory is given in Table 3-1.

3.1 Project Director

The project director, John M. Molloy, P.E., has overall responsiblity for all operational activities.

3.2 Quality Assurance Manager

The Quality Assurance Manager, Joann M. Slavin, M.S., will review all data and be responsible for the laboratory reporting and quality control.

3.3 Senior Analyst

3.3.1 - Organics Department

Ursula Middel will directly supervise the organic laboratory analysts and technicians, as well as review all analytical and QC data.

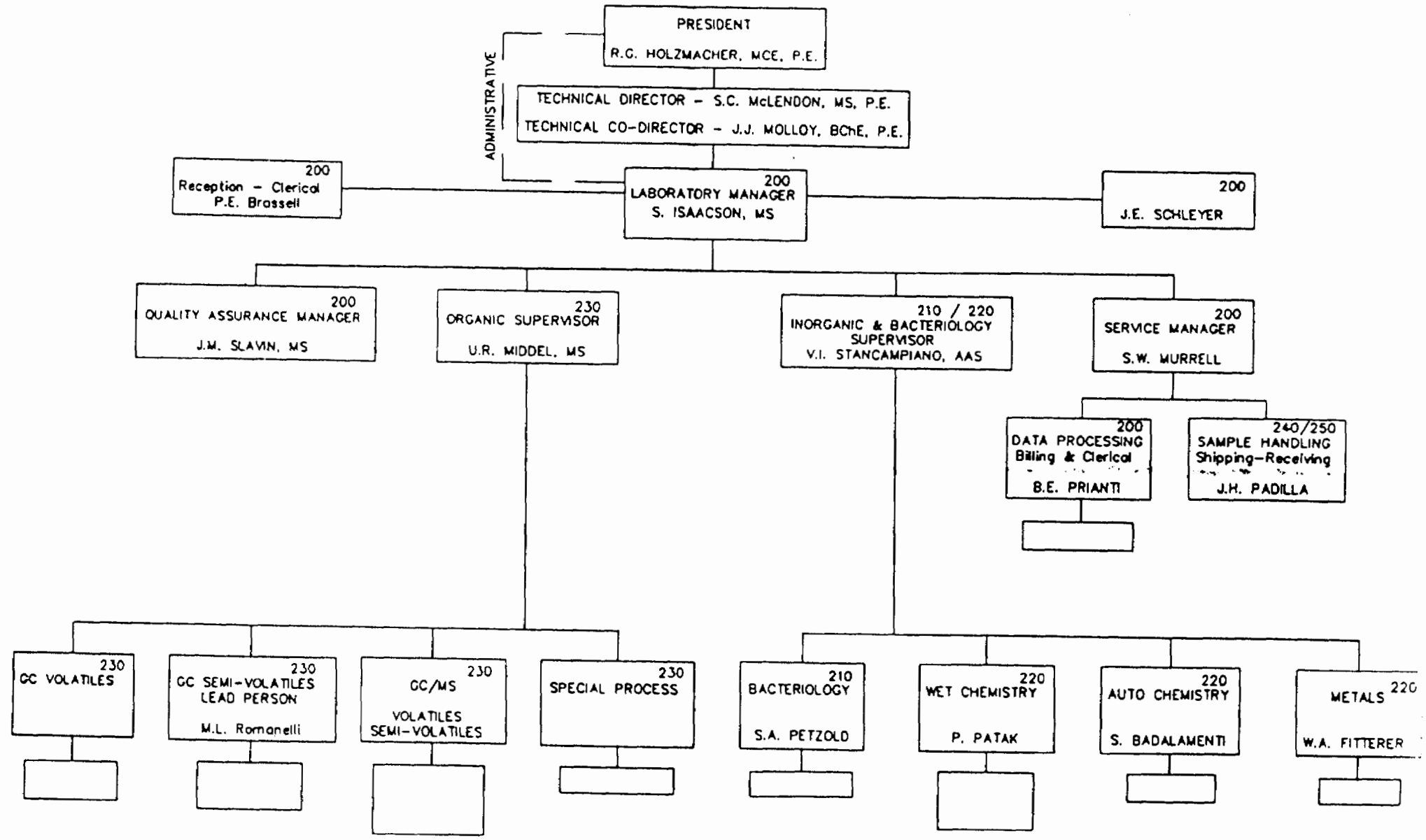
3.3.2 - Inorganics Department

Vincent Stancampiano will supervise the analyses of all inorganics, as well as TOC and TOX. He will review all raw data, calculations, and QC analyses. Sal Badalamenti will assist Mr. Stancampiano in review of raw data, in the inorganic section.

3.4 Technicians

In both organic and inorganic departments, several technicians will perform analyses under direct supervision of the Senior Analysts. The responsibilities of the technicians will be to perform analyses according to the established and documented procedure, calibrate and maintain equipment and analyze QC check samples. To keep our employees current on new techniques, they are encouraged to attend seminars and conferences on areas that are benefical to their job requirements. The employees on our more sophisticated equipment are formally trained in "hands-on" courses given by the instrument manufacturers.

TABLE OF ORGANIZATION – LABORATORY



4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA IN TERMS OF PRECISION, ACCURACY, COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

The validity of all data generated is assessed for precision, accuracy, completeness, representativeness and comparability. The evaluation procedures, as well as the equation for calculation of the parameters, are defined below.

4.1 Precision

Precision is assessed by collecting and analyzing replicate samples. The precision is calculated as the percent difference between the values obtained for duplicates. Ten percent of the samples are run in duplicate. The following formula is used:

$$\% D = \frac{V2-V1}{\frac{V1+V2}{2}} \times 100$$

For data from volatile organic analyses to be considered acceptable, the % D must be $\leq$ 20 percent when sample results are > 10 ug/l and $\leq$ 10 ug/l.

4.2 Accuracy

Accuracy is evaluated by comparing determined results to true or known values of quality control or check samples. Calibration of methods and instruments is referenced to traceable standards. Analysis of spiked samples are also used to evaluate data accuracy. At least once a month, EMSL quality control sample ("known") is analyzed. Section heads will also intersperse check samples with the routine work ("unknowns").

For calculations of accuracy, the following formula applies:

$$\% \text{ error} = \frac{\text{observed - known}}{\text{known}} \times 100$$

For data from volatile organic analyses to be considered acceptable, the value of the % error must be $\leq$ 40 percent for "known" values of < 10 ug/l and $\leq$ 20 percent foe "known" values of > 10 ug/l.

4.3 Comparability and Completeness

Data comparability is assured by the use of standard methodology. Data completeness is defined as having all the support and audit data to document the reported results. Completeness is accomplished by comparison of the project objectives and require outputs to the monthly reports.

4.4 Representativeness

Representativeness is assured by collecting samples that are indicative of actual conditions.

5.0 SAMPLING, SHIPPING, STORAGE, AND LOG-IN

5.1 Sample Containers

Sample containers will be provided by H2M. Materials must be selected that would not result in interference with the analysis. Each sample container must have a label containing all the information necessary to identify the sample. The amount of information on the label may vary depending on the source and other factors, but in general, should include at least a sample identification number, time, date, and sample collector.

5.2 Sample Collection Procedures

The procedures used in sample collection depend upon the type of samples to be analyzed. Depending upon the type of compound analyzed and the sample matrix various procedures for sample collection are utilized.

5.3 Sample Preservation and Shipment

Sample preservation is dependent on which analysis are to be performed. A summary of sample container types and preservation methods is presented in Table 6-1. The samples will need to be shipped, packed in ice, via an overnight deliverer or hand delivered to the laboratory as soon as collected.

Volatile halogenated samples, including trihalomethanes, are preserved with sodium sulfate. 1:1 hydrochloric acid is added to vials for aromatic analysis to bring the pH to < 2. If a "double scan" by GC is required, both preservatives are added. Sodium sulfate is compatible with HCL and is preferred over the sodium thiosulfate which causes interference for the double scans. The vials for EPA method 524 must only be spiked with one preservative. If both are added, sulfur dioxide will be released and interfer with the early eluters. Unless the presence of CL2 is suspected, only 1:1 HCL is used for GC/MS samples. If the presence of CL2 is a problem, an extra vial of sodium sulfate must be collected for separate analysis of trihalomethanes.

5.4 Sample Log-ins

Upon arrival at H2M, samples are to inspected for integrity. That is, they are examined for breakage, leakage, air bubbles (for purgeables), and proper labeling.

Personnel are in the laboratory during the hours of 7:00 am to 9:00 pm, Mondays through Thursday; 7:00 am to 7:00 pm on Fridays, and approximately two hours on Saturday and Sunday. Samples received after 3:00 pm are logged in the following work day.

We would request, however, if deliveries must be made later than 5:00 pm on weekdays or anytime on weekends, that we be contacted in advance so that arrangements can be made with our personnel to assure proper receipt of samples.

5.5 Tracking of Samples

H2M has estalished and has in place, a routine procedure to record, track

and complete laboratory analysis on individual samples. The procedure is as follows:

1. Sample Numbers

Upon receipt of the sample, it is labeled by the Laboratory Coordinator with a 6 digit lab number.

2. Completion of H2M Control Cards

The Laboratory Coordinator logs the sample in by completing a control card. The control card lists the client, sample location, sample data, sample number, collector, analyses to be performed, where the reports are to be sent, price and special remarks.

3. Entry Into Computer System

The control card is submitted to the data processing group. Information on the card is key punched into the main computer.

4. Storage of Samples

The samples are stored in certain areas of the laboratory. The sample custodian will secure the area. Work sheets are printed daily by the computer to inform the chemists and technicians of the type of analytes to be performed on the samples.

5.6 High Priority Samples

Every effort will be made to provide fast turnaround times on a limited number of samples. This assumes that the necessary instrumentation is available, e.g., not down for maintenance or repairs.

We would also request that we be notified prior to shipment of high priority samples so that efforts can be made to expedite these samples.

H2M LABORATORY

6.0 SAMPLE CUSTODY

H2M Laboratory has a Standard Operation Procedure for documanting the receipt, tracking, and compilation of sampled data. Sample custody related to sampling procedures and sample transfer are described below. A flow diagram summarizing all steps involved with sample cusatody is presented in Fig. 6-1. It includes the sequence of sample progress through analytes and reporting.

STANDARD OPERATING PROCEDURES FOR SAMPLE CUSTODY

I. Delivery of Cooler to H2M

a. Samplers check for external damage (such as leaking).

b. Samplers sign for cooler from shipper.

II. Cooler Delivery to Custodian and Opening of Cooler

a. Samplers place coolers in receiving area.

b. Check condition of external seal.

c. Open cooler.

d. Remove client chain-of-custody forms, fill out and sign.

e. Check to see if any samples are broken or damaged.

1. Is vermiculite wet?

2. If samples are broken, note manner of disposal and notify client.

III. Continuing Chain of Custody

a. Samples are given H2M Laboratory numbers.

b. Chain of custody forms, attached to laboratory cards for:
1. sample receipt
2. sample preparation
3. analysis
4. data reduction
5. reporting
6. Q.C. Managers Review

c. All chain of custody forms for a group filed together as a case load.

IV. Report Sent to Client

Final Steps

V. a. Invoice to Accounting
b. Raw data stored on file
c. GC/MS data stored on 9 track tape as well as hard copied.

TABLE 6-1

SAMPLE CONTAINERS AND PRESERVATION

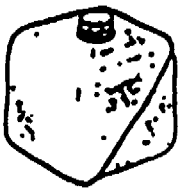
PARAMETER	CONTAINER	PRESERVATIVE
1. Purgeable halocarbons	(2) 28-60 ml glass vials with teflon-lined septa	sodium thiosulfate sol., cool to 4°C
2. Trihalomethanes	(2) 28-60 ml glass vials with teflon-lined septa	sodium thiosulfate sol., cool to 4°C
3. Purgeable aromatics	(2) 28-60 ml glass vials with teflon-lined septa	adjust pH to 2 or add HCl cool to 4°C
4. PCB's	(2) 1 to 2 L glass bottles with teflon-lined caps	Cool to 4°C
5. Chlorinated	(2) 1 to 2 l. glass bottles with teflon-lined caps	Cool to 4°C
6. Haloethers	(2) 1 to 2 L glass with teflon-lined caps	Cool to 4°C
7. Phenols	(2) 1 to 2 L glass with teflon-lined caps	Cool to 4°C
8. Organo Chlorine Pesticides	(2) 1 to 2 L glass with teflon-lined caps	Cool to 4°C
9. Priority Pollutants: a. Volatiles	(2) 28-60 ml glass vials with teflon-lined caps	Sodium sulfite plus adjust pH to 2, cool to 4°C
b. Acid Extractables) c. Base Neutrals)	(2) 1 to 2 l. glass with teflon-lined caps	Cool to 4°C
10. Aldicarb	1 liter plastic	Freeze
11. Triazines	(2) 1 l. glass with teflon-lined caps	Cool to 4°C
12. Herbicides	(2) 1 l. glass with teflon-lined caps	Cool to 4°C
13. Acrolein, Acrylonitrile	(2) 28-60 ml glass vials with teflon-lined caps	Adjust pH, cool to 4°C
14. TOC	150 ml glass with teflon-lined cap	Add HCL to pH 2, cool to 4°C
15. POX/TOX	160 ml glass with teflon-lined cap	Add HCL to pH 2, cool to 4°C
16. Maximum THM Potential	(2) 28-60 ml glass with teflon-lined caps	Cool to 4°C

TABLE 6-1

SAMPLE CONTAINERS AND PRESERVATION

PARAMETER	CONTAINER	PRESERVATIVE
17. Extractable Organics by GC/MS	(2) 1 to 4 l. glass with teflon-lined caps	Adjust pH to 2 or add $HgCl_2$ sol. Cool to 4°C
18. 1,2-Dibromoethane	(2) 40-60 ml glass with teflon-lined caps	Cool to 4°C
19. Metals	250 ml plastic	HNO_3 to pH 2
20. Microbiological	125 ml plastic	Add sodium thiosulfate Cool to 4°C
21. Chlorine Residual	1 liter plastic	Cool to 4°C
22. Nitrates	1 liter plastic	Cool to 4°C
23. Fluorides	1 liter plastic	Cool to 4°C
24. Turbidity	1 liter plastic	Cool to 4°C
25. Chlorides	1 liter plastic	Cool to 4°C
26. Color	1 liter plastic	Cool to 4°C
27. Cyanide	1 liter plastic	Adjust pH to >12 with NaOH, cool to 4°C
28. Sulfide	1 liter plastic	Zinc acetate
29. Foaming Agents	1 liter plastic	Cool to 4°C
30. Odor	500 ml glass	Cool to 4°C
31. pH	1 liter plastic	Cool to 4°C
32. Sulfates	1 liter plastic	Cool to 4°C
33. Total Dissolved Solids	1 liter plastic	Cool to 4°C
34. Corrosivity	1 liter plastic	Cool to 4°C
35. Phenols	1 liter glass with teflon-lined cap	Adjust pH to <2 with H_2SO_4

Bottle A - Unpreserved Plastic Cubietainer (1 qt. or 5 qt.)



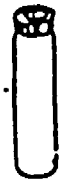
Bottle B - Plastic HNO3 Acid Preserved

Bottle C - Glass 1 qt. H2SO4 Acid Preserved

Bottle D - Glass H2SO4 Acid Preserved

Bottle E - Glass NaSO2 Preserved

Bottle F - 40 ml. glas vial Unpreserved



Bottle G - Glass 125 ml. Sterilized w/Sodium Thio-sulfate

Bottle H - 1 qt. plastic Cubietainer NaOH preserved

Bottle I - 1 liter gla w/teflon li cap Unpreserved

Bottle I O - 1 liter gl w/teflon l cap H_2SO_4 Acid Prese

Bottle J - 40 ml. glass vial w/teflon lined septa NaSO2 and HCL acid Preserved

Bottle K - Glass 1 qt. Unpreserved

7.0 INSTRUMENT CALIBRATION PROCEDURES

7.1 Inorganics

The calibration procedures are dependent upon the type of analysis. All metal analyses as well as nitrates, fluorides, chlorides, foaming agents and sulfates are calibrated using five standards between the detection limit and the upper end of the linear range.

The nephelmeter is calibrated with a 4.0 NTU standard. The pH meter is calibrated with 4.0, 7.0 and 10.0 buffers. Color analyses are calibrated with chloroplatinate standards ranging from three to fifty color units. Odor is a subjective analysis and does not have a specified "calibration procedure". The analytical balances are calibrated daily using class S weights.

7.2 Organics

Linearity checks are performed at method validation to determine the linear ange of the calibration. A linear range over five decimals has been determined for all volatile scans. A five point "initial calibration" braceting the expected concentration rabge is executed after any major instrument service or modification.

Continuous Calibration:

The response factors are updated daily and compared to the initial calibration. After any modifications, the system performance is monitored at the low end of the concentration range. For this performance check, a standard between detection and quantification level at 0.4 ug/l is introduced and evaluated before routine analysis can begin.

For verification of the response factor, each working day one working standard solution is measured per shift of a concentration of 20 ug/l. The response factors are averaged over the day and recorded in the QC log.

A. Calibration of Gas Chromatographs

All our gas chromatographs are linked to computing integrators: the multi-channel IBM System 9000, Spectraphysics SP4290 or Perkin-Elmer Sigma 15. For all scans covered by this contract, the "external method" calibration is applicable, that is, calibration with the response factors from separate runs of standard mixes containing all the components for which the sample will be analyzed.

B. Calibration of GC-MS

1. Calibration forIdentification

Mass ratios for test substances BFB bromofluorobenzene or DFTPP decafluorotriphenylphosphine are checked each 12 hour shift for compliance with EPA criteria for base-neutral acid extractables. For the Finnigan, OWA-30 GC/MS, adjustments of source voltages are made while observing peak ratios and shapes for FC43, for the HP 5996 GC/MS, PFTBA is used. After each new tuning, the software then calibrates time/intensity data against time/mass

12.0 SPECIFIC PROCEDURES TO BE USED TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

12.1 Quality Assurance Protocol for Organic Analysis of Volatile Organics by GC

12.1.1. - Method Validation

A. Accuracy of Calibration of Detector Response

Response cures are developed with solutions of different concentrations and the range of linear response is determined. The accuracy of the calibration is validated by analysis of "known" solutions from the EMSL Division of EPA, and comparing the results with the known values. The calibration is acceptable if the deviation of the calculated and known value is less than 20% of the known concentration.

B. Evaluation of Sample Preparation Technique for Recovery and Precision

For the scans of purgeable organics, the parameters for sample preparation by the purge and trap method are initially optimized when the method is developed by comparing responses of direct injections of standards and purging standards at various conditions.

For evaluation of efficiency of the sample preparation technique for semi-volatile compounds, clean water or other matrices are spiked with standard solutions and subjected to the sample preparation and analytical procedure. The results are evaluated for the recovery of the individual components.

The recovery data for each component from these spiked matrix analyses are compiled and evaluated for precision. The standard deviations are then used as guidelines for acceptability of routinely run spiked matrix analysis.

12.1.2 - Routine Monitoring of Method Performance

A. Stability and Accuracy in Calibration of Gas Chromatograph

Standard mixes containing all components to be analyzed are run each time the analysis is performed. The response factors from these "in-batch" standards are recorded. Factors are considered acceptable if they remain within 2x standard deviation of the average of the previous factors. Changes above the normal deviation have to be confirmed and the cause investigated and corrected.

Confirmation of the accuracy of the calibration is performed with analyses of solutions of known concentrations from EMSL, EPA. The deviations of the results, compared to the real value, have to be less than 20%. For calculation of the accuracy, the following formula applies:

$$\% \text{ error} = \frac{\text{observed-known}}{\text{known}} \times 100$$

B. Column Performance

New columns have to be tested for resolution with test substances. The computed efficiency has to reach a minimum of theoretical plates to be considered adequate.

Monitoring of decomposition or component absorption, due to column contamination, is accomplished by monitoring the response factors of polar substances.

C. Matrix Spike Analysis

For volatile purgeable organics, recoveries of sample preperation are not routinely monitored because monitoring of the calibration comprises recovery data. This is due to the fact that the calibration is not performed by direct injections of standards, but is done on purged standards to include recovery from purging, trapping, and desorbing.

To monitor the efficiency of sample preparation technique for semi-volatile scans, in every batch of 10 samples, one standard spiked clean water sample is analyzed or for every 20 samples a matrix spike and matrix spike sample in duplicate is analyzed and the recoveries recorded. Problems related to the preparation technique are detected by comparing recoveries to the standard deviation of the long term compiled data.

D. Detection Limits

Concentrations of a standard mix representing the reportable detection limits are injcted routinely for verification of detectability.

E. Monitoring of Retention Times

Retention times for all components are established by "in-batch" standard runs. The times are entered into a computing integrator which matches the sample retention times (relative to the surrogate standard) with the windows of the relative retention times from the standard run for component identification.

F. Surrogate Standard Monitoring

To monitor method performance for each individual extract, all our samples and quality control runs are spiked with a surrogate standard. If the recovery of the surrogate standard in an individual sample falls outside the established quality control limits, either the data are recalculated if an error can be established, or measures are taken for correction of the problem before the sample is reanalyzed.

G. Reproducibility of Duplicates

If positive samples, (or organic free water, spiked with known amounts of standards) are run in duplicate, the results R1 and R2 are assessed for reproducibility. The following formula is used for calculation of the deviation D:

Equipment and Facilities

H2M LABORATORY

FACILITIES DESCRIPTION

H2M's Laboratory is located at 575 Broad Hollow Road, Melville, Long Island, New York 11747. Broad Hollow Road is also identified as Route 110. It is conveniently located at Exit 49 of the Long Island Expressway (Route 495).

H2M Labs Inc. occupies approximately 5600 square feet. It is staffed with thirty nine technically qualified people whose educational backgrounds vary, depending on specific job functions.

The laboratory is subdivided into 5 sections; Shipping/Receiving, Inorganic Chemistry, Organic Chemisty (GC), Organic Chemistry (GC/MS) and Special Process Lab.

In a continuing effort to extend our capabilities and timeleness, H2M is expanding the laboratory 2,000 square feet in 1987, as well as remodeling the existing facility. Substantial increase in space of our GC/MS section is planned to incorporate our two additional GC/MSD's, purchased in 1986.

In addition, our Finnigan OWA has been upgraded by adding a new 72 Megabyte Winchester Disk Drive and Super Incos Software.

The laboratory currently operates on a staggered shift five days per week and 9 A.M. to 4 P.M. on Saturday (except for bacteriology which is a seven day operation).

The sample receiving section is open 8 A.M. to 6 P.M. Monday through Friday. Arrangements for receipt of samples on weekends or after normal hours can be made upon request.

SPECIAL PROCESS LABORATORY

Our laboratory is aware of the potential hazards associated with handling highly toxic materials. Therefore, a special process laboratory was designed and built to accommodate this type of sample. This area of the laboratory was designed so as to handle these samples with no significant threat to the safety and health of our staff.

All employees working in this laboratory will receive sufficient instruction to allow them to work safely. There will always be at least two employees working in this area at the same time.

This facility is equipped with double sets of doors between this section and the rest of the facility. Access is limited to authorized personnel only. Separate areas are provided within the special process laboratory for changing street clothing to special disposable protective clothing. A washer/dryer is available for work clothes to prevent transfer of any contamination. A shower area is supplied for personnel to be utilized at the end of the work day.

The laboratory area was designed to be a "self-contained" laboratory to minimize the possibility of contamination.

The laboratory is supplied with a continuous fresh air supply. Four (4) hoods are avialable for use and each is designed for specific functions, such as:

- opening of coolers with sample containers
- prescreening of samples and aliquots taken
- extraction of sample aliquots
- evaporation and concentration

The performance of the hoods is monitored on a routine basis. The hoods are manufactured by Kewaune and are stainless steel, coved corner hoods, to minimize any absorption of hazardous materials on the work surface. The exhaust of the hoods is filtered through activated carbon filters to prevent contamination of the environment. The water supply of certain hoods is collected and analyzed to assure proper disposal in accordance with government regulations.

data in the memory.

2. Calibration for Quantification

The automatic quantification of the software employs the "internal standard" method, computing concentrations with response factors relative to an internal standard. These factors are entered into a user library from standard files. Resposnse curves are first developed for various concentrations to establish ranges of linear response. The software permits application of selected RFs, averages or quadratic curve. Intiial calibration of the system is performed using a 5-point calibration.

Using the response factors from the initial calibration with the average response of a selected group of compounds, the percent relative standard deviation must be less than 30%. For the initial calibration to be valid, both the SPCC and the CCC must be met.

Calibration standards containing all compounds must be performed each twelve hours. The RFS of this continuing calibration are then compared to the average of the initisl calibration. Then the SPCC and CCC must be met for the continuing calibration to be valid. Once the validity is established, all quantification for this period is based on the single point calibration.

Standard Solutions

Traceable calibration standard solutions are purchased and other stock standards are prepared from the neat material by the weighing method. Working standard mixes are prepared by a two-step dilution. The exact concentration for the standards is calculated and recorded. The solutions are stored at 4 C.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

Data processing encompasses all manipulations performed on raw information. This includes data collection, validation, storage, transfer, reduction, and analysis.

8.1 Collection

Prior sections of this Quality Assurance Project Plan address the standard operating procedures that are utilized for the data aquisition system. The internal checks used to ensure suitable quality in the data collection process are also identified.

8.2 Validation

Data validation is defined as the process whereby data are analyzed and accepted or rejected based on a set of scientifically acceptable criteria. The standard operating procedure and analytical method describes how a reduced data set is generated, including a defined audit trail that can be retraced datum by datum. The validation process include several forms of checks using specified criteria.

8.3 Reporting

The results of analyses are transmitted by H2M on laboratory report sheets. Sample copies of the Laboratory Report Forms are shown in Tables 8-1 and 8-2.

8.4 Data Reduction and Analysis

Data reduction and analysis for organic analyses involves relating a "peak area" to the mass of a constituent. This is accomplished by digital computers. The computer hardware and software is designed to allow the analyst to create libraries or files of calibration standards, and then compare raw sample data against these libraries to produce a report which contains the identification and quantifications of constituents present in the sample. The computer-reduced data is manually checked by the analysts.

Inorganic analyses are performed with instruments of varying electronic sophistication, but in all instances data reduction and analysis involves essentially the generation of a standard calibration curve, and then comparing the instrument readout against the calibration curve to obtain a "Quantity" of constituent. The concentration is then manually calculated. The calculated results are manually enetered into the computer system.

TABLE 8 - 1

H2M LABS, INC. 575 BROAD HOLLOW ROAD, MELVILLE, N.Y. 11747 • 516-694-3040

HOLZMACHER, McLENDON and MURRELL, P.C. • ENVIRONMENTAL and INDUSTRIAL ANALYTICAL SERVICES

Sample Lab No.
Date Collected:
Date Received:
Type:
Point:
Collected By:

PRIORITY POLLUTANTS ANALYSIS - BASE NEUTRAL EXTRACTABLES

	ug/l		ug/l
1,3-Dichlorobenzene	ND	N-Nitrosodiphenylamine	ND
1,4-Dichlorobenzene	ND	Hexachlorobenzene	ND
Hexachloroethane	ND	4-Bromophenylphenylether	ND
Bis(2-chloroethyl)ether	ND	Phenanthrene	ND
1,2-Dichlorobenzene	ND	Anthracene	ND
Bis(2-chloroisopropyl)ether	ND	Di-n-butyl phthalate	ND
N-nitroso-di-n-propyl amine	ND	Fluoranthene	ND
Nitrobenzene	ND	Pyrene	ND
Hexachlorobutadiene	ND	Benzidine 1)	ND
1,2,4-Trichlorobenzene	ND	Butyl benzyl phthalate	ND
Isophorone	ND	Bis(2ethylhexyl)phthalate	ND
Naphthalene	ND	Chrysene	ND
Bis(2-chloroethoxy)methane	ND	Benzo(a)anthracene	ND
Hexachlorocyclopentadiene	ND	3,3'-Dichlorobenzidine 2)	ND
Chloronaphthalene	ND	Di-n-octyl phthalate	ND
Acenaphthylene	ND	Benzo(b)fluoranthene	ND
Acenaphthene	ND	Benzo(k)fluoranthene	ND
Dimethyl phthalate	ND	Benzo(a)pyrene	ND
2,6-Dinitrotoluene	ND	Indeno(1,2,3-c,d)pyrene	ND
Fluorene	ND	Dibenzo(a,h)anthracene	ND
4-Chlorophenyl phenyl ether	ND	Benzo(g,h,i)perylene	ND
2,4-Dinitrotoluene	ND	n-nitrosodimethylamine	ND
1,2-Diphenyl hydrazine	ND		
Diethyl phthalate	ND		

Method limit of detection: lower than 10 ug/l (unless otherwise indicated.)
Quantification Limit: 10 ug/l.
ND - Under quantification limit.
1) Method limit of detection: lower than 80 ug/l.
2) Method limit of detection: lower than 20 ug/l.
Date Reported: 1/29/87

****
* *
* *
****
S.C. McLendon, P.E.
Laboratory Director

H2M
Environmental Engineers & Scientists
HOLZMACHER, McLENDON and MURRELL, P.C.
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040

WATER RESOURCES • WATER SUPPLY & TREATMENT • SEWERAGE & TREATMENT • ECOLOGICAL & IMPACT STUDIES
MODEL STUDIES • PILOT PLANT STUDIES • WATER/WASTE WATER LABORATORY AND ANALYTICAL SERVICES

LABORATORY REPORT

LAB NO.

PROJECT NO. 2C

CLIENT'S NAME AND ADDRESS

TYPE OF SAMPLE - POTABLE WATER COLLECTED BY

DATE COLLECTED - DATE RECEIVED -

PARAMETER	RESULT	PARAMETER	RESULT	PARAMETER	RESULT	PARAMETER	RESULT
TURBIDITY	5.80	HARDNESS	226.	LEAD	<2.00#	DETERG. (MBAS)	<0.04
COLOR	5.00	SULFATE	100.	MERCURY	<0.50#	T. DISS SOLIDS	240.
ODOR (COLD)	0.00	CHLORIDE	41.0	SELENIUM	10.0 #	FLUORIDE	<0.10
PH	6.70	NITRATE (NO3-N)	6.10	ZINC	<0.02		141.
TOTAL ALK.	105.	ARSENIC	<2.00#	IRON	5.88		
CARBON DIOXIDE	102.	BARIUM	<0.20	MANGANESE	1.07		
SPEC. COND.	584.	CADMIUM	<5.00#	COPPER	0.05		
CALCIUM	56.4	CHROMIUM	<0.01	SODIUM	27.2		
MAGNESIUM	20.8	SILVER	<0.01	AMMONIA (NH3-N)	0.05		

ALL RESULTS IN (MG/L) EXCEPT AS NOTED BY # (UG/L) OR % (PERCENT) AND
T.COLI BACT. & FECAL COLI (MPN/100ML)
COLOR, ODOR, TURBIDITY & PH (UNITS)
APC & FECAL STREP (COUNTS/ML)
SPEC.COND. (UMHOS) SETT.SOLIDS(ML/L)

DATE REPORTED

S. C. McLENDON, P.E., LABORATORY DIRECTOR

9.0 INTERNAL QUALITY CONTROL CHECKS

Internal quality control checks are designed to ensure that the test operations are functioning within the expected limits. "Blind Samples" are analyzed in the laboratory and results discussed with the analysts. At least once a month, an EPA EMSL sample is analyzed for the parameter under current investigation. The samples are introduced into the sample analysis stream by the Senior Analysts. Replicate samples are sometimes analyzed on different instruments by different analysts using the same methodology as a check on precision.

The quality control criteria that are documented in each method are followed in the laboratory.

All of the above are documented in the appropriate log books maintained by the analysts. These logs are checked on a routine basis by the Senior Analyst and on a periodic basis by the Quality Assurance Manager.

10.0 PERFORMANCE AND SYSTEM AUDITS

It is anticipated that on-site system audits may be conducted prior to the beginning of and during a project. This could include a review of the facilities, training, record keeping, and overall QA system. It is also expected that performance audits may be conducted. This could entail a quantitative analysis or check against a "known" value.

11.0 PREVENTIVE MAINTENANCE

The requirements of instrumentation, consumables, and services are determined by the type of analyses made and the objectives of the project. The Quality Assurance Manager and the Senior Analysts are responsible for assuring that the instrumentation, supplies and service are adequate to produce data of the desired quality.

Trained analysts are responsible for the day-to-day routine maintenance of the instruments. Instrument log books are maintained for referral to special trouble-shooting techniques. A supply of spare parts is kept on hand and replaced as they are used to avoid any unnecessary instrument downtime.

This preventive maintenance program also includes service contracts for our more sophisticated instrumentation, thus minimizing downtime and assuring data of the desired quality.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Certifies That

H2M CORPORATION
575 Broad Hollow Road
Melville, NY 11747

having duly met the requirements of the

Regulations Governing Laboratory Certification
And Standards Of Performance N.J.A.C. 7:18 et. seq.

is hereby approved as a

State Certified Water Laboratory

To perform the analyses as indicated on the Annual Certified Parameter List which must accompany this certificate to be valid

73158
PERMANENT CERTIFICATION NUMBER

July 8, 1982
DATE

COMMISSIONER
DEPARTMENT OF ENVIRONMENTAL PROTECTION

This certification is subject to unannounced laboratory inspections as specified by N.J.A.C. 7:18-2.11(d) and agreed to by the Laboratory Manager on filing the application

TO BE CONSPICUOUSLY DISPLAYED AT THE LABORATORY WITH THE ANNUAL CERTIFIED PARAMETER LIST.

State of Connecticut, Department of Health Services

APPROVED PUBLIC HEALTH LABORATORY

This is to certify that the laboratory described below has been approved by the State Department of Health pursuant to applicable provisions of the Public Health Code and General Statutes of Connecticut, for making the examinations, determinations, or tests specified below which have been authorized in writing by that Department.

H2M LABS, INC.
Name of Laboratory

Located at 575 Broad Hollow Road *in* Melville, New York 11747 *and registered in the name of* Paul W. Grosser, Ph.D.

This certificate is issued in the name of Samuel C. McLendon *who has been designated by the registrant to be in charge of the laboratory work covered by this certificate of approval as follows:*

POTABLE WATER, SEWAGE AND/OR EFFLUENT, TRADE WASTE AND/OR EFFLUENT, SOIL

Examination for:

- Bacteria
- Plankton (Potable Water only)
- Inorganic Chemicals
- Organic Chemicals

AIR

Examination for:

- Atmospheric Contaminants

(See Computer Print-Out dated February 27, 1986 for Specific Tests)

CONNECTICUT RECIPROCAL APPROVAL BASED ON CONTINUED NEW YORK STATE APPROVAL.

This certificate expires June 30, *19* 87 *and is revocable for cause by the State Department of Health.*

Dated at Hartford, Connecticut, this 15th *day of* May, *19* 86

Jesse A. Tuthill, Ph.D
Director of Laboratory Division

Earl R. Thompson Jr. M.S.
Chief Laboratory Standards

No. PH-0435

AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, INC.

CERTIFICATE OF MEMBERSHIP.

this certifies that as of January, 1982

H2M Corporation

HAVING QUALIFIED BY MEETING THE REQUIREMENTS OF MEMBERSHIP AND HAVING SUBSCRIBED TO THE CODE OF ETHICS OF THIS COUNCIL HAS BEEN ELECTED A

M E M B E R

secretary *president*

Key Personnel

Mr. Molloy was Project Manager/Engineer for a major project to remove organics by air stripping for a large Long Island water supplier. This was one of the first such treatment systems in the region. Mr. Molloy applyed the same treatment expertise to additional air-stripping systems for treatment of contaminated public supply wells for other public water supply client experiencing organics contamination.

As District Engineer for the Plainview Water District, Mr. Molloy is involved in continuing monitoring, forecasting and long range planning for the management of a public supply well field near a major unlined landfill. His expertise in determining contamination and his experience with a variety of remedial alternatives will continue to be utilized in this district.

Mr. Molloy has assessed many sites for extent and severity of contamination problems for industrial clients. A recent example is the Accurate Forming Division of Tyco Laboratories in Hamburg, New Jersey, where Mr. Molloy directed a preliminary hydrogeologic assessment preceding the expected full investigation, design and installation of a monitoring system. In serving industrial clients, Mr. Molloy serves as liaison with regulatory agencies to achieve full and cost-effective compliance with federal, state and local requirements.

John J. Molloy, P.E.
Vice President

PRESENT POSITION	Director, Water Supply/Industrial Services Section Environmental/Industrial Laboratory Co-Director
EDUCATION	B.E., Chemical Engineering Manhattan College
PROFESSIONAL REGISTRATION	Licensed Professional Engineer in the State of New York
SOCIETY MEMBERSHIP	American Institute of Chemical Engineers American Water Works Association Long Island Water Conference National Society of Professional Engineers Water Pollution Control Federation
PROFESSIONAL EXPERIENCE	H2M/Holzmacher, McLendon & Murrell, P.C. (1974 - Present)

Mr. Molloy's broad range of responsibilities at H2M includes management of industrial and hazardous waste treatment projects, as well as mitigation of water quality problems for a mix of private, industrial and government clients. He is a chemical engineer and, as Co-Director of H2M Laboratory, is responsible for managing diverse sampling and pilot programs involving hazardous waste, industrial waste and public water supply contamination problems. He coordinates laboratory and environmental projects utilizing laboratory testing. He was instrumental in expanding the capabilities of the laboratory for detailed organic and priority pollutant analyses.

Mr. Molloy began his professional career as a process engineer in private industry, and subsequently served as an air pollution control engineer for the City of New York, Department of Air Resources, where he was involved in the review and evaluation of plans and environmental rating reports for industrial processes.

Since joining H2M in 1974, Mr. Molloy has participated in and managed more than fifty projects related to water quality protection, water system development, industrial wastewater treatment and disposal, and hazardous waste management. Notable assignments have included:

> For the Town of Southampton, New York, Mr. Molloy evaluated the extent of contamination and possible remedial alternatives for private wells in the vicinity of the North Sea Landfill. After establishing the existing site conditions, Mr. Molloy assessed feasible remedial actions including well deepening, establishment of a new private supply system, or extension of service from a nearby public water supplier. Mr. Molloy was instrumental in resolving administrative problems and negotiating with the public water supplier to effect the latter alternative.

H2M

Stanley Isaacson

PRESENT POSITION:	Manager, Analytical Laboratory
EDUCATION:	M.A., Health Care Administration C.W. Post M.A., Biology Hunter College B.A., Biology Hunter College
PROFESSIONAL REGISTRATION:	NYC Department of Health Supervisors License in General and Special Chemistry
PROFESSIONAL SOCIETIES:	Clinical Laboratory Management Association American Chemical Society
PROFESSIONAL EXPERIENCE:	H2M/Holzmacher, McLendon & Murrell, P.C. (1985 - Present)

As H2M's Laboratory Manager, Mr. Isaacson directs thirty-five scientists and technicians, and manages the programs necessary to conduct the organic, inorganic and bacteriological services of the laboratory. He reviews and supervises the methods, protocols and quidelines for sample collection and analysis based upon USEPA and state contract requirements and chain-of-custody procedures. Mr. Isaacson is responsible for the analysis of 40,000 samples per year, many requiring up to 25 tests. He administers requirements set forth in multiple-year USEPA water quality and New York State Superfund Program contracts, and supervises subcontractor laboratory services for Federal Superfund projects.

Mr. Isaacson has had 13 years experience as Administrative Director of Laboratories. He has implemented laboratory computer systems, organized a centralized access department, directed major renovations of bacteriology and chemistry departments, reorganized a special chemistry department to provide faster and more economical assays, as well as expanded test menu and laboratory services.

Stuart W. Murrell

PRESENT POSITION:	Service Manager Environmental Laboratory
EDUCATION:	SUNY AT Farmingdale Business Management (1984 - Present)
PROFESSIONAL EXPERIENCE:	H2M/Holzmacher, McLendon & Murrell, P.C. 1977 - Present

Mr. Murrell is responsible for chain-of-custody procedures. He prioritizes testing; schedules pick-up and sampling crews; acts as liaison with county health departments regarding changes in monitoring requirements and reporting of results; acts as liaison with clients; and sets up sampling programs. Supervision of service departments and business office. Responsible for accounts receivable, computer activities and internal management reports.

H2M

Ursula R. Middel

PRESENT POSITION:	Organic Lab Supervisor Environmental Laboratory
EDUCATION:	Chemical Engineering Ohm - Polytechnikum, Germany
SOCIETY MEMBERSHIPS:	American Chemical Society, Environmental Section
PROFESSIONAL EXPERIENCE:	H2M/Holzmacher, McLendon & Murrell, P.C. 1977 - Present

Ms. Middel is the supervisor of the organic laboratory, including gas chromatograph and GC/MS sections. Her responsibilities include quality control, maintenance of GC instruments, calibration and programming of the computing integrator for processing results; development of testing protocols; interpretation of results and supervision of chemists and technicians.

Ms. Middel's extensive prior experience includes isotopic analysis of geological samples; uranium and thorium in core samples and cesium in sea water.

As a radiochemist, she performed chemical separation of uranium and thorium from natural carbonates for analysis. She was also responsible for quality control of materials and procedures in the construction of aircraft, was a sales representative of gas chromatographs, and was involved with their installation and repair, preparation of customized columns, and analysis of test substances.

Ms. Middel has successfully completed the three-day Finnigan Mat Institute "Superincos Quantitation Procedures" training program, and the two-day Finnigan Mat Institute "Target Compound Analysis: Autoquan" training course.

Joann M. Slavin

PRESENT POSITION:	Quality Assurance Manager Environmental Laboratory
EDUCATION:	MS, Toxicology St. John's University BS, Toxicology St. John's University
SOCIETY MEMBERSHIPS:	Society of Forensic Toxicologists New York Academy of Sciences American Chemical Society ACS Safety & Health Section American Academy for the Advancement of Science American Society of Mass Spectroscopy Rho Chi Pharmaceutical Honor Society International Association of Quality Circles Long Island Metro Chapter

PROFESSIONAL EXPERIENCE: H2M/Holzmacher, McLendon & Murrell, P.C.
1980 - Present

Ms. Slavin is responsible for implementing the quality assurance/quality control program of H2M's environmental laboratory. She manages and reviews all analytical reports and oversees chain-of-custody policies. Prior to her present position as Quality Assurance Manager, Ms. Slavin was GC/MS Supervisor.

As the Laboratory's Safety Officer, OSHA Representative and trained toxicologist, Ms. Slavin supervises all aspects of occupational safety and health programs. She has designed safety protocols for the safe handling and disposal of hazardous materials.

Ms. Slavin acts as liaison to all state and county certification departments which require reporting of results of proficiency sample analyses. She is also liaison and project manager of major government contracts and government agencies such as the USEPA and NYSDEC.

Ms. Slavin attended a course on the interpretation of mass spectra at the Finnigan Institute in Cincinnati, Ohio in 1982. She reviews the identifications of non-targeted components in the GC/MS Laboratory.

Prior experience includes analyses of pesticides, PCB's, herbicides, volatile and semi-volatile organics by GC and priority pollutants by GC/MS.

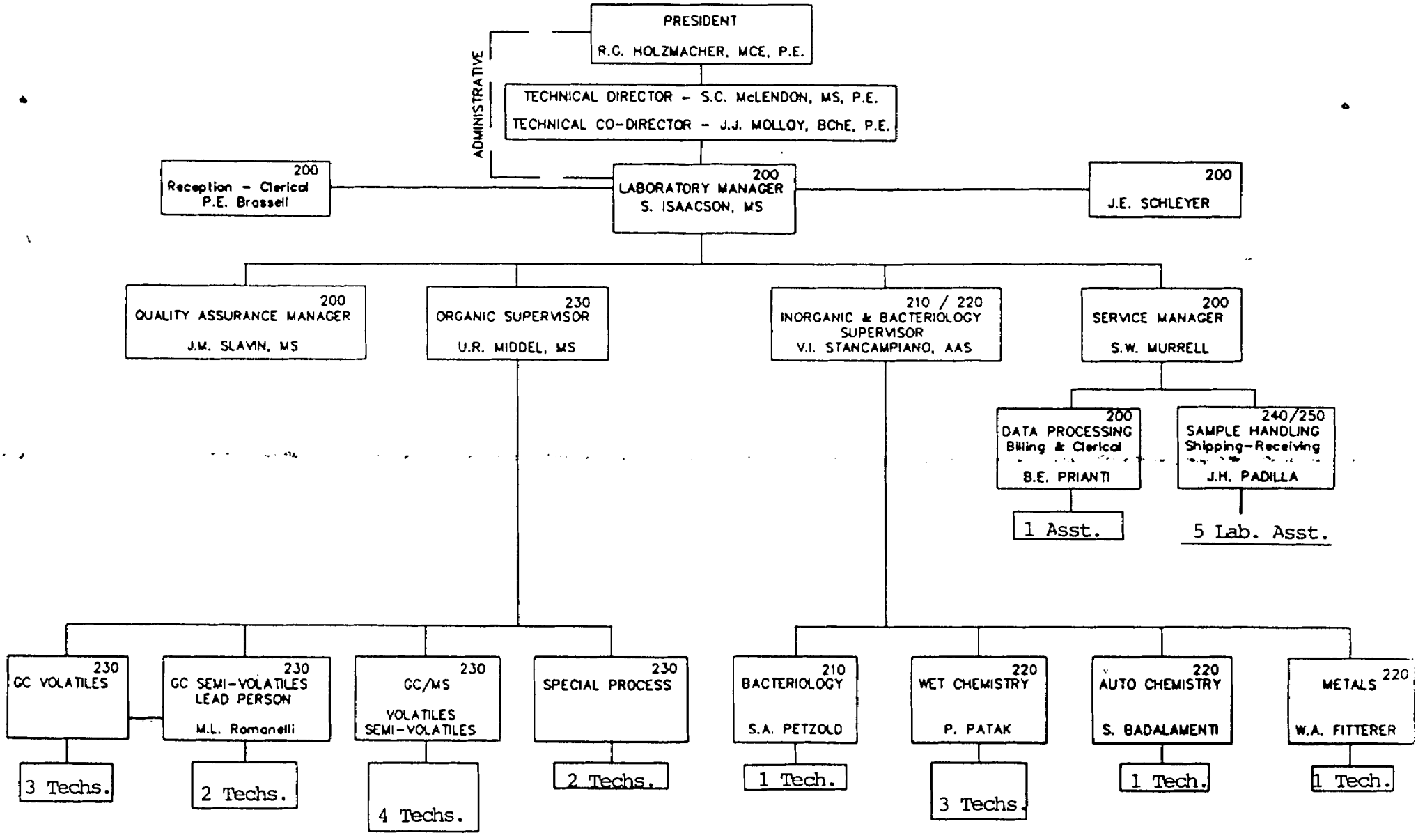
Vincent Stancampiano

PRESENT POSITION:	Inorganic & Bacteriology Laboratory Supervisor
EDUCATION:	A.A.S., Air and Water Pollution Control Sullivan County Community College Training in Sample Collection and Laboratory USEPA, Cincinnati, Ohio Training in Air and Water Sample Collection and Testing Procedures NYC Labs
PROFESSIONAL SOCIETIES:	American Association for the Advancement of Science (AAAS)
PROFESSIONAL EXPERIENCE:	H2M/Holzmacher, McLendon & Murrell, P.C. 1973 - Present

Mr. Stancampiano's responsibilities include supervising other technicians in chemistry analyses of water, sewage and industrial/hazardous wastes; flash point, ignitability, EP Tox (extraction procedure), corrosivity and toxicity tests; automated analyses for inorganic constituents via Technicon and total organic carbon analysis via Dohrmann Envirotech TOC. He troubleshoots, repairs and maintains all laboratory instruments including gas chromotograph, TOC and Technicon; is experienced with field sampling and analysis of landfill gases including vinyl chloride and methane, as well as with analyses under NYSDEC contract for hazardous waste testing of water and wastewater.

Prior to joining H2M, Mr. Stancampiano set up microbiology and chemistry laboratories, and conducted chemical analyses.

TABLE OF ORGANIZATION – LABORATORY



Certifications

CERTIFICATES OF APPROVAL

1. New York State Department of Health
   Certificate of Approval for Laboratory Service

2. State of New Jersey Department of Environmental Protection
   State Certified Water Laboratory

3. State of Connecticut, Department of Health Services
   Approved Public Health Laboratory

NEW YORK STATE DEPARTMENT OF HEALTH

DAVID AXELROD, M.D. *COMMISSIONER*

INTERIM **CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE**

(Issued in accordance with the Laws of New York State)

pursuant to Section 502 of the Public Health Law
Expires 12:01 AM April 1, 1986

Laboratory ID Number 10478

Laboratory Name: H2M Labs, Inc.
Number & Street: 575 Broad Hollow Road
City,State,Zip: Melville, NY 11747-5076

Laboratory Director: Mr. Samuel C. McLendon

is hereby APPROVED as an Environmental Laboratory for the category

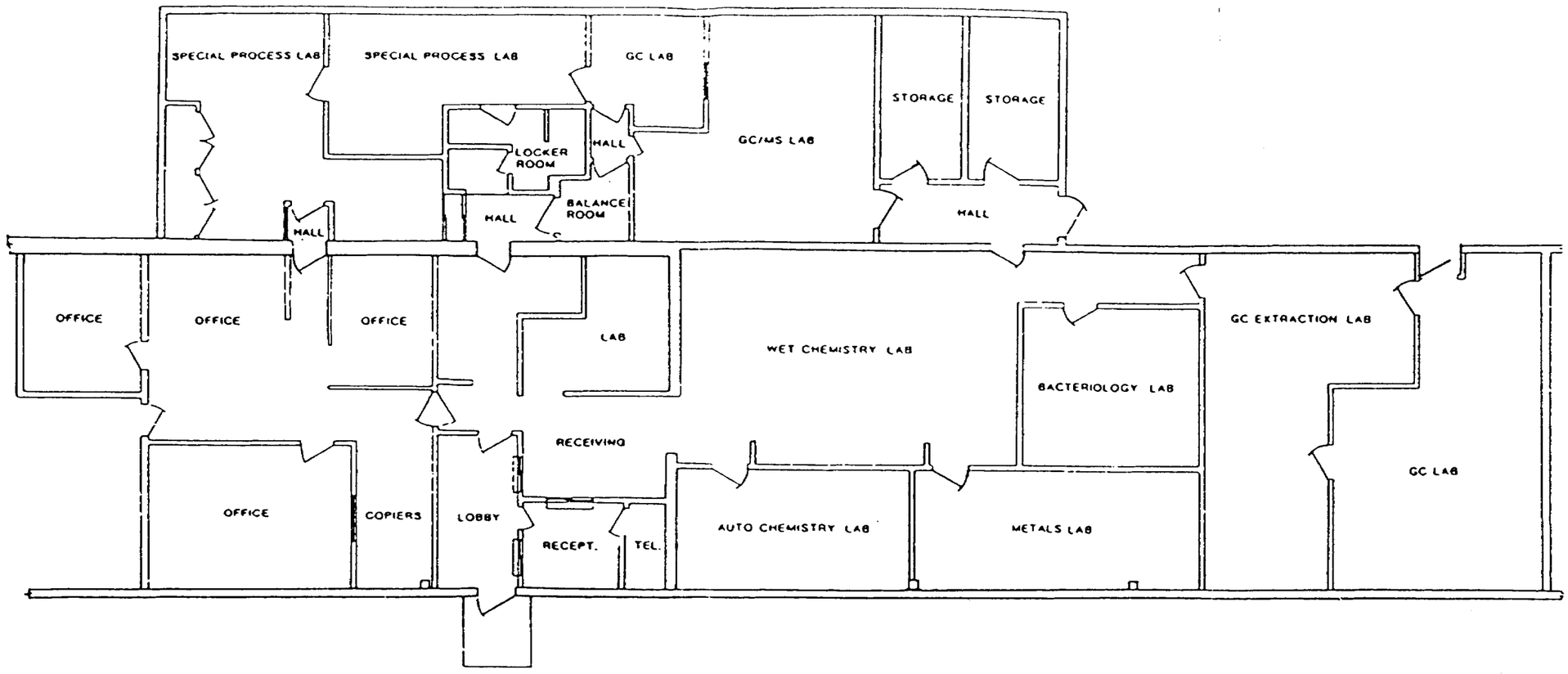
POTABLE WATER NON-POTABLE WATER

All approved subcategories and analytes are listed on the attached addendum

Herbert W. Dickerman, M.D. PhD.
[redacted]
Acting Director
Wadsworth Center for Laboratories and Research

FORM LR 23.F

2682



LABORATORY FLOOR PLAN

SCALE

0 5 10 15

FEET

H2M HOLZMACHER, McLENDON & MURRELL, P.C.
CONSULTING ENGINEERS, ENVIRONMENTAL SCIENTISTS and PLANNERS

MELVILLE, N.Y.
FARMINGDALE, N.Y.
RIVERHEAD, N.Y.
FAIRFIELD, N.J.

Flammable cabinets are equipped for storage of reagents for use in this area and an additional exhaust vent is provided.

The walls and floors of this area are sealed with an epoxy coated covering to minimize absorption of the surface.

All standard precautions are taken when analyzing samples such as goggles, gloves, and in certain cases, face masks.

Safety equipment provided in the laboratory includes safety showers, emergency eye washes, fire extinguishers, fire blankets, spill control kits, emergency lighting and self-contained breathing devices.

The laboratory was designed so that the personnel could be viewed while analyses are performed in all areas of the facility. Support equipment is provided outside the laboratory for resource operation, if necessary.

MAJOR H2M LABORATORY EQUIPMENT

EQUIPMENT	MANUFACTURER	MODEL	Year Purchased
Organic Analysis			
Gas Chromatographs	Tracor	(1) 540	1984
		(2) 550	1978,77
		(2) 560	1980,82
Purging Apparatus	Tekmar	(1) LSC-1	1977
		(3) LSC-2	1981
Automatic Liquid Sampler	Tekmar	(3) ALS	1980,83
Electrolytic Conductivity Detectors	Hall	(3) 700-A	1984
Flame Ionization Detector	Tracor	(3) 12016A	1977,82
PID Photo Ionization Detector	Tracor	(1)	1982
Electron Capture Detector	Tracor	(2) 113550-3201	1978,81
Flame Photometric Detector	Tracor	113550-3400	1980
Computing Integrators	Perkin-Elmer	Sigma 10 w/ 4 interfaces	1977
	IBM	Multichannel System 9000	1984
IBM 9000 Software Update	IBM		1986
Dual Channel Integrator	Spectraphysics	SP4290	1986
Organic Analysis (GC/MS/DS)			
(2) Gas Chromatograph/Mass Spectrometer including:			
	(1) Finnegan	OWA 30	1980
- Gas Chromatograph	Perkin-Elmer	Sigma 3	1980
- 9 Track Tape Drive	Perkin-Elmer	---	1980
- Computer (NOVA 4)	Data General	Nova 4	1980
- Sample Concentrator	Tekmar	LSC-2	1980
- Dual Disk Drive	Perkin-Elmer	---	1980
- CRT	Tektronix	4006	1980
- Real-Time Display Oscilloscope	Tektronix	---	1980
- Capillary Column Injector	---	Grob-type	1980

Organic Analysis (GC/MS/DS) (cont'd.)			Year Purchased
- Printer	Okidata	SL125	1980
- Automatic Liquid Sampler	Tekmar	ALS	1980
- Unacon Sample Concentrator for Capillary Column Use	Environchem	810	1984
- Winchester 70 Megabyte Disk Drive	Priam	---	1986
- 1050 Software Upgrade Superincos	Finnigan Matt	---	1986
	(1) Hewlett-Packard	5996A	1984
- Capillary Interface	HP	---	1984
- Graphics Display Terminal/Printer	HP	HP2623A	1984
- 200 CPS Printer	HP	HP2933A	1984
- Combined Wiley & NBS Data Base w/Wiswisser Line Notation	HP	HP59868A	1984
- CAS Registry Numbers	HP	---	1984
- Aquarius Software Pkg.	HP	---	1984
- CO_2 Sub-Ambient	HP	---	1984
- Winchester Disk Drive	HP	---	1984
- Graphics Display Terminal	HP	HP2623A	1984
- Autosampler	HP	---	1984
Metal Analysis			
Atomic Absorption Spectrophotometer including:	(1) Perkin-Elmer	AA-5000	1979
	(1) Perkin-Elmer	AA-2380	1985
Graphite Furnace	Perkin-Elmer	HGA-5000	1979
Flame Auto Sampler	Perkin-Elmer	AS-50	1979
Chart Recorder	Perkin-Elmer	56	1971
Automatic Burner Control Module	Perkin-Elmer	---	1979
Printer Sequencer	Perkin-Elmer	PRS-10	1979
Auto Sampler for Graphite Furnace	Perkin-Elmer	AS-1	1979
Hydride Generator	Perkin-Elmer	MHS-10	1979
Mercury Analysis System	Perkin-Elmer	---	1971
Zeeman Furnace and Autosampler	Perkin-Elmer		1987

			Year Purchased
Metal Analysis (cont'd.)			
Inductively Coupled Plasma Spectrometer System	Applied Research Laboratories	3400 w/ IBM XTC Computer Pkg.	1986
Inorganic Analysis			
Autoanalyzer	4 channel Technicon	II	1973
Block Digestor	Technicon	BD40	1977
Envirotech Total Organic Halide Analyzer (TOX) including:	Dohrmann	DX20	1984
- Purgeable Organic Halide (POX)			
- Non-purgeable Organic Halide (N POX)			
- Adsorption Module		AD-2	1984
- Microcoulometrix Analyzer Module		MC-1	1984
Refrigerator Locking (no spark interior)	Kelvinator		
Envirotech Organic Analyzer (TOC) including:	Dohrmann	50	1979
- High level TOC module		52	1979
- Ultra low TOC module		54	1979
DO Meter	Yellow Springs Instruments	(2) 51-A (2) 57	1975 1984
COD Apparatus	Glas-col		1977
Centrifuge	Fisher Scientific	(2)	1957,84
Drying Oven	GCA/Precis. Scientific	THELCO 18	1980
Kjeltec Autoanalyzer	Tecactor	1030	1983
Dessicator	Bokeo	---	1978
Balance	Sartorius	(1) 1612 (1) 2602 (1) 2462	1971 1974 1984

Inorganic Analysis (Cont'd.)			Year Purchased
Auto Titrator	Fisher	380,381 395,385	1983
Muffle Furnace	Thermoline	(2) 1500	1971,83
pH Meters	Corning	103	1984
	Beckman	4500	1976
	Fisher	640	1982
	Gallenkamp	pit stick	1985
	Fisher	825/753	1986
Spectrophotometer	Sequoia-Turner	340	1983
Analytical Nephelometer	Hach	---	1977
Glass Stills	Belco	---	1975
Specific Ion Electrodes	Orion	---	1983
Pensky-Martens Flash Tester	Precision Scientific	---	1983
Bacteriologic Analysis			
Autoclave	Market Forge	(2) STM-E Type C	1986,87
Microscope	Nikon	Labobot Type 104	1983
Coliform Incubator Bath	GCA/Precis. Scientific	66850	1980
Ambi-Hi-Lo Chamber Incubator	Labline Instruments	3554-17	1976
Automatic Pipetting Machine	Scientific Equipment Products	40	1983

Organic Analysis (GC.MS.MSD) (Cont'd)			Year Purchased
MSD Quadrupole	Hewlett-Packard	(2) 5970B	1987
Gas Chromatograph Mainframe	Hewlett-Packard	(2) 5890A	1987
Capillary Inlet System	"	(2) 107	"
HP-IB Data Communications	"	(2) 570	"
Universal Injection Port	"	100	"
Electron Capture Dector with Electronics	"	238	"
Networking Integrator with Printer Plotter	"	3392A	"
Robotic Arm Autosampler	"	201	"
Capillary Direct Interface for HP 5890	"	(2)090	"
Glass Jet Spr.	"	59913A	"
512KBytes of High Performance Memory	"	020	"
Graphes Display Terminal	"	2393A	"
200 CPS Impact Printer	"	2934A	"
Ultrasonic Disrupter	Tekmar		1986

$$\% D = \frac{R2 - R1}{\frac{R1 + R2}{2}} \times 100$$

H. Method Blank Analysis

For the volatile scans, two instrument blanks are run each day to determine the level of interferences introduced by the ambient air into the instrument. To prevent contamination by "carry-over", any high concentration samples are followed by a blank run. Furthermore, if the sample concentration had been extremely high, a blank is also introduced into the sequence of the ALS in the same position as the high sample had been.

For scans of extractable components for every batch of twenty samples or less, one "blank" water sample spiked with the surrogate standard is carried through the entire analytical scheme, to verify that no interfering substances are introduced by the reagent or methodology.

12.2 Quality Assurance Protocol for Analysis of Volatile Priority Pollutants by GC/MS/DS

12.2.1. - Method Validation

A. Accuracy and Precision of Calibration of MS Response

Response curves are established for each component by analyses of at least five different concentrations. The response factors relative to the internal standards (RRFs) are stored in a user library in the computer system. Quality control calculations for precision of the entered RRFs are performed using the software of the computer data system and data are rejected that fall outside the quality control limits. EMSL QC samples are used to verify the accuracy of the calibration.

B. Recovery and Precision of Analytical Method

The purge and trap procedure is evaluated for component recovery by comparing the areas from the purge run with those obtained from direct injections. Parameters for the purging and desorption are optimized to yield at least 60% for bromoform and higher recoveries for all other purgeable (non-polar) pollutants.

Since the response factors for the standards are calculated from purged standards, the flucuations of the response factors are indicative of the changes of the component recoveries in the purge and trap concentration step. The precision of the response factor calibration is therefore simultaneously the precision of the concentration procedure.

12.2.2 - Routine Monitoring of Method Performance

A. Ion Abundance Calibration

Ion ratios for test substance bromofluorobenzene (BFB) are checked each day for compliance with EPA criteria. If the spectra do not comply, adjustments of source voltages are made while observing peak ratios and shapes

for test substance FC43. After each new tuning, the computer then calibrates time/intensity data for FC43 against time/mass data in the memory. After the tuning, BFB is re-injected for verification that the correct mass ratios have been achieved.

Bromofluorobenzene Key Ions and Ion Abundance Criteria

Mass	Ion Abundance Criteria
50	15-40% of Mass 95
75	30-60% of Mass 95
95	Base Peak, 100% Relative Abundance
106	5-9% of Mass 95
173	< 2% of Mass 174
174	> 50% of Mass 95
175	5-9% of Mass 174
176	> 95% but < 101% of Mass 174
177	5-9% of Mass 176

B. Detection Limits

Injections of standards of detection limit quantities are examined for peak sizes and positive identification, i.e., the ion abundance has to satisfy the "fit" threshold.

C. Monitoring of Retention Times

The entries in the user library for the relative retention times of the components are updated with "in-batch" standard runs. Relative retention times are computed relative to the internal standards 1,4-dichlorobutane-d8, fluorobenzene and 1,2-dichlorobenzene-d4.

D. Matrix Spike Analysis

All standard runs for factor calibrations represent matrix spike analyses in the case of the volatile pollutants.

E. Reproducibility of Duplicates

The data for duplicate samples or standards have to meet quality control limits for the deviation D, determined from the two results R1 and R2:

$$\% D = \frac{R2 - R1}{\frac{R1 + R2}{2}} \times 100$$

F. Method Blank Analysis ("Instrument Blank")

In the purge and trap procedure, organic compounds "outgassing" from the plumbing account for the majority of contamination problems. Cross-contamination can occur whenever high level and low level samples are sequentially analyzed. To guard against cross-contamination, a blank -- organic free water -- is run after high samples to demonstrate that the system is free from concentration.

12.3 Quality Assurance Protocol for Semi-Volatile Pollutant Analysis (Phenols and Base Neutrals) by GC/MS/DS

12.3.1 - Method Validation

A. Accuracy of Calibration of Mass Spectrometer Response

Response curves are first developed for various concentrations to establish ranges of linear response, and the response factors relative to 1,4-dichlorobenzene-d4, napthalene-d8, anthracene-d10 and chrysene-d12 are entered into the user library.

These calibration factors are confirmed with "known" solutions from EMSL, EPA, and the accuracy of quantification is established.

B. Evaluation of Analytical Procedure for Recovery and Precision

Organic free water, spiked with standard solutions is carried through the analytical scheme to demonstrate ability to recover and analyze the components. Not enough data have been developed thus far for statistical evaluation of the precision of the recovery data.

12.3.2 - Routine Monitoring of Method Performance

A. Ion Abundance Calibration of Mass Spectrometer

The electrical parameters of the ion source and quadropole are tuned and calibrated with the test substance FC43 until optimized to produce a satisfactory spectrum with an injection of decafluorotriphenylphosphine (DFTPP). Compliance with the EPA criteria for the ion abundance of DFTPP is documented on a daily basis.

B. Performance of Fused Silica Capillary Column

For monitoring the capillary column performance, a special test mix ("Grobe" mix) is injected before a series of tests are undertaken. The response ratios of polar and non-polar components, as well as acidic and basic compounds, have to remain within established limits.

C. Detection Limits

Detectability of the reportable concentration levels is verified by injections of low standards. This has to be repeated periodically, because of changing chromatographic column conditions and varying mass spectrometer sensitivity.

D. Monitoring of Retention Times

The entries for the relative retention times of the components in the "user libraries" are updated by entering the files from routinely run "in-batch" standard runs. Windows for the retention times are set in the libraries as criteria for automatic component identification.

E. Stability of Response Factors

The response factors from the routine standard injections are added to the response factor file in the user library. Quality control evaluation of the factor lists permits detection of instrument malfunctions or errors related to "bad" solutions or calculations errors.

F. Matrix Spike Analysis

Information gained from routinely performed analyses of standard spiked blank water is incorporated into the records for component recovery and is used for statistical evaluation of precision of the analytical method.

G. Surrogate Standard Monitoring

Before extraction of samples, fluorinated and deuterated components are added to each sample to permit determination of the extraction efficiency from the recovery of these "surrogate" substances. The components that are used as surrogate standards to be extracted with the base neutral fraction are 1-fluorobiphenyl, p-terphenyl, and D6-nitrobenzene. Adequate phenol extraction is verified from the recoveries of the surrogate spikes of D6-phenol, 2-fluorophenol, and 2,4,6-tribromophenol.

H. Reproducibility of Duplicates

No quality control limits have yet been set for acceptability of duplicate results. Guidelines are being developed from data of the analyses of standard spiked water.

13.0 CORRECTIVE ACTION

13.1 Sample Acceptance

Sample containers are inspected upon receipt in the laboratory. If the integrity of a sample is questionable (broken bottle, inverted septum, entrapped atr, etc.), it will be reported to EPA.

13.2 Organic Analyses

All quality control data are routinely examined by the Senior Analyst for acceptability according to the guidelines outlined in Section 5.0.

After a single occurrence of either an error by the analyst or instrument malfunction (e.g., leaking) are ruled out, systematic causes are examined. Table 16-1 represents a rough guide through the steps that are taken for determining and correcting existing faults.

Any sample data collected, after the occurrence of poor quality control results, have to be either repeated or recalculated depending on the nature of the corrective action that had to be taken.

TABLE 13-1

OBSERVED INDICATION	POSSIBLE CAUSE	CORRECTIVE ACTION
Detection limits not low enough	Absorption in a. Column b. Transfers c. Detector	Replace, clean or recondition appropriate part
Accuracy not within specifications	Wrong calibration	Recalibrate with new solutions
Precision not within specifications	Interferences in Integration	Prevent contaminations, Correct Baseline Treatment,
	Change of instrument parameters	Prevent change
	Inconsistency in calibration	Correct cause (make new solutions, change injection techniques, etc.
	Inconsistency in sample preparation	Remedy appropriate step a. Extraction b. Concentration c. Cleanup

H2M LABORATORY

14.0 REFERENCES

1. "Handbook For Analytical Quality Control in Water and Wastewater Laboratories", U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, OH 45268, 1979.

2. United States Environmental Protection Agency, "Guidelines and Specifications For Preparing Quality Assurance Project Plans", Environmentsl Monitoring and Support Laboratory, Cincinnati, OH, December 1980.

3. "Methods For The Determination of Organic Compounds in Finished Drinking Water and Raw Source Water", U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268, Revised November 1985. Methods No. 502.1, 503.1, 504. and 524.1.

4. United States Environmental Protection Agency, "The Analysis of Trihalomethanes in Drinking Water by Liquid/ Liquid Extraction", Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268, November, 1979.

Cost Proposal

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APPROVED ENVIRONMENTAL LABORATORY IN NEW YORK, NEW JERSEY & CONNECTICUT

METALS

PARAMETER/SYMBOL	FEE	PARAMETER/SYMBOL	FEE
Aluminum/Al	$15	Mercury (cold vapor technique)/Hg	$25
Antimony/Sb	15	Molybdenum/Mo	15
Arsenic/As*	20	Nickel/Ni	12
Barium/Ba	15	Potassium/K	10
Beryllium/Be	15	Selenium/Se*	20
Boron/B (Colorimetric)	20	Silica/SiO_2	20
Cadmium/Cd*	15	Silicon/Si	20
Calcium/Ca	10	Silver/Ag	15
Chromium, Total/Cr	15	Sodium/Na	10
Chromium, Hexavalent/Cr+6	12	Strontium/Sr	15
Cobalt/Co	15	Thallium/Tl	25
Copper/Cu	10	Tin/Sn	20
Iron/Fe	10	Titantium/Ti	25
Lead/Pb*	15	Vanadium/V	25
Lithium/Li	20	Zinc/Zn	10
Magnesium/Mg	10	Digestion	25
Manganese/Mn	10	EP Tox Prep	75
		Filtration (Dissolved Fe & Mn)	10

NOTE: Other metals are available upon request.
Sample collection available, call for quotation.
Quantity discounts available by inquiry.
Minimum order - $50

* These metals are routinely analysed by the graphite furnace method. Many others can be analysed by graphite furnace if lower detection limits are required. The remainder are routinely analysed via the flame method.

PRICES ARE SUBJECT TO CHANGE

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GENERAL CHEMISTRY AND MICROBIOLOGY

PARAMETER	FEE	PARAMETER	FEE
Acidity & CO_2	$ 8	Percent Caustic	$20
Volatile Acids	20	Percent Trade Chlorine	20
Alkalinity	8	pH	5
Ammonia (N)	10	Phenol	30
BOD (5)	25	Phosphate, Ortho	10
BOD (20)	35	Phosphate, Total	15
Bromide	18	Solids, Settleable (SETT)	8
Calcium Hardness	12	Solids, Dissolved (TDS)	10
Chloride	8	Solids, Suspended (SS)	10
CL_2 Demand (breakpoint curve)	60	Solids, Volatile (TVS)	15
Chlorine Residual	5	Solids, Total (TS)	10
COD	20		
		Sulfate	10
Color	6	Sulfide	15
Conductivity	6	Sulfite	12
Cyanide	30	TOC (Total Organic Carbon)	30
Cyanide Ameniable to Chlorinization	65	Total Carbon	30
MBAS (detergents)	15	Total Hydrocarbons (Gravametric)	30
Fluoride (distill.)	25	Turbidity	6
		Langlier Saturation Index (Includes pH, CA, TDS, Talk, Temp)	25
Fluoride	12	Total Organic Halides (TOX)	80
Formaldehyde	80		
Hardness, Total	8		
Total Kjeldahl Nitrogen (TKN)	22		
Nitrate	12		
Nitrite	10		
		MICROBIOLOGY	
Odor	6	Total Coliform[1]	12
Oil and Grease	22	Fecal Coliform[2]	15
Organic Nitrogen	32	Fecal Strep	20
Oxygen, Consumed (Field Fixed)	8	Chlorophyll A	50
Oxygen, Dissolved (Field Fixed)	8	Total Plate Count	15

NOTE: Sample collection available, call for quotation.
Quantity discounts available by inquiry.
Minimum order - $50

[1] Membrane Filter Technique or Multiple Tube Fermentation Technique

[2] Includes Total Coliform

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ORGANICS

GAS CHROMATOGRAPHY

ANALYSIS	PRICE PER SAMPLE
Volatile Halogenated Organics in Water	$120
Volatile Halogenated Organics in Soil	170
Volatile Non-Halogenated Organics in Water	120
Volatile Non-Halogenated Organics in Soil	170
Combination Scan (Volatile Halogenated/Non Halogenated) in Water	195
Combination Scan (Volatile Halogenated/Non Halogenated) in Soil	245
Pesticides in Water	85
Pesticides in Soil	135
Pesticides and PCB's in Water*	160
Pesticides and PCB's in Soil*	210
Aldicarb/Temik	120
Herbicides in Water	150
Herbicides in Soil	200
PCB's in Water	150
PCB's in Soil	200
PCB's in Oil	120
Solvent Analysis by Direct Aqueous Injection (>1 MG/L)	120
Polar Volatile Organics (Methylethyl Ketone, Methylisobutyl Ketone, Acetone)	120
Trihalomethane Potential	125
1,2 Dibromoethane and DBCP	95
Florisil Cleanup, If Required/Scan	140

NOTE: Sample collection available, call for quotation.
Quantity discounts available by inquiry.

* GC/MS Confirmation of positive response, additional $120.

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ORGANICS

CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS/DS)

ANALYSIS	PRICE PER SAMPLE
Volatile Organic Analysis of Aqueous Samples	$195
Volatile Organic Analysis of Soils, Sediment or Sludges	245
Volatile Organic Analysis of Air	195
Acrolein, Acrylonitrile in Water	60
Acrolein, Acrylonitrile in Soil	110
Semi-Volatile Analysis of Aqueous Samples:	
Acid Extractable Compounds	225
Base/Neutral Compounds	285
Combined Extracts (Acid-Base/Neutral)	405
Semi-Volatile Analysis of Soils, Sediments or Sludges:	
Acid Extractable Compounds	275
Base/Neutral Compounds	335
Combined Extracts (Acid-Base/Neutral)	455
Characterization of Unknown Peaks (1-10 Peaks)	10/Peak, Additional
Broad Scan Analysis (Maximum 15 Largest Peaks)	Call for Quotation

NOTE: Sample collection available, call for quotation.
Quantity discounts available by inquiry.

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PROFILES/SCANS

ANALYSIS	PRICE PER SAMPLE
E.P. Toxicity Testing for RCRA Requirements:	
E.P. Toxicity Extraction	$75
Metals (As,Ba,Cd,Cr [Total],Pb,Se,Ag,Hg)	128
Cyanide	30
Pesticides (Endrin,Lindane,Methoxychlor,Toxaphene)	80
Herbicides (2, 4-D; 2, 4, 5-TP)	150
Hazard Assessment:	
Ignitibility	40
Corrosivity	50
Reactivity	50
Heavy Metals (As,Ba,Cd,Cr,Pb,Hg,Se,Ag,Zn)	130
Minerals (pH,Ca,Mg,Na,K,Talk,So_4,Cl,F,TDS,Hard,Cond)	90
Nutrients (NH_3,$N0_{2,3}$,0-PHOS,T-PHOS,TKN)	60
Demand (TOC,COD,BOD)	65
Solids (SETT,TDS,SS,TVS,TS)	45

NOTE: Sample collection available, call for quotation.
Quantity discounts available by inquiry.

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PRIORITY POLLUTANT ANALYSIS

The prices listed below are for samples analysed according to protocols specified by the U.S. EPA for priority pollutants.

ANALYSIS	PRICE PER SAMPLE
AQUEOUS	
Volatile (Purgeable) Organics	$195
Acrolein, Acrylonitrile	60
Acid Extractables	225
Base/Neutrals	285
Combined Extracts (Acid-Base/Neutral)	405
Pesticides/PCB's	160
Metals (13 Elements):	
Sb,As,Be,Cd,Cr,Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn	195
Cyanide	30
Total Phenols	30
Asbestos	By Quote
SEDIMENT	
Volatile (Purgeable) Organics	245
Acrolein, Acrylonitrile	110
Acid Extracables	275
Base/Neutrals	335
Combined Extracts (Acid-Base/Neutrals)	455
Pesticides/PCB's	200
Metals (13 Elements):	
Sb,As,Be,Cd,Cr,Cu,Pb,Hg,Ni,Se,Ag,Tl,Zn	215
Cyanide	30
Total Phenols	30
Total Solids	10
Digestion	25

NOTE: Sample collection available, call for quotation.
Quantity discounts available by inquiry.

PRICES ARE SUBJECT TO CHANGE