

PHASE II INVESTIGATION WORK PLAN
ASTRO ELECTROPLATING, INC.
INACTIVE HAZARDOUS WASTE SITE
FARMINGDALE, SUFFOLK COUNTY, NEW YORK
(SITE NO. 152036)

PREPARED BY:

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

JULY 1988

RECEIVED

JUL 27 1988

NYSDPC
STATE PLANT
D.E.C.

PHASE II WORKPLAN

ASTRO ELECTROPLATING, INC.

CONTENTS

SECTION	TITLE	Page
SECTION 1.0	INTRODUCTION	1
1.1	Purpose of the Investigation	1
1.2	Site Description	2
1.3	Site Geology	4
1.4	Aquifer Utilization as Water Supply within the Farmingdale Area	4
SECTION 2.0	GEOPHYSICAL STUDY	5
SECTION 3.0	MONITORING WELLS	5
3.1	Locations, Depths and Numbers	5
3.2	Decontamination Procedures for Drilling Equipment on Site	7
3.3	Installation	8
3.4	Well Development	12
3.5	Water Elevations	13
SECTION 4.0	SAMPLING AND ANALYSIS PLAN	14
4.1	Geologic Soil Samples	15
4.2	Analysis of Soil Samples by HNU, Photo Analyzer	16
4.3	Exploratory Boring	17
4.4	Groundwater Sampling	18
4.5	Laboratory Analysis	20
4.6	Data Analysis	20
SECTION 5.0	QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)	21
5.1	Project Organization	21
5.2	Data Quality Requirements and Assessments	22
5.3	Field Calibration	22
5.4	Data Validation	23
5.5	System Audits	24
5.6	Corrective Actions	24
5.7	QA/QC Report	24
5.8	Field Activities, QA/QC Procedures	25

LIST OF FIGURES

FIGURE NUMBER	TITLE	Page
1	Location Map	26
2	Location of Area Wells	27
3	Plot Plan/Site Plan	Insert,
4	Deep Groundwater Monitoring Well	back 28
5	Shallow Groundwater Monitoring Well	29
6	Work Schedule	30
7	Chain-of-Custody	31

LIST OF TABLES

TABLE NUMBER	TITLE	Page
1	Summary of Laboratory Analysis for Groundwater Samples	32
2	Summary of Laboratory Analysis for Soil Samples	33
3	Required Water Analysis Methods, Preservation and Holding Times	34
4	Required Soil Analysis Methods, Preservation and Holding Times	36

LIST OF APPENDICES

APPENDIX	TITLE
A	Health and Safety Plan
B	Laboratory QA/QC Manual
C	Resumes of Key Personnel

PHASE II WORKPLAN
ASTRO ELECTROPLATING, INC.

1.0 INTRODUCTION

This document is a plan for the investigation of the Astro Electroplating, Inc., site, 170 Central Avenue, Farmingdale, Town of Babylon, Suffolk County, New York, according to the guidelines of New York State Department of Environmental Conservation (NYSDEC) for 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 prepared in response to the Signed Order on Consent from the New York State Department of Environmental Conservation (DEC).

The purpose 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; and
- Evaluate on-site and off-site 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 prepare a Site Hazard Ranking System (HRS) score which the NYSDEC can use to rate and/or prioritize the site as hazardous or non-hazardous. In the Phase I Site Investigation Report prepared by Woodward-Clyde (in January, 1986), Astro Electroplating received an HRS Score of 38.06.

1.2 Site Description

Astro Electroplating, Inc., is a small privately owned commercial plating facility which employs approximately forty people as a normal work force, with thirty-eight people working in the plating department and two office personnel. The work schedule is twelve hours per day, one and one-half shifts per day, five days a week. The site Location Map is shown on Figure 1.

Astro Electroplating, Inc., operates from a leased multi-tenant building (Finch Realty Corp., Owners) at 170 Central Avenue, Farmingdale, Town of Babylon, County of Suffolk, State of New York 11735.

The facility occupies 9,700 square feet (approximately 1/5) of a single story structure of approximately 45,000 square feet. The firm currently utilizes 5,300 square feet for production space and waste treatment area and the remaining 4,400 square feet for warehouse, storage, office and laboratory facilities. The facility has always occupied this portion of the building with Finch Realty as the owner. Prior to the building's construction, the property was used for agricultural purposes.

Astro Electroplating, Inc., specializes in the nickel, chrome and copper plating of plastic kitchen and bathroom accessories. All industrial effluents were piped to unpermitted industrial leaching pools to the east of the plant located in the parking lot (See Figure 3). All sanitary and industrial wastes (as of July 1, 1987) at the facility are currently discharging to the Southwest Sewer District. The unpermitted industrial leaching pools are no longer used for discharge purposes.

The plating process at Astro consists of thirty-four (34) separate tanks. The operational process involved in the production of a finished product is as follows: The molded plastic product is taken from the warehouse (storage) portion of the building and attached to a dip bar with racks which contain approximately 100 plastic pieces. The dip bar is attached to an overhead conveyor which is electrically controlled with a manual override. The average production is five cycles per hour, or six hundred (600) pieces per day. Currently, Astro plates 10,000 square feet per day and has a production capacity of 25,000 square feet per day. The pieces then move through the thirty-four tanks, all equipped with drip shields, of which all but one are used in the process. The capacity of the tanks vary from 600 gallons (31 tanks) to 1,200 gallons (3 tanks). Chemicals stored in the tanks include chromic acid, sodium hydroxide, palladium chloride, hydrochloric acid, nickel, copper sulfate, sodium bicarbonate, and nickel sulfate.

1.3 Site Geology

Groundwater in the site area occurs in 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 were found to be approximately 95 feet thick at the Babylon landfill east of the site (Kimmel and Braids, 1980). Groundwater in the upper glacial aquifer occurs at an elevation of approximately 48 feet above MSL within the area which translates to approximately 40 feet below the ground surface at the site. The water table has a hydraulic gradient of approximately 8 feet per mile in a southeasterly direction. (Remedial Investigation/ Feasibility Study, Tronic Plating Co. Site, Farmingdale, New York, E.P.A. Work Assignment Number: 158-2LR6, Prepared by: Ebasco Services Incorporated)

1.4 Aquifer Utilization as Water Supply within the Farmingdale Area

The Magothy Formation constitutes the major water resource for both Nassau and Suffolk Counties. The majority of wells used for public water supply are screened within the Magothy Formation. Within the Farmingdale area, the upper glacial aquifer is presently exploited for agricultural irrigation, which today is limited. Presently, there are very few, if any, private wells utilizing the glacial aquifer for domestic water supply within the Farmingdale area. The Lloyd Sandmember is used to some extent as a source of public water but is less desirable than the

Magothy Formation due to its depth and inferior water quality. See Figure 2 for location of wells within several miles of the Astro Electroplating facility.

2.0 GEOPHYSICAL STUDY

An extensive system of monitoring well clusters (described in the following section) will be used to collect unfiltered groundwater samples that will establish the 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). Resistivity logs will be performed at each deep well.

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 3. Four wells (MW1, MW2, MW3 and MW4) will be shallow wells and four (MW5, MW6, MW7 and MW8) will be deep wells.

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

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 site 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 depth will be about fifty (50) feet for the shallow wells. The deeper wells will be screened at the bottom of the Upper Glacial Aquifer which, according to the USGS is believed to be approximately one hundred (100) feet beneath the surface in the project area. In this way, information will be obtained to establish vertical water chemistry profiles, hydraulic gradients, and water table elevations.

Shallow wells will be screened from two (2) feet above to eight (8) feet below the water table. The two (2) foot portion of the screen extending above the water table is required in order to intercept potential floating contaminants. The deep wells will be screened at depths between ninety (90) to one hundred (100) feet below grade. Resistivity logs will be performed at each deep well.

3.2 Decontamination Procedure for Drilling Equipment, On Site

To prevent the introduction of foreign materials into the boreholes before drilling is commenced and to prevent cross-contamination during the drilling operation, all drilling equipment that will be in actual contact with soil will be thoroughly brushed and steam cleaned. Steam cleaning is preferred over the use of solvents in order to eliminate the possibility of contamination from the use of such solvents. This equipment will include: auger flights, bits, split spoon samplers, tremie tube, etc.

An area within the Astro Electroplating property will be selected as the location of all cleaning-decontamination activities, remote from the actual construction area. A large agricultural trough will be used to contain all used cleaning water. The drilling equipment will be placed in the trough during the steam cleaning operation, allowing the water to fall into the trough and be contained. This water will be drummed and stored on-site. After the equipment is thoroughly cleaned, it will be placed on clean plastic sheets, 10 mil. thick.

The cleaning water will come from a public water supply, "tap water," and will be analyzed for volatile organics and metals prior to its use. This analysis will indicate whether any possible contamination could result from the use of the cleaning water. The split spoon samplers will have a final rinse of distilled or deionized water prior to their next use. Representative samples of the used cleaning water will be submitted for laboratory analysis to determine if the drummed

water is contaminated. If it is contaminated, the drummed water will be treated by Astro Electroplating's industrial waste water treatment system which is used to treat plating rinse waters.

3.3 Well Installation

A 6-inch I.D. hollow-stem auger will be used to advance each boring. Each borehole, a 4-inch I.D. Schedule 40 PVC threaded flush joint, approved slotted PVC well screen (10-mil. slot screens) and riser casing assembly will be installed in 10-foot or 5-foot long sections. Joints, caps and end plugs are to be secured by threaded flush joints. Glues or other adhesives are not permissible. Each screen will be ten (10) feet long. The wells will be fifty (50) feet deep for shallow wells and one hundred (100) feet long for deep ones. Continuous split spoon samples will be collected during the drilling of deep well MW-6. At the other deep wells, split spoon samples will be collected every five (5) feet. 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. The pack is to consist of clean, inert siliceous material compatible with the natural formation and the 10-mil. slot size of the well screen. The source of the packing material will be from a local supplier of sand and gravel approved by the NYSDEC. This packing material will be compared to formation material and the 10-mil. slot screen size.

A gravel pack is to be placed in the annular space surrounding that portion of the well occupied by the well screen and for a minimum distance of two (2) feet above the top of the screen.

The annular space between the outside diameter of the monitoring well casing and the inside diameter of the auger flights, drill casing or borehole wall is of a size sufficient to allow free passage of the packing material to the screened depth.

The packing material is to be placed slowly with a tremie pipe to allow the material to settle and to avoid bridging. Frequent checks of the level of the pack within the annular space will be performed as the pack is being placed.

Sections of the auger flights or drill casing will be removed periodically to avoid binding of the casing in the borehole. Frequent and careful measurements are to be taken to assure that some portion of the pack is retained within the auger flights or drill casing at all times as they are removed. Measurements will be taken to ensure that the monitoring well assembly is not being pulled out of the ground as the augers and/or casing are being removed.

A bentonite seal is to be placed on top of the same pack to isolate the water bearing zone to be monitored from the remaining portion of the borehole. The bentonite seal will consist of Volclay Brand bentonite pellets, bentonite granules and/or bentonite powder, depending on specific conditions, such as water in the annular space, monitoring well couplings, size of annular space, etc. Gelatin-coated bentonite pellets will be preferable.

The seal is to be placed by a tremie pipe into the annular portion of the borehole to achieve a minimum 2-foot seal between the pack and the grout which is to be placed in the upper portion of the borehole. A minimum of sixty (60) minutes must pass to allow for proper swelling of the pellets before placement of the grout. If the pellets are placed in a dry zone, a continuous stream of water will be introduced into the hole until a reservoir of water can be detected above the pellets. It will be concluded that the pellets are swollen and the 60-minute waiting period must be observed with periodic testing every ten (10) minutes to ensure that the reservoir of water remains. If this is not detected, then more water will be introduced into the hole until a satisfactory seal is obtained.

The size (diameter) and shape (sphericity) of the bentonite seal particles (pellets, granules, powder) will be selected so as to assure a complete pack around the screen at the proper vertical interval within the borehole.

A grout mix consisting of cement/bentonite will be placed in that portion of the annular space between the auger flight, drill casing or borehole wall and the monitoring well assembly, extending from the top of the pack to the surface seal.

The proportions of cement/bentonite/water in the grout mix shall be 94 lbs/3 to 5 lbs/6.5 gallons. A ten (10%) percent by volume hydrated lime (CaO) may be added to facilitate pumping. The mix will be dense enough to set up without being diluted by formation water and to displace water from within the annular

space such that undiluted grout will flow out of the auger flight, drill casing or borehole at the ground surface.

The grout mix will be tremied, either by gravity or pumped, to the bottom of the annular space to be filled by means of a continuous pipe or hose.

Auger flights or drill casing remaining in the borehole are to be removed as the annular space is being filled with the grout mix. Upon removal of such items, additional grout mix is to be added to the borehole to fill the hole to a point no less than two (2) feet below the ground surface.

A protective steel casing, minimum of two (2) inches in diameter greater than the monitoring well casing, will be placed over the monitoring well casing and secured in a surface well seal in the upper portion of the borehole. The protective casing is to project a minimum of three and one-half (3.5) feet below the ground surface and high enough at the surface to ensure adequate protection of the well pipe, so that a flush manhole can be installed. A locking cap is to be placed on the protective casing, and secured with a padlock, with duplicate keys provided to the DEC personnel in the central office.

During installation of the protective casing, a surface well seal will be constructed by mounding concrete around the casing to secure the manhole casing in the ground and to provide positive drainage of surface water away from the monitor well assembly. The diameter of this well seal must be a minimum of two (2) feet.

Partially completed wells will be secured at the end of a day's work. The hollow-stem auger will be left in place in the hole, but attached to the driveblock assembly. The in-place resistance provided by the hydraulic system will ensure that the flights cannot be removed from the hole without large, heavy-duty equipment.

Upon completion of monitoring well installation, each well is to be developed in accordance with Section 3.4

It is estimated that three (3) weeks will be needed to complete installation of the wells. A project schedule is included in Figure 6.

Auger cuttings from the borings will be stored on the Astro Electroplating 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. All cuttings will be drummed with a closed lid, preventing contact with the environment. The cuttings will be disposed of at a later date, depending upon the result of the split spoon sample analysis. Should results indicate that the cuttings are hazardous, they will be disposed of properly as hazardous waste.

3.4 Well Development

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

Development and purging before the collection of groundwater samples will be completed using a Geoguard portable gas drive pump, manufactured by American Sigma. For pumped development, the standard procedure will be to pump for fifteen (15) minutes. After fifteen (15) minutes a surge 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 subject to NYSDEC approval prior to its implementation. During the development the wells will not be pumped to dryness.

Development will continue until the discharge water has a turbidity level of less than fifty (50) NTU's. Turbidity will be measured in the field with an NTU meter. Certified standards and a calibration schedule will be used for the NTU meter.

Development water will be treated on site by Astro Electroplating's industrial waste treatment facility in accordance with its Suffolk County Department of Public Works Pretreatment Permit No. 507-711-001. 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.

3.5 Water Elevations

Water elevations in all wells will be measured before and after development within a 24-hour period. All wells will be surveyed by a licensed Land Surveyor, State of New York, to the nearest one hundredth (0.01) of a foot.

4.0 SAMPLING AND 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. See Section 5.8 for more details.

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 are outlined in Table 1, and information regarding water analysis methods and sample preservation and holding times is included in Table 2.

A background soil sample will be collected on site and analyzed for the same parameters as the other soil samples. The location and depth at which the background soil sample will be collected will be determined on site.

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 (5) feet, or less as determined by changes in lithology, throughout the entire depth of the boreholes, except for Borehole No. 6. Continuous split spoons shall be collected from Borehole No. 6. 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.

The soil samples collected from the split spoons will be transferred into several jars with the use of a stainless steel trowel or spatula immediately after the split spoon is opened. One (1) wide mouth jar will be used purely for soil classification purposes (items such as grain size distribution, etc.). Two (2) additional jars, including a 40 ml. VOA vial provided by the laboratory and a wide mouth jar will be used for laboratory analysis and the taking of HNU readings in the field. The soil sample or VOC will be collected from each split spoon first, prior to soil description and other analyses.

A total of two (2) soil samples from each deep well boring will be sent to the laboratory for analyses. The split spoon collected from the groundwater interface in each deep well boring will be one (1) of the two (2) soil samples sent to the laboratory for analysis. The second soil sample for laboratory analysis will be selected based upon the HNU readings found in each split spoon sample. The soil sample with the highest HNU reading will be selected for laboratory analysis (See Table 2). Since the shallow well borings will be placed several feet from the deep well borings, it is not necessary to collect soil samples from both wells for laboratory analysis.

As mentioned previously, split spoon samplers will be thoroughly brushed, steam cleaned and rinsed with distilled water prior to reuse.

The soil samples will be transported to the laboratory in time to allow for the eradication of VOC's to be completed within holding times as noted in Table 4.

4.2 Analysis of Soil Samples by HNU Photo Analyzer

Upon recovery of each split spoon, a portion of the soil sample will be placed, using a stainless steel spatula, in a wide mouth glass jar, supplied by the laboratory. The jar will be covered with foil and capped tightly, maintaining a headspace in the jar. A subsample from each split spoon will be packed tightly into a 40 ml. VOA vial. The foil covered jars will be stored at ambient soil temperature, to avoid condensation buildup within the jar. After fifteen to twenty (15-20) minutes, the cap will be removed and the HNU probe will be gently pushed through the foil cover to obtain a reading.

The HNU readings will be recorded in the field log book. HNU readings will determine which split spoon samples will be sent to the laboratory for analysis, except for those which have already been selected for analysis as noted (See Table 2). Also, the HNU readings will maintain the proper level of personnel protection as outlined in the Health and Safety Plan.

4.3 Exploratory Boring

Exploratory borings (B-1 and B-2) will be advanced to a depth of about twenty-five (25) to thirty (30) feet to sample soils through the two (2) southernmost leaching pools. Split spoon samples will be obtained continuously to ten (10) feet

below the leaching pools. Each split spoon sample will be tested with an HNU and transferred to appropriate sample containers in the same manner as the well boring split spoon samples.

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. Equipment used in exploratory borings will be decontaminated by the procedure described in Section 3.2.

A total of three (3) split spoon samples from each exploratory boring (B-1, B-2) will be sent to the laboratory for analysis. The first split spoon will be collected at 0-2 feet from the bottom of the two (2) leaching pools. The remaining two (2) split spoon samples from each boring will be selected based on the HNU readings of the continuous split spoon samples. As noted previously in the description of the deep well borings, the two split spoon samples with the highest HNU readings from each boring (B-1 and B-2) will be selected for analysis (See Table 2). Each soil sample will be transferred to the appropriate sample container and sent to the laboratory for analysis.

4.4 Groundwater Sampling

Groundwater sampling will commence one (1) week after development. All wells will be bailed for groundwater samples after well installation and development has been completed. Samples should be collected from the wells in a one to two day period. The purging and collection of groundwater samples will

be completed on the same day. If the operations take longer than one day, the purging and sampling of the eight monitoring wells will be divided into purging and sampling of four wells per day. 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 3.4. Water levels will be recorded before purging 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. The bailer will be lowered to a depth that would approximate the middle of the well screen to collect the sample in both deep and shallow wells. 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. Sample bottles will be filled in the following order: volatiles, metals, semivolatiles and last will be the indicator parameters (TSS, TDS, COD, etc.).

These sample storage containers will be supplied by the analytical laboratory. Table 3 lists the various analytical methods, required method of preservation, and maximum holding times before analysis.

To insure that the cross contamination of groundwater samples is eliminated, all materials used during the sampling of each monitoring well will be dedicated to that respective well. This would include: Teflon bailer, nylon cord, plastic sheet

placed around the monitoring well (this will insure that the cord does not touch the ground), disposable gloves, drawdown tubes for the pump. Rubber boots worn during the sampling operation will be thoroughly washed with detergent and water, rinsed with tap water, and finally rinsed with distilled water before and after sampling each monitoring well.

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. Groundwater samples for metals will not be filtered.

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. One round of groundwater sampling will be completed. After a review of the laboratory results has been performed, a decision regarding whether a second round of sampling is necessary will be made. Samples will be transferred to the analytical laboratory within twenty-four (24) hours of sample collection. A total of eight (8) groundwater samples will be submitted for the analytical scan as shown in Table 1. Duplicate groundwater samples will be collected for MW-3, which is a downgradient well with respect to the Astro electroplating facility. One distilled water field blank as well as one trip blank will be analyzed for volatile organics. A method of taking field blanks is represented in Section 5.8. At the time of

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

4.5 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. Contract laboratory protocols will be followed. Samples will be analyzed for the parameters given in Table 2 and include atomic absorption spectrophotometry for metals (unfiltered), gas chromatography and mass spectrometry for organics, and spectrophotometry (EPA Method 420.3) for total phenols.

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

4.6 Data Analysis

Various data comparisons will be made to assess chemical concentrations in the Astro Electroplating's soil and groundwater samples. Upgradient well water samples will be compared with downgradient samples to examine for and account for any background contamination levels. Groundwater 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 Lab., 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 and Stacey Gogos will serve as Field Supervisors and will be responsible for supervision of well installation and for collection of environmental samples as well as maintaining the field log book. Richard Barbour will serve as Project Hydrogeologist and direct the risk assessment and HRS score preparation using analytical results of subcontractors. 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. Tyree Brothers Environmental, Inc., will perform the drilling, borings, well installation, etc., for this project.

5.2 Data Quality Requirements and Assessments

The minimum detection levels required will be those published by the U.S. E.P.A. for the method. The precision of the analysis 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 (2) 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 contraction range should bracket the expected range of environmental sample concentrations. Upper and lower control levels will be established at three 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. The HNU will be calibrated on a daily basis using manufacturer provided calibration. A 1-point calibration will be performed on an hourly basis during use. The conductivity meter will be calibrated using distilled water and a known calibration solution between each well sample.

5.4 Data Validation

The analytical laboratory will be required to perform "check," or known concentration, analysis as well as to spike and analyze representative media samples. Analytical data will be validated by revealing 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, recalibration 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 audit 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. The final report will include all QA/QC data and report forms as outlined in the N.Y.S. C.L.P.

5.8 Field Activities, QA/QC Procedures

To insure that the information and field procedures are completed in an acceptable manner, we will follow the USEPA publication, Doc. No. SW-846, "Test Methods for Evaluating Solid Wastes," as a guideline to perform the following activities:

- Preparation of field logs will contain the information as outlined in SW-846-9.2.2.7, Paragraph 7
- All sample containers will be labeled in accordance with SW-846-9.2.2.7, Paragraph 7
- The use of trip blanks, outlined in SW-846-9.2.2.5, Paragraph 2
- The collection of field blanks outlined in SW-846-9.2.2.5, Paragraph 2
- Field blanks will be taken in accordance with SW-846-9.2.2.5, Paragraph 2, #2

The field conditions when field blanks are taken will be presented in a manner as outlined below:

GROUNDWATER

Bailers

Water Level Measurement

Pump

Cleaning/decontamination Methods

Sample Containers

SOILS

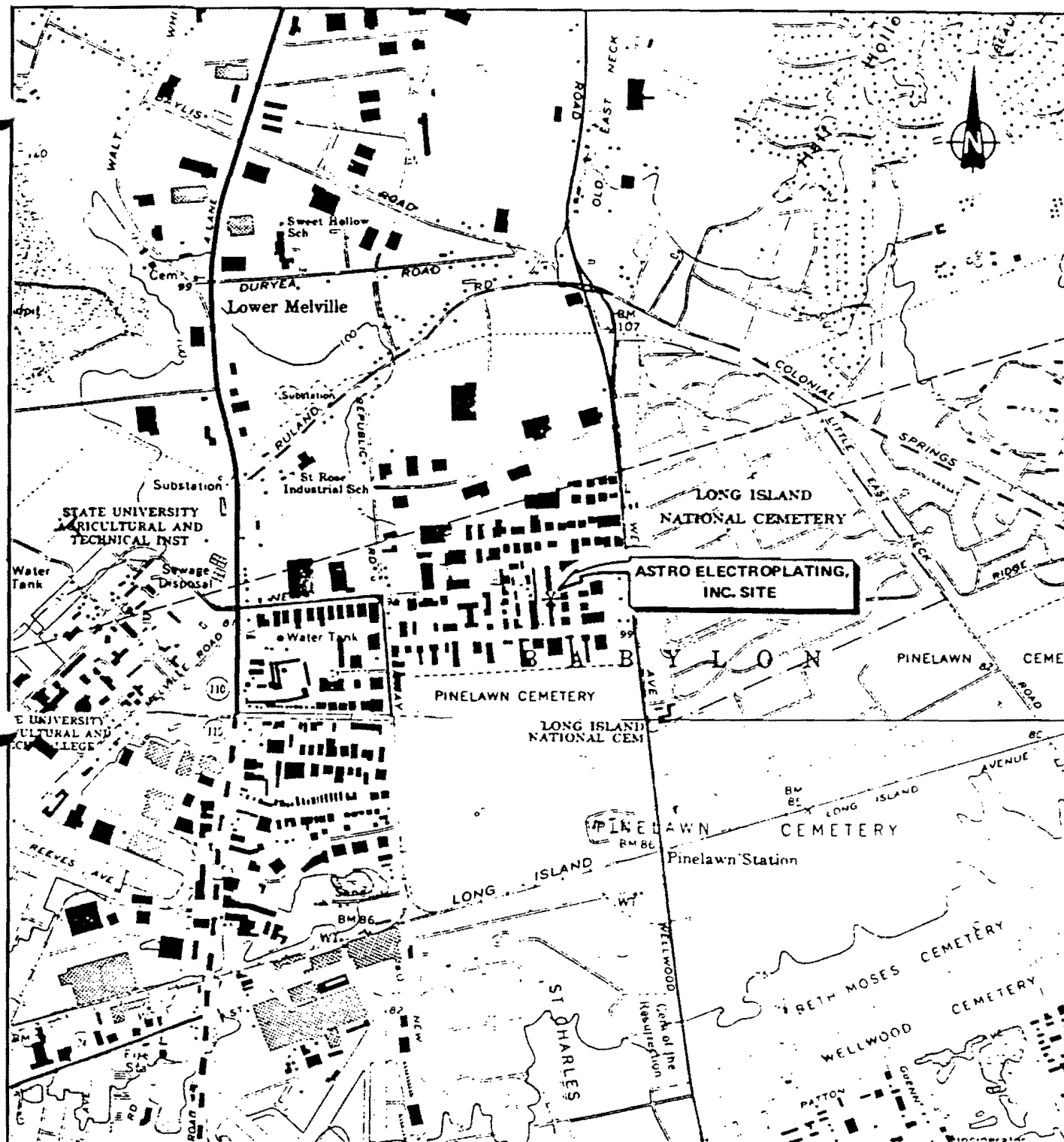
Drilling Equipment

Split Spoon

Knife, Spatula, Trowel

Cleaning/decontamination Methods

Sample Containers



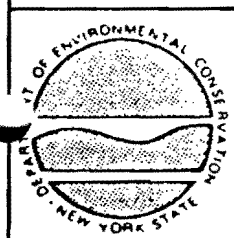
0 2000 4000 FT
SCALE

COORDINATES

LAT. $40^{\circ} 46' 15''$
LONG. $73^{\circ} 24' 24''$

MAP SOURCE:

USGS MAPS HUNTINGTON AND AMITYVILLE
QUADRANGLES NEW YORK-SUFFOLK CO.
7.5 MINUTE SERIES 1967 (Photorevised 1979)



Prepared for
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road Albany, New York 12233
Henry G. Williams, Commissioner

Division of Solid and Hazardous Waste

Norman H. Rosenschuck, P.E.
Director

Approved

ASTRO ELECTROPLATING, INC. SITE PHASE I INVESTIGATION

SITE LOCATION MAP

Prepared by
WOODWARD-CLYDE CONSULTANTS, INC.
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
NEW YORK, NEW YORK

DR BY	BTD	SCALE	AS SHOWN	PROJ NO	82C4548-3
CKD BY	CJM	DATE	24 JAN 1985	FIG NO	1

Figure 1 Location Map

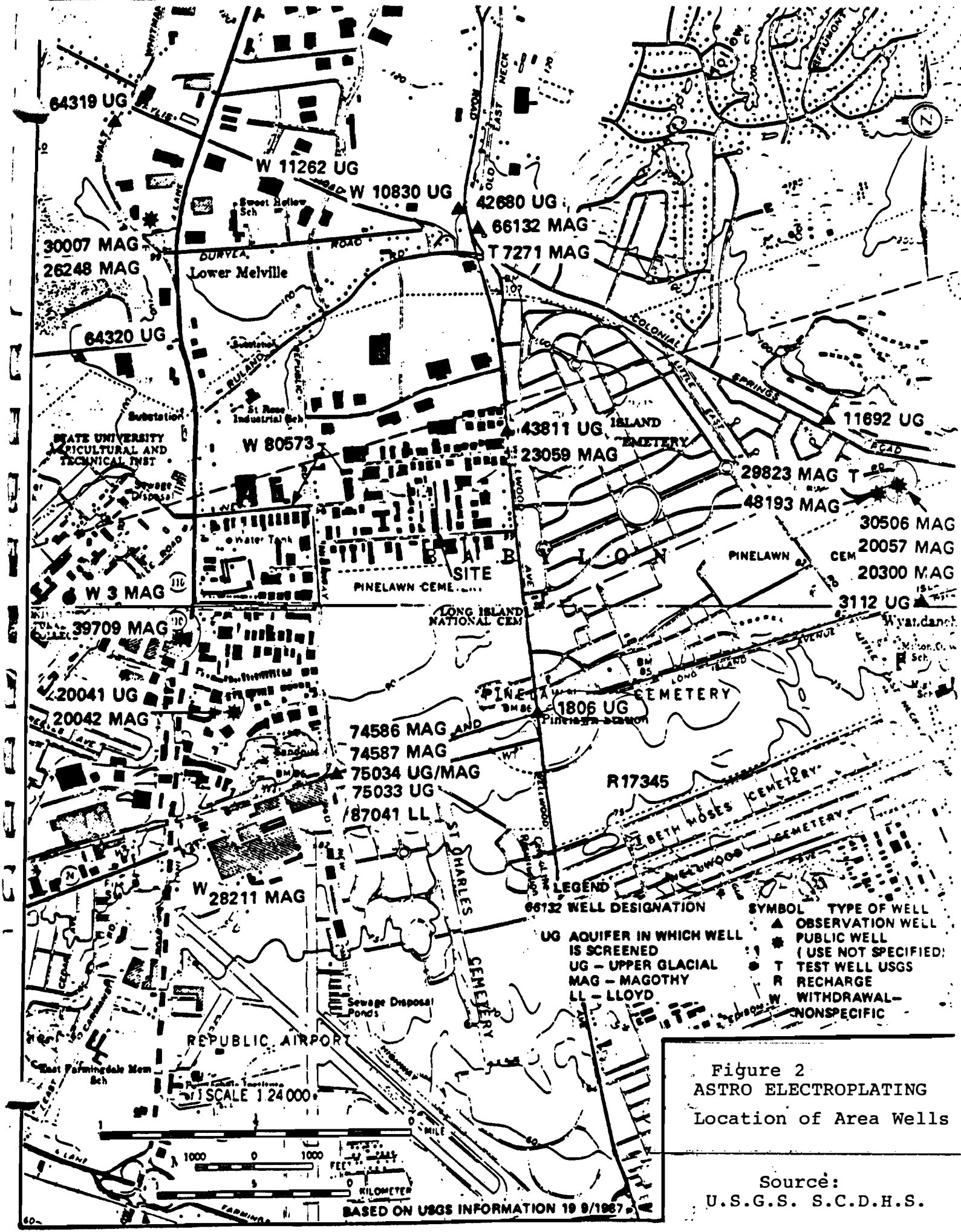
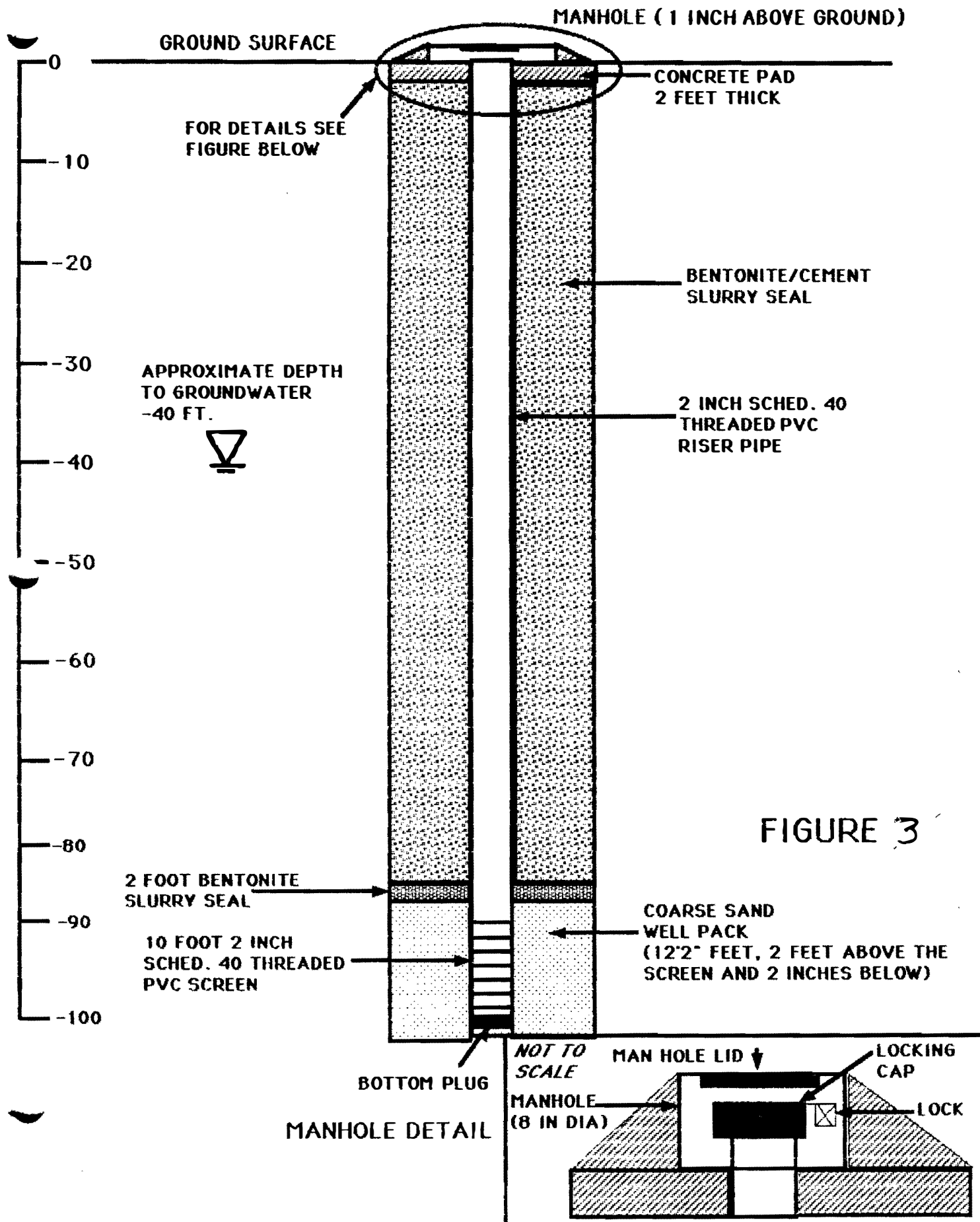


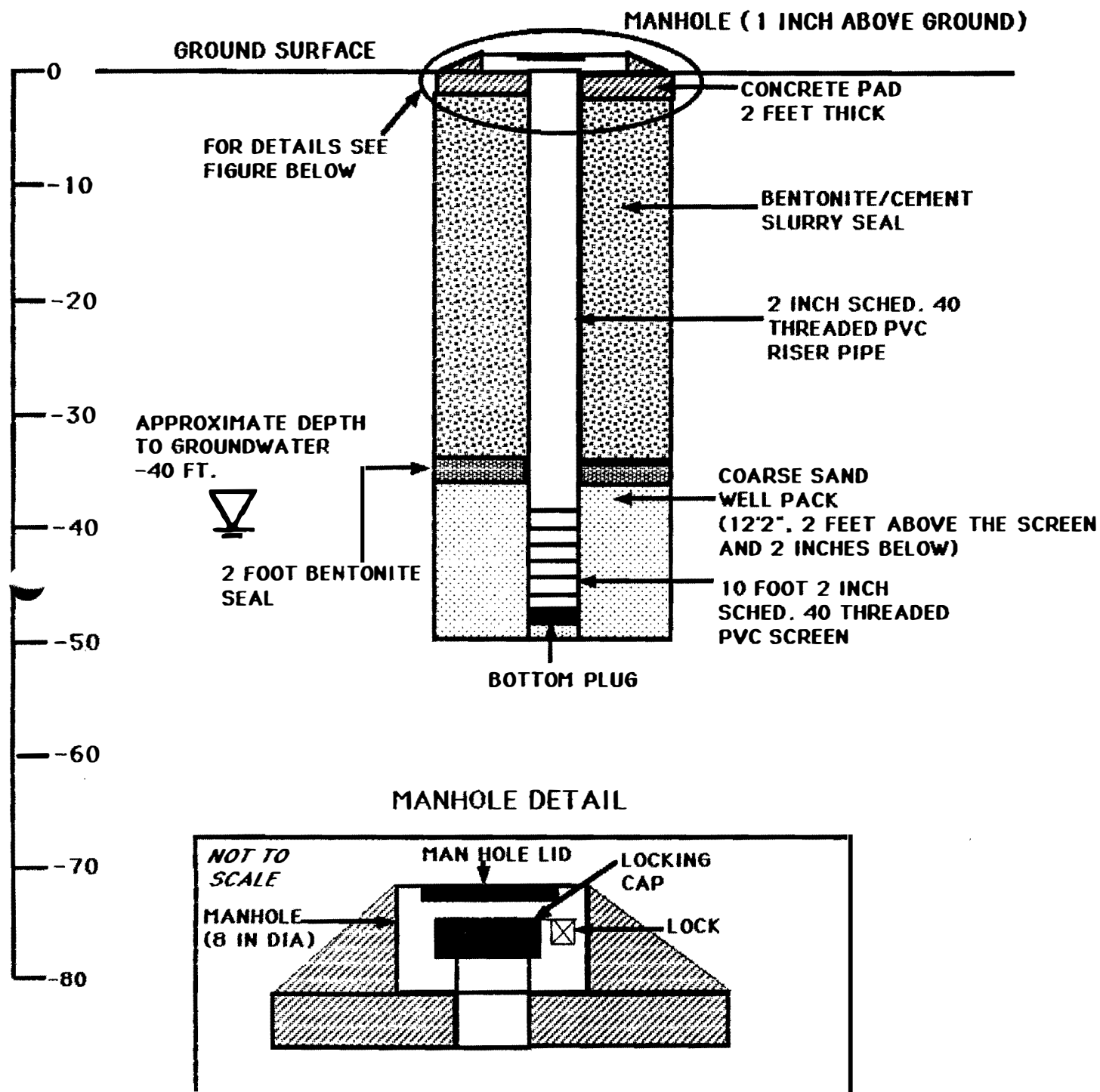
Figure 2
ASTRO ELECTROPLATING
Location of Area Wells

Source:
U.S.G.S. S.C.D.H.S.

DEEP MONITORING WELL DESIGN



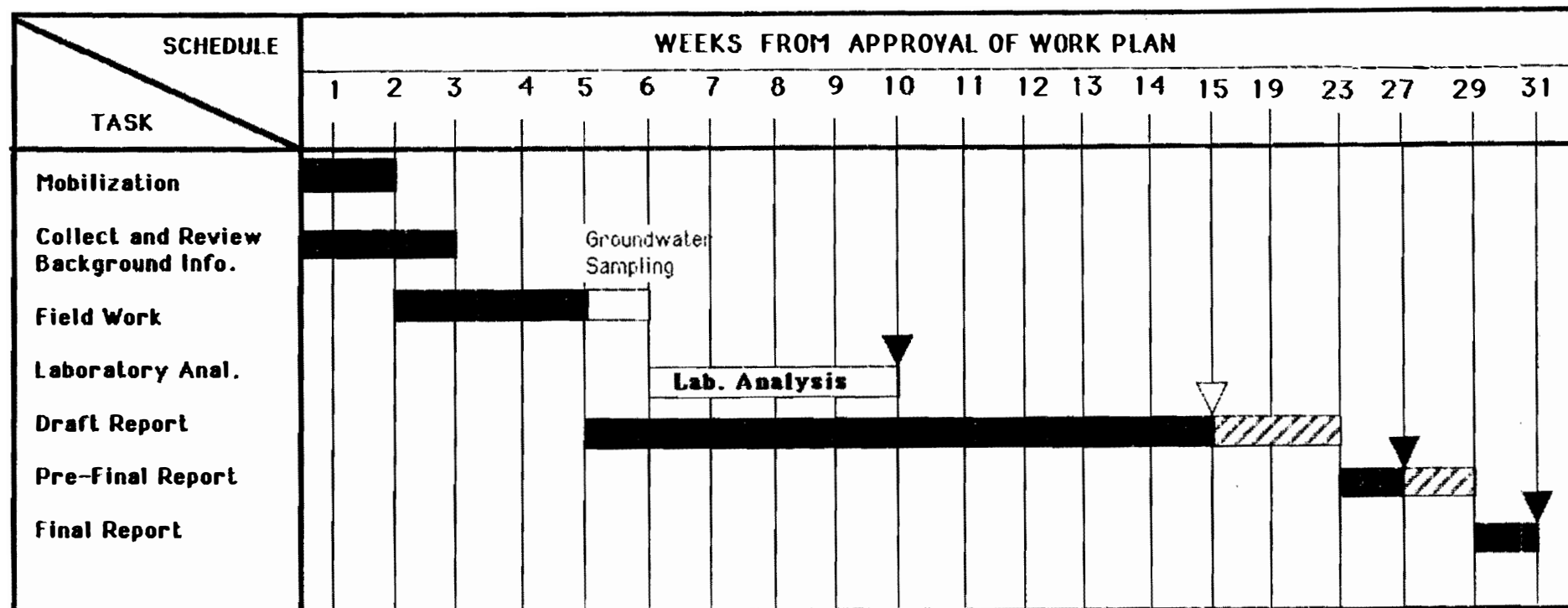
SHALLOW MONITORING WELL DESIGN



NOTE : WELL SCREEN WILL BE SET 2 FEET ABOVE THE WATER TABLE TO ALLOW FOR GROUNDWATER FLUCTUATION

FIGURE 4

ASTRO ELECTRO PLATING WORK SCHEDULE



NOTE: THE ESTIMATED TIME TO SUBMIT THE DRAFT REPORT IS 15 WEEKS. THIS IS BASED ON THE AVAILABILITY OF A DRILLER BEING ABLE TO MOBILIZE WITHIN 2 WEEKS AND A FOUR WEEK LABORATORY TURNAROUND TIME.



DRAFT REPORTS



FINAL REPORTS



DEC REVIEW PERIOD

FIGURE 5

31

Figure 6

[illegible]

TABLE 1
ASTRO ELECTROPLATING
SUMMARY OF LABORATORY ANALYSIS
FOR GROUNDWATER SAMPLES

SAMPLE LOCATION	SAMPLE MEDIA (NO. OF SAMPLES)	DEPTH	LABORATORY ANALYSIS
MW 1,5	Groundwater (1)	At 50' & 100'	Priority pollutant metals and volatile organics, total volatile organics and phenols, semi- volatiles, cyanide
MW 2,6	Groundwater (1)	At 50' & 100'	Priority pollutant metals and volatile organics, total volatile organics and phenols, cyanide
*MW 3,7	Groundwater (1)	At 50' & 100'	Priority pollutant metals and volatile organics, total volatile organics and phenols, cyanide
MW 4,8	Groundwater (1)	At 50' & 100'	Priority pollutant metals and volatile organics, total volatile organics and phenols, cyanide

Note: On all samples, pH will be analyz'd in the field.

* A duplicate groundwater sample will be collected from MW 3.

TABLE 2
ASTRO ELECTROPLATING
SUMMARY OF LABORATORY ANALYSIS
FOR SOIL SAMPLES

SAMPLE LOCATION	SAMPLE COLLECTION DETERMINED BY	NUMBER OF SAMPLES	LABORATORY ANALYSIS
MW 5	Groundwater Inter-face	(1)	Priority pollutant metals, volatile organics, phenols, cyanide
	HNU Reading, Highest	(1)	
MW 6	Groundwater Inter-face	(1)	Priority pollutant metals, volatile organics, phenols, cyanide
	*HNU Reading, Highest	(1)	
MW 7	Groundwater Inter-face	(1)	Priority pollutant metals, volatile organics, phenols cyanide
	*HNU Reading, Highest	(1)	
MW 8	Groundwater Inter-face	(1)	Priority pollutant metals, volatile organics, phenols cyanide
	*HNU Reading, Highest	(1)	
B-1	Bottom of Leaching Pool, 0-2 feet	(1)	Priority pollutant metals, volatile organics, phenols cyanide
	*HNU Readings, Highest	(2)	
B-2	Bottom of Leaching Pool, 0-2 feet	(1)	Priority pollutant metals, volatile organics, phenols, semi-volatiles, indicator parameters, cyanide
	*HNU Readings, Highest	(2)	
Background soil sample location to be determined on site	Location can be assumed free of any contamination, and has been undisturbed by human activities	(1)	Priority pollutant metals, volatile organics, phenols, semi-volatils, indicator parameters, cyanide

*Samples selected for anlaysis will also be based on the opinions of the N.Y.S. D.E.C. Field Representative and personnel from Galli Anson Environmental, Inc.

TABLE 3

REQUIRED WATER ANALYSIS METHODS,
PRESERVATION AND HOLDING TIMES

PARAMETERS	EPA METHOD	PRESERVATION	MAXIMUM HOLDING TIME
Total Phenols	420.3	Cool, 4° C, H ₂ SO 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 Extract- able Organics	610/625	Cool, 4° C, Store in dark ²	7 days until extractions; 40 days after
Heavy Metals ³	200 Series	HNO ₃ to pH<2	6 months
Cyanide	335.2	NaOH to pH<2 pH<12	12 days
pH	150.1	None	Analyze Immediately
Conductivity (Total dis- solved solids)	*	None	Analyze Immediately
Temperature	*	None	Analyze Immediately
TSS	*	None	Analyze Immediately
TOX	*	*	*
TOC	451.1		26 days
BOD	405.1	Cool, 4° C	24 hours
COD	410.2	Cool, 4° C H ₂ SO ₄ to pH<2	26 days
Sulfate	375.1	Cool 4° C	26 days
Flouride	340.1	None	26 days

PARAMETER	EPA METHOD	PRESERVATION	MAXIMUM HOLDING TIME
Chloride	325.1	None	26 days
Nitrate	352.1	Cool, 4° C, H ₂ SO ₄ to pH<2	26 days

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, Na₂ S₂ O₃ will be added.
3. Including hexavalent chromium.
4. All sampling methodologies and preservation techniques will be in conformance with CLP protocol.
5. All analysis methodologies will be completed in accordance with CLP protocol.

*An approved SCLP method, preservation, holding time.

TABLE 4

REQUIRED SOIL ANALYSIS METHODS,
PRESERVATION AND HOLDING TIMES

PARAMETERS	EPA METHOD	PRESERVATION	MAXIMUM HOLDING TIME
Total Phenols	420.3	Cool, 4° C	28 days
Volatile Organic Aromatics	624	Cool, 4° C	7 days
Purgeable Halocarbons	625	Cool, 4° C	7 days
Base/Neutral Acid Extract- able Organics	610/625	Cool, 4° C	7 days until extractions; 40 days after
Heavy Metals ³	200 Series	Cool, 4° C	7 months
Cyanide	335.2	Cool, 4° C	12 days

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, $\text{Na}_2\text{S}_2\text{O}_3$ will be added.
3. Including hexavalent chromium.
4. All sampling methodologies and preservation techniques will be in conformance with CLP protocol.
5. E.P.A. methods will be modified for soils in accordance with SCLP.

APPENDIX A

ASTRO ELECTROPLATING, INC.
FARMINGDALE, SUFFOLK COUNTY, NEW YORK

HEALTH AND SAFETY PLAN

Prepared by:

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

MARCH 8, 1988

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 Phase II investigations are being performed at Astro Electroplating, Inc.,'s property at Farmingdale, New York.

Richard D. Galli, P.E., P.C., (RDG) will be responsible for providing materials, equipment and labor required by the HASP. The protocols of the HASP will be 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. Additional measures will be implemented 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 Tip II. 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 "breathe". 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 I. If conditions warrant it, Level B and C protection will be worn.

Table I
Atmospheric Hazard Guidelines

<u>Hazard</u>	<u>Monitoring Equipment</u>	<u>Measured Level</u>	<u>Action</u>
Explosive atmosphere	Combustible gas indicator (CGS-20M)	<10% LEL1	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 atmosphere 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 C2 protection
		5-500 ppm	Can continue investigation if wearing Level B3 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 below.

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 tobacco, smoking or any practice that increase the probability of hand-to-mouth transfer and ingestion of materials 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. One the site there will be plenty of fluids available. Personnel should replace water and salts lost 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:

<u>Ambient Temperatures</u>	<u>Maximum Wearing Time</u>
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.

APPENDIX B

LABORATORY QA/QC MANUAL

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. • Cranford, N.J.

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", Environmental 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.

TABLE OF CONTENTS

1.0	TITLE PAGE
2.0	TABLE OF CONTENTS
3.0	PROJECT ORGANIZATION AND RESPONSIBILITIES
4.0	QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA IN TERMS OF PRECISION, ACCURACY, AND COMPLETENESS RESPENTATIVENESS AND COMPARABILITY
5.0	SAMPLING, SHIPPING, STORAGE AND LOGGING
6.0	SAMPLE CUSTODY
7.0	INSTRUMENT CALIBRATION PROCEDURES
8.0	DATA REDUCTION, VALIDATION AND RECORDING
9.0	INTERNAL QUALITY CONTROL CHECKS
10.0	PERFORMANCE AND SYSTEM AUDITS
11.0	PREVENTATIVE MAINTENANCE
12.0	SPECIFIC ROUTINE PROCEDURES TO BE USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS
13.0	CORRECTIVE ACTION
14.0	REFERENCES



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 responsibility 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.

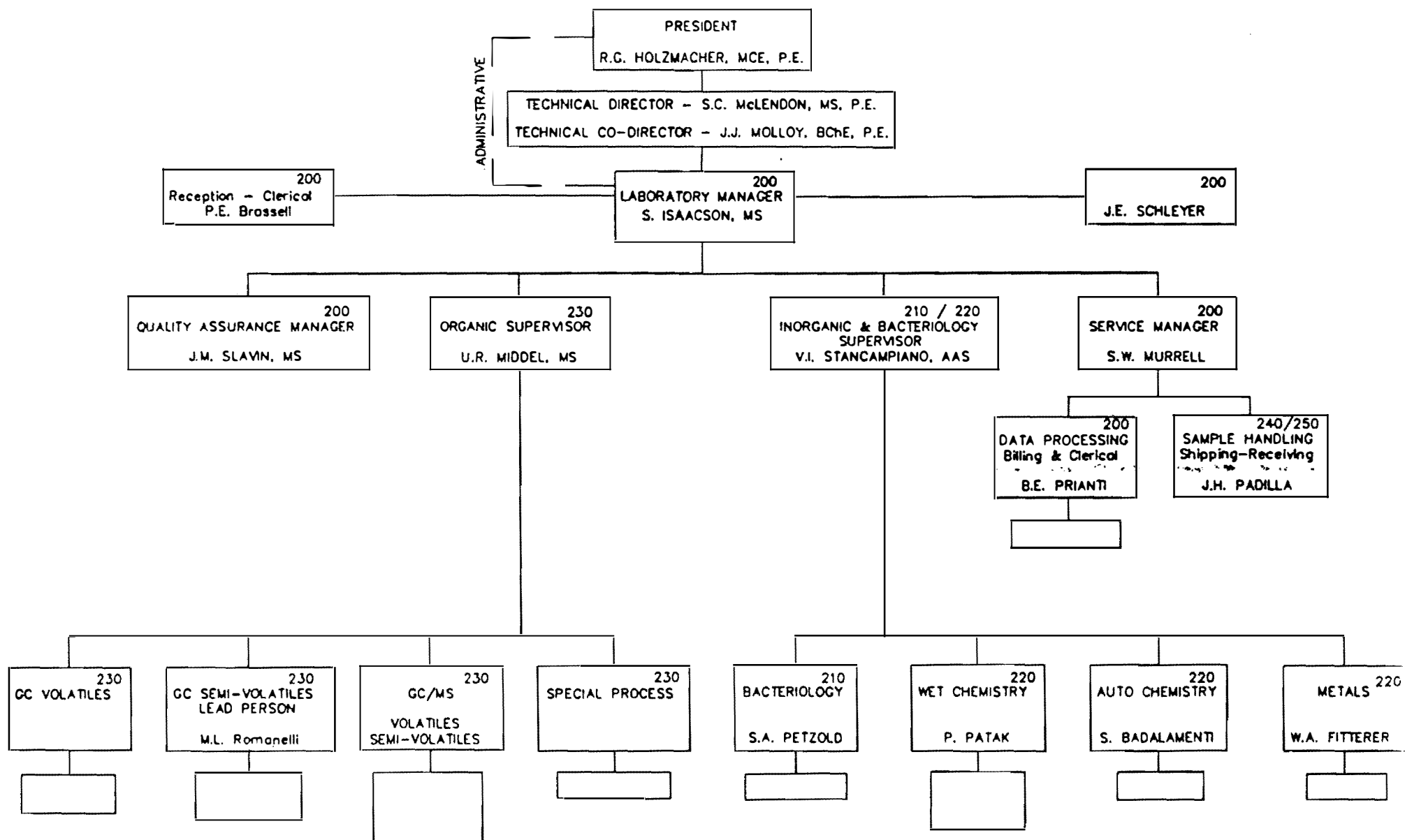
3.3.2 - Inorganics Department

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 beneficial 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 ≤ 20 percent when sample results are > 10 ug/l and ≤ 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:

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

For data from volatile organic analyses to be considered acceptable, the value of the % error must be ≤ 40 percent for "known" values of < 10 ug/l and ≤ 20 percent for "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 interfere 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 be 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 established 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.

6.0 SAMPLE CUSTODY

H2M Laboratory has a Standard Operation Procedure for documenting 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 custody 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

- 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:	(2) 28-60 ml glass vials with teflon-lined caps	Sodium sulfite plus adjust pH to 2, cool to 4°C
a. Volatiles		
b. Acid Extractables)	(2) 1 to 2 l. glass with teflon-lined caps	Cool to 4°C
c. Base Neutrals)		
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

<u>PARAMETER</u>	<u>CONTAINER</u>	<u>PRESERVATIVE</u>
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 ₂ SO ₄

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



Bottle B - Plastic HNO₃
Acid Preserved



Bottle C - Glass 1 qt.
H₂SO₄ Acid
Preserved



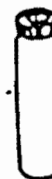
Bottle D - Glass
H₂SO₄ Acid
Preserved



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
Cubetainer
NaOH preserved



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



Bottle I O - 1 liter gl
w/teflon l
cap H₂SO₄
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 nephelometer 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 range of the calibration. A linear range over five decimals has been determined for all volatile scans. A five point "initial calibration" bracketing the expected concentration range 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 for Identification

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

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. Response curves are first developed for various concentrations to establish ranges of linear response. The software permits application of selected RFs, averages or quadratic curve. Initial 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 initial 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 acquisition 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 entered into the computer system.



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



Environmental Engineers & Scientists

HOLZMACHER, McLENDON and MURRELL, P.C.

575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040

LABORATORY REPORT

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

LAB NO.

PROJECT NO. 2C

CLIENT'S NAME AND ADDRESS

TYPE OF SAMPLE - POTABLE WATER
DATE COLLECTED -

COLLECTED BY
DATE RECEIVED -

PARAM- ETER	RESULT	PARAM- ETER	RESULT	PARAM- ETER	RESULT	PARAM- ETER	RESULT
TURB- IDITY	5.80	HARD- NESS	226.	LEAD	<2.00#	DETERG. (MBAS)	<0.04
COLOR	5.00	SULFATE	100.	MERCURY	<0.50#	T. DISS SOLIDS	240.
ODOR (COLD)	0.00	CHLOR- IDE	41.0	SELEN- IUM	10.0 #	FLUOR- IDE	<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	MANGA- NESE	1.07		
SPEC. COND.	584.	CADMIUM	<5.00#	COPPER	0.05		
CALCIUM	56.4	CHROM- IUM	<0.01	SODIUM	27.2		
MAG- NESIUM	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.

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 curves 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 preparation 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 injected 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:

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

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 fluctuations 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

<u>Mass</u>	<u>Ion Abundance Criteria</u>
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

Injectations 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, naphthalene-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 air, 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

<u>OBSERVED INDICATION</u>	<u>POSSIBLE CAUSE</u>	<u>CORRECTIVE ACTION</u>
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 Change of instrument parameters Inconsistency in calibration	Prevent contaminations, Correct Baseline Treatment, Prevent change Correct cause (make new solutions, change injection techniques, etc.
	Inconsistency in sample preparation	Remedy appropriate step a. Extraction b. Concentration c. Cleanup

Equipment and Facilities

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

<u>EQUIPMENT</u>	<u>MANUFACTURER</u>	<u>MODEL</u>	<u>Year Purchased</u>
<u>Organic Analysis</u>			
Gas Chromatographs	Tracor	(1) 540 (2) 550 (2) 560	1984 1978,77 1980,82
Purging Apparatus	Tekmar	(1) LSC-1 (3) LSC-2	1977 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
<u>Organic Analysis (GC/MS/DS)</u>			
(2) Gas Chromatograph/Mass Spectrometer including:			
- Gas Chromatograph	(1) Finnegan	OWA 30	1980
- 9 Track Tape Drive	Perkin-Elmer	Sigma 3	1980
- Computer (NOVA 4)	Perkin-Elmer	---	1980
- Sample Concentrator	Data General	Nova 4	1980
- Dual Disk Drive	Tekmar	LSC-2	1980
- CRT	Perkin-Elmer	---	1980
- Real-Time Display	Tektronix	4006	1980
- 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	Envirochem	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/Wiswisher 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
<u>Metal Analysis (cont'd.)</u>			
Inductively Coupled Plasma Spectrometer System	Applied Re- search Labora- tories	3400 w/ IBM XTC Computer Pkg.	1986
<u>Inorganic Analysis</u>			
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

Year
Purchased

Organic Analysis (GC.MS.MSD) (Cont'd)

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

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 Chemistry (GC), Organic Chemistry (GC/MS) and Special Process Lab.

In a continuing effort to extend our capabilities and timeliness, 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 Incoos 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.

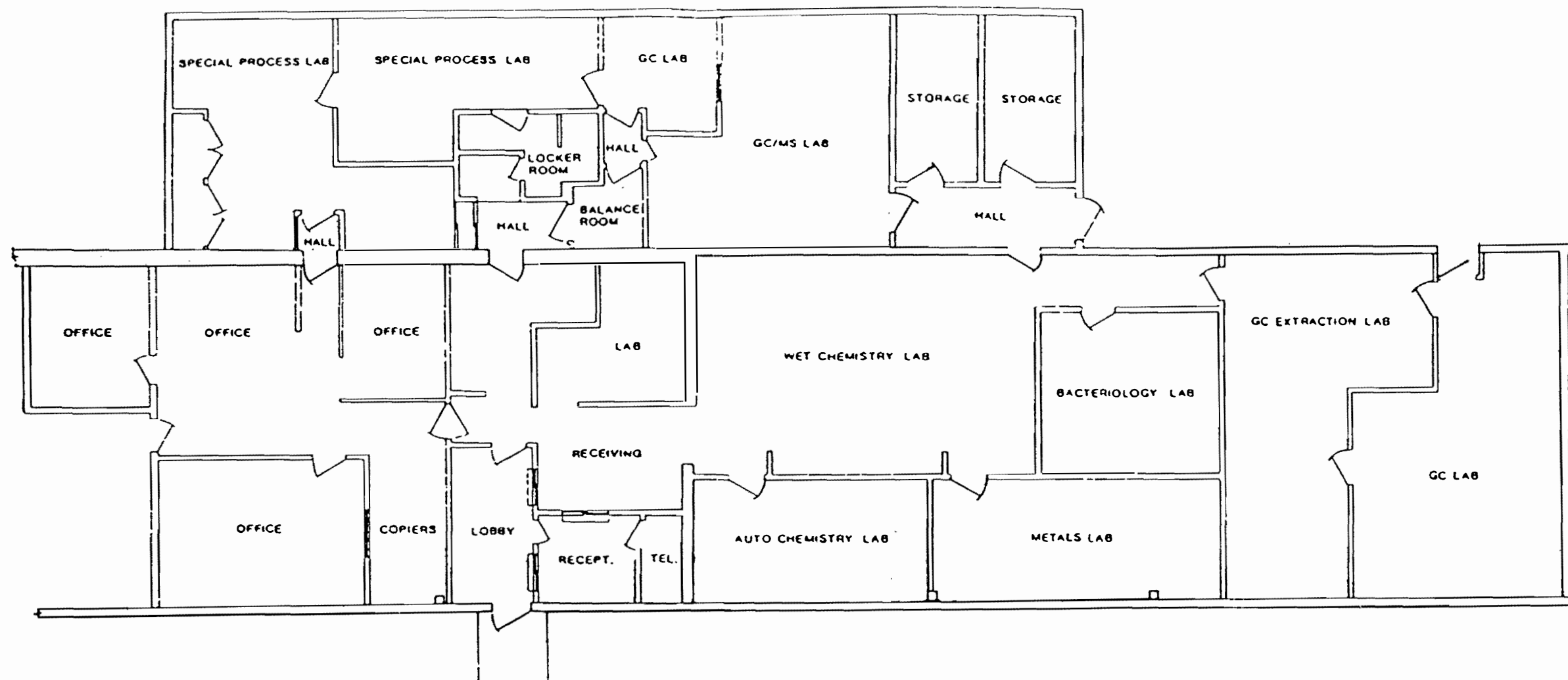
This facility is equipped with double sets of doors between this section and the rest of the facility. Access is limited to authorized personnel only. Separate areas are provided within the special process laboratory for changing street clothing to special disposable protective clothing. A washer/dryer 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 available for use and each is designed for specific functions, such as:

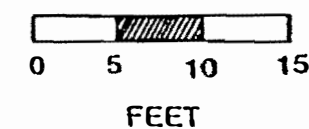
- opening of coolers with sample containers
- prescreening of samples and aliquots taken
- extraction of sample aliquots
- evaporation and concentration

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.



LABORATORY FLOOR PLAN

SCALE



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

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

Key Personnel

John J. Molloy, P.E.
Vice President

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 applied 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.

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 guidelines 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.

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 "Suprincos 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

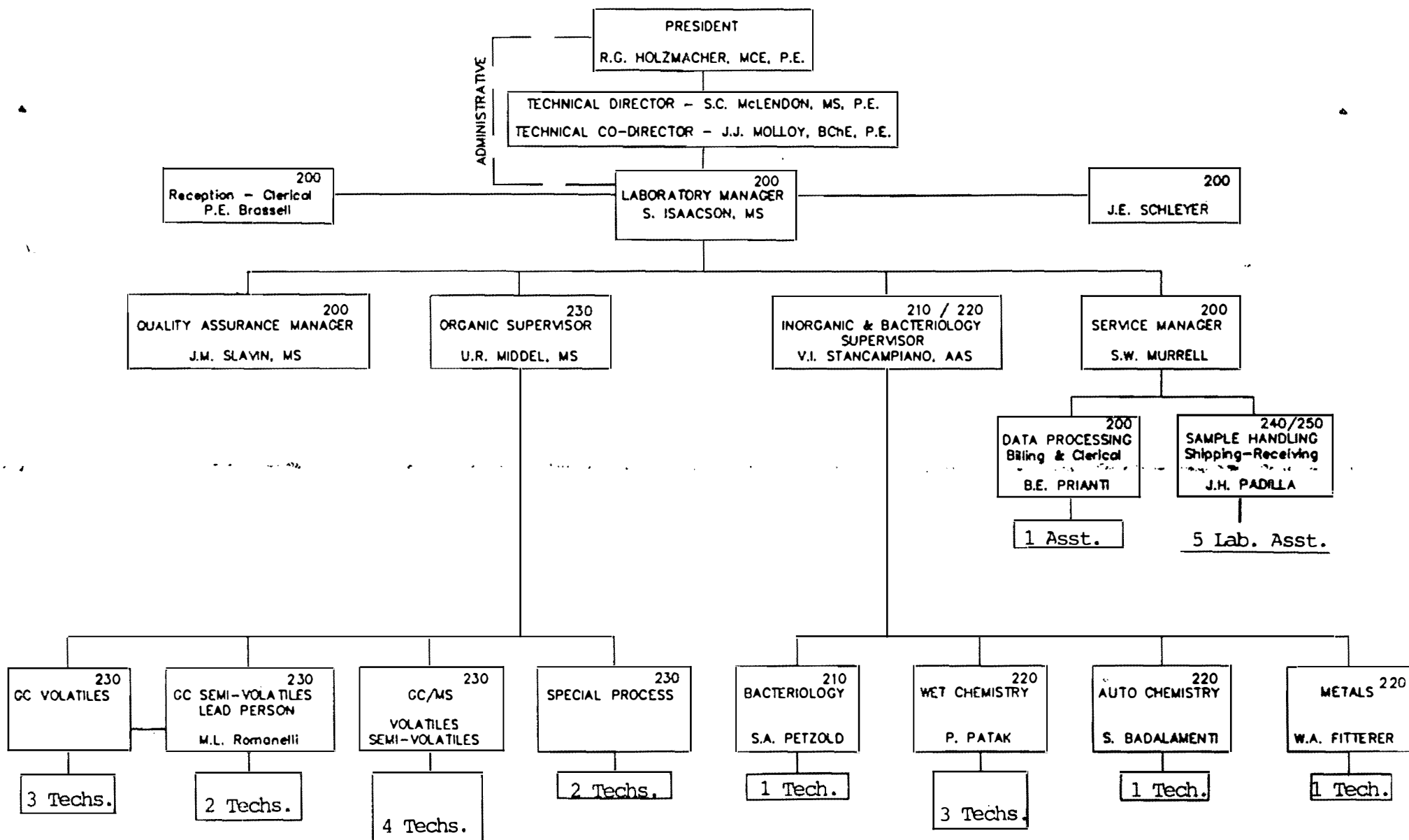
PROFESSIONAL SOCIETIES: American Association for the Advancement
of Science (AAAS)

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 chromatograph, 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.

~~David O. Casperson, M.D.~~

Acting

Director

Wadsworth Center for Laboratories and Research



DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Certifies That

H2M CORPORATION
575 Broad Hollow Road
Melville, NY 11747



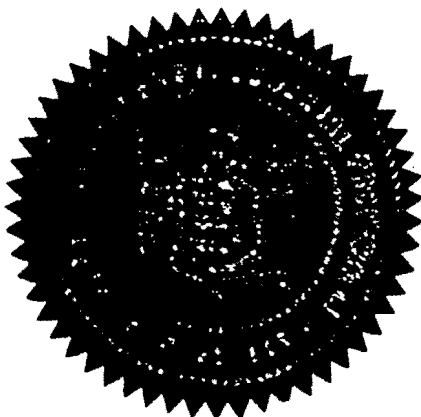
*having duly met the requirements of the
Regulations Governing Laboratory Certification
And Standards Of Performance N.J.A.C. 7:18 et. seq.*

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:

AIR

Bacteria
Plankton (Potable Water only)
Inorganic Chemicals
Organic Chemicals

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, ... 19⁸⁷ and is revocable for cause by the State Department of Health.

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



No. .. PH-0435

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

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

AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, INC.



CERTIFICATE OF MEMBERSHIP.

this certifies that as of January, 1962

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

Cost Proposal

H2M LABORATORIES

HOLZMACHER, McLENDON & MURRELL, P.C. ENVIRONMENTAL LABORATORY AND ANALYTICAL SERVICES
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040
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	Titanium/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 analyzed by the graphite furnace method. Many others can be analyzed by graphite furnace if lower detection limits are required. The remainder are routinely analyzed via the flame method.

PRICES ARE SUBJECT TO CHANGE

H2M LABORATORIES

HOLZMACHER, MCLENDON & MURRELL, P.C. ENVIRONMENTAL LABORATORY AND ANALYTICAL SERVICES
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 . (516) 694-3040
APPROVED ENVIRONMENTAL LABORATORY IN NEW YORK, NEW JERSEY & CONNECTICUT

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 Amenable to Chlorinization	65	Total Carbon	30
MBAS (detergents)	15	Total Hydrocarbons (Gravimetric)	30
Fluoride (distill.)	25	Turbidity	6
Fluoride	12	Langlier Saturation Index	
Formaldehyde	80	(Includes pH, CA, TDS, Talk, Temp)	25
Hardness, Total	8	Total Organic Halides (TOX)	80
Total Kjeldahl Nitrogen (TKN)	22		
Nitrate	12		
Nitrite	10		
Odor	6		
Oil and Grease	22		
Organic Nitrogen	32		
Oxygen, Consumed (Field Fixed)	8		
Oxygen, Dissolved (Field Fixed)	8		

MICROBIOLOGY

Total Coliform ¹	12
Fecal Coliform ²	15
Fecal Strep	20
Chlorophyll A	50
Total Plate Count	15

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

¹Membrane Filter Technique or Multiple Tube Fermentation Technique

²Includes Total Coliform

H2M LABORATORIES

HOLZMACHER, McLENDON & MURRELL, P.C. ENVIRONMENTAL LABORATORY AND ANALYTICAL SERVICES
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040
APPROVED ENVIRONMENTAL LABORATORY IN NEW YORK, NEW JERSEY & CONNECTICUT

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.

PRICES ARE SUBJECT TO CHANGE

H2M LABORATORIES

HOLZMACHER, McLENDON & MURRELL, P.C. ENVIRONMENTAL LABORATORY AND ANALYTICAL SERVICES
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040
APPROVED ENVIRONMENTAL LABORATORY IN NEW YORK, NEW JERSEY & CONNECTICUT

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.

PRICES ARE SUBJECT TO CHANGE

H2M LABORATORIES

HOLZMACHER, MCLENDON & MURRELL, P.C. ENVIRONMENTAL LABORATORY AND ANALYTICAL SERVICES
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040
APPROVED ENVIRONMENTAL LABORATORY IN NEW YORK, NEW JERSEY & CONNECTICUT

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,Sc,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,Sc,Ag,Zn)	130
Minerals (pH,Ca,Mg,Na,K,Talk,So ₄ ,Cl,F,TDS,Hard,Cond)	90
Nutrients (NH ₃ ,NO 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.

PRICES ARE SUBJECT TO CHANGE

H2M LABORATORIES

HOLZMACHER, McLENDON & MURRELL, P.C. ENVIRONMENTAL LABORATORY AND ANALYTICAL SERVICES
575 BROAD HOLLOW ROAD, MELVILLE, NEW YORK 11747 (516) 694-3040
APPROVED ENVIRONMENTAL LABORATORY IN NEW YORK, NEW JERSEY & CONNECTICUT

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

Appendix C Resumes of Key Personnel

RICHARD D. GALLI
Waste Treatment Engineer

Education
Manhattan College, B.C.E., 1977; M.C.E., 1978
(Magna Cum Laude)

Societies
American Society of Civil Engineers
Water Pollution Control Federation
Chi Epsilon
Tau Beta Pi

Professional Engineer License
New York, New Jersey

Mr. Galli has 9 years of experience in design and engineering of municipal, industrial and hazardous waste treatment facilities including municipal landfills and surface impoundments. He is responsible for the design of industrial waste and hazardous waste treatment facilities, solid waste management studies, resource recovery facilities, environmental licensing studies for the power industry and landfills and garbage-burning facilities. He has extensive experience in the areas of biological waste and heavy metal removal treatment systems. Specific projects include:

UTILITY SOLID WASTE ACTIVITY GROUP (USWAG),
Edison Electric Institute, Washington, D.C.

Mr. Galli assisted in the preparation of review of reports which documented past and current solid waste management and disposal practices utilized by the electric power industry. The effort was initiated to determine the impact of the Resource Conservation and Recovery Act upon the power industry's solid and hazardous waste management activities. Mr. Galli studied and designed several landfills for the disposal of fly ash bottom ash and flue gas desulfurization scrubber sludges from coal-fired power plants and gasification plants.

PENNSYLVANIA AVENUE LANDFILL - Brooklyn, New York

Mr. Galli was involved with the design of the closure and post-closure of the Pennsylvania and Edgemere landfills for the City of New York. These included installing methane gas collection system, leachate collectors and treatment system, monitoring wells and final cover of the landfill.

NIAGARA POWER PROJECT - Niagara Falls, New York

Mr. Galli was responsible for the design of a double-lined landfill and leachate treatment system for the storage of contaminated soils resulting from excavation activities at the Niagara Power Project in Niagara Falls, New York. Mr. Galli engineered and designed a portable air stripping system for the Larry Tyree Equipment Company of Farmingdale, New York, gasoline station contractors, for

the treatment of contaminated groundwater resulting from leaking underground gasoline storage tanks. Contamination consisted of benzene, ethyl benzene, toluene, xylene and other gasoline compounds.

Mr. Galli was the senior engineer responsible for the design and engineering of waste treatment systems to treat contaminated groundwaters resulting from the proposed construction of the Robert Moses Power Project (Underground Powerhouse) Expansion. The waste treatment system consisted of a heavy metals removal system followed by an air stripping tower and polishing activated carbon adsorption system. The chemical contamination consisted of methylene chloride, carbon tetrachloride, carbon disulfide, dichloroethane and tetrachloroethylene. They resulted from former operation of a chemical manufacturing and repackaging facility located adjacent to the hydro-electric facility.
Client: Power Authority State of New York

MOUNT TOM GENERATING STATION - Northampton, Massachusetts

Mr. Galli prepared drilling, geophysical, and monitoring specifications for the geohydrology study to determine the extent of groundwater contamination under an existing coal ash pile. Mr. Galli was responsible for the design of a new landfill to handle the disposal of fly ash and bottom ash generated by the coal-conversion at the Mount Tom Generating Station.

ARTHUR KILL POWER PLANT - Staten Island, New York

Mr. Galli was responsible for the wastewater treatment and solid waste disposal sections of the environmental impact statement conducted for the New York Power Authority (NYPA)'s proposed 800MW Arthur Kill coal-fueled power plant.

NORTH RIVER WATER POLLUTION CONTROL PROJECT (WPCP) - New York

Mr. Galli performed detailed engineering, design and specification preparation for various unit process operations for the 170 million-gallon-per-day (MGD) North River WPCP for the City of New York. Specific areas of concern included sedimentation tanks, activated sludge system, and sludge thickening equipment.

ESSEX COUNTY RESOURCE RECOVERY FACILITY - Newark, New Jersey

Mr. Galli engineered and designed an air stripping system for the proposed Essex County Resource Recovery Facility located in Newark, New Jersey for the removal of benzene, ethyl benzene and other hydrocarbons from groundwater on the project site. Client: Port Authority of New York & New Jersey.

SPECTRUM FINISHING CORPORATION - West Babylon, New York

Mr. Galli engineered, designed and supplied a wastewater treatment facility for the removal of chromium, cadmium, cyanide and other heavy metals resulting from the rinsewater discharge of this electroplating facility. Currently a hazardous waste site investigation is being performed to determine the extent of groundwater and soil contamination resulting from past disposal ultrafiltration, multi-effect evaporators, practices of heavy metals and organic solvents. Mr. Galli designed and supplied a waste treatment facility to treat plating rinse wastewaters generated by SPECTRUM. He also directed the Phase II site investigation report to determine the extent of groundwater contamination due to the facility's past operations.

the treatment of contaminated groundwater resulting from leaking underground gasoline storage tanks. Contamination consisted of benzene, ethyl benzene, toluene, xylene and other gasoline compounds.

Mr. Galli was the senior engineer responsible for the design and engineering of waste treatment systems to treat contaminated groundwaters resulting from the proposed construction of the Robert Moses Power Project (Underground Powerhouse) Expansion. The waste treatment system consisted of a heavy metals removal system followed by an air stripping tower and polishing activated carbon adsorption system. The chemical contamination consisted of methylene chloride, carbon tetrachloride, carbon disulfide, dichloroethane and tetrachloroethylene. They resulted from former operation of a chemical manufacturing and repackaging facility located adjacent to the hydro-electric facility.

Client: Power Authority State of New York

MOUNT TOM GENERATING STATION - Northampton, Massachusetts

Mr. Galli prepared drilling, geophysical, and monitoring specifications for the hydrogeology study to determine the extent of groundwater contamination under an existing coal ash pile. Mr. Galli was responsible for the design of a new landfill to handle the disposal of fly ash and bottom ash generated by the coal-conversion at the Mount Tom Generating Station.

ARTHUR KILL POWER PLANT - Staten Island, New York

Mr. Galli was responsible for the wastewater treatment and solid waste disposal sections of the environmental impact statement conducted for the New York Power Authority (NYPA)'s proposed 800MW Arthur Kill coal-fueled power plant.

NORTH RIVER WATER POLLUTION CONTROL PROJECT (WPCP) - New York

Mr. Galli performed detailed engineering, design and specification preparation for various unit process operations for the 170 million-gallon-per-day (MGD) North River WPCP for the City of New York. Specific areas of concern included sedimentation tanks, activated sludge system, and sludge thickening equipment.

ESSEX COUNTY RESOURCE RECOVERY FACILITY - Newark, New Jersey

Mr. Galli engineered and designed an air stripping system for the proposed Essex County Resource Recovery Facility located in Newark, New Jersey for the removal of benzene, ethyl benzene and other hydrocarbons from groundwater on the project site. Client: Port Authority of New York & New Jersey.

SPECTRUM FINISHING CORPORATION - West Babylon, New York

Mr. Galli engineered, designed and supplied a wastewater treatment facility for the removal of chromium, cadmium, cyanide and other heavy metals resulting from the rinsewater discharge of this electroplating facility. Currently a hazardous waste site investigation is being performed to determine the extent of groundwater and soil contamination resulting from past disposal ultrafiltration, multi-effect evaporators, practices of heavy metals and organic solvents. Mr. Galli designed and supplied a waste treatment facility to treat plating rinse wastewaters generated by SPECTRUM. He also directed the Phase II site investigation report to determine the extent of groundwater contamination due to the facility's past operations.

FOREMOST DAIRIES - Lemoore, California

Mr. Galli directed the design and construction of an anaerobic biological waste treatment facility for the disposal of cheese whey and treatment of dairy process wastewaters. He was responsible for performing feasibility studies to determine the suitability of anaerobic technologies to perform the required degree of treatment.

INDUSTRIAL GRAIN PRODUCTS (IGP), - Thunder Bay, Ontario

Mr. Galli was responsible for the engineering and design of an anaerobic waste treatment facility for IGP. He directed equipment specification and procurement, subcontractor contract control, and process instrumentation.

Mr. Galli is currently providing the following types of consulting engineering services to the companies related to the electroplating and metal finishing industry:

1. Analysis of process and waste streams.
2. Complete laboratory analyses for liquid, solids, sludge and air streams.
3. Preparation of baseline and discharge monitoring reports.
4. Review of waste generating processes to identify waste reduction options and streamline waste handling procedures.
5. Review of alternative treatment systems, feasibility studies and cost estimates.
6. Prepare programs for treatability and pilot plant studies, process development.
7. Preliminary and final design, engineering reports, plans and specifications.
8. Construction management, contractor liaison, project administration, cost estimates.
9. Preparation of permits including all necessary submittals for Pretreatment Program, (municipal sewer system) and State Pollution Discharge Elimination System Program (surface/groundwaters discharge).
10. Permitting and regulatory affairs.

Companies include:

- | | |
|---------------|---|
| 1,2,3,4 | L&L White Metal Castings Co., Carlstadt, NJ (60K) |
| 1,2,3,4,7,8,9 | Ferris Plating, Co., Moonachie, NJ (25K) |
| 9 | RAI Research, Hauppauge, NY (1K) |
| 1,2,3,4,7,8,9 | Record Plating Company, NJ (25K) |

DEAN ANSON II

Title: Project Manager/Supervising Environmental Scientist

Education: BA/Ohlo Wesleyan University
MS/New York University
MBA/New York University

Experience: In the past six months, Dean Anson has managed three asbestos projects. Bayville's Municipal Building had three boiler rooms, crawl spaces and 1,200 feet of pipe insulation. Dean and his staff developed specifications and bid documents to remove the asbestos as well as supervised the removal contractor.

Prior to its demolition, Dean managed the asbestos survey of a 20,000 square foot turn of the century commercial building in the Village of Great Neck Plaza.

Dean managed a survey for asbestos and other hazardous materials in a 40,000 square foot commercial building and maintenance garage. This work was completed for the Town of Huntington.

Dean Anson has recently evaluated the environmental impacts associated with the location of a resource recovery facility in Old Westbury, New York. Disciplines reviewed included air quality, noise, groundwater, ecology, traffic, and roadway conditions and capacity.

He is managing the review of environmental impact statements for several proposed condominium developments in the Village of Great Neck Plaza. In this role, Storch Associates is functioning as the Village's environmental consultant and planner.

Dean Anson is managing the environment assessment, site development, traffic analysis and topographic survey for People Express Airlines Corporate headquarters facility.

For the 15 years prior to joining Richard D. Galli Dean Anson has managed and coordinated feasibility studies for a coal gasification plant in Kentucky and an industrial park in Brooklyn, N.Y., including evaluation of economic, financial, regulatory, and environmental conditions in the region surrounding the project; overall management of Environmental Report and Permits and Licenses Plan for a \$400-million coal gasification plant in Illinois and coal-fired 700-MW power plant in New York City; prepared and monitored job schedules and budgets, assigning and monitoring subcontractor field programs, and functioning as Gibbs & Hill's principal representative with the client; he was responsible for satisfactory completion of work in accordance with project requirements. He coordinated preparation of aquatic and terrestrial biological scopes of work; selected field sampling locations; evaluated and selected subcontractors; monitored subcontractor field studies for USERDA-funded Illinois Coal Gasification Project; prepared baseline descriptions of aquatic communities in the Mississippi River and evaluation of impacts on biological communities.

HAZARDOUS WASTES - REPRESENTATIVE PROJECTS AND PUBLICATIONS

Plating wastes centralized treatment facilities - investigations and preliminary design for treatment plant to serve 20 job shop platers discharging chrome, cyanide, copper, nickel, lead, cadmium, zinc, oil and grease - Plating City, Brooklyn, NY; for Brooklyn Economic Development Agency, 1984.

Investigations and remedial design for solvents contaminated groundwater; Newark, NJ; McKesson Environmental Systems, 1982.

Base line monitoring and analysis of ground and surface water, and ecology; impacts assessment and permitting documents for coal preparation plant and coal wastes disposal at Coburn, VA; for Virginia Iron Coal and Coke Company, 1980.

Conceptual and detail engineering/design, and permitting including air pollution source permits for \$1 billion, 170 million gallon per day North River sewage treatment plant; City of New York; in construction, startup 1986.

Investigations to identify and quantify toxic wastes residues from mining and the resulting stream pollution; preparation of remedial plan for the 1,250 sq mi Youghiogheny River Basin; for Pennsylvania Department of Environmental Resources, 1972.

Carcinogenic and heavy metals wastes handling and disposal impacts analysis and permitting related to coal gasification/liquification projects sponsored by U.S. Energy Research and Development Agency and its successor U.S. Department of Energy:

- o Coalcon Project, New Athens, IL
(independent evaluation of sites in seven states and review of Environmental Impact Assessment; for U.S. ERDA)
- o Illinois Coal Gasification Group Project, Perry County, IL
(complete base line monitoring, impacts assessment and preparation of permitting documents)
- o CNG Energy Company
(site selection for coal gasification project; assessment of permitting feasibility, and conceptual design for water supply and wastes disposal)

"Site Evaluation Survey, Clean Boiler Fuel Demonstration Plant," U.S. Energy Research and Development Administration, FE-1772-3, August 1975.

Environmental Report - 650-MW Coal Fueled Nebraska City Power Plant - Submitted to US-COE, Kansas City, by Omaha Public Power District, June 1975.

NAME/TITLE:

RICHARD BARBOUR/SUPERVISING HYDROGEOLOGIST

EDUCATION:

BS/GEOLOGY/1974

MS/1979/ENVIRONMENTAL SCIENCE

MBA/1985/BUSINESS ADMINISTRATION

CERTIFICATIONS:

CERTIFIED PROFESSIONAL GEOLOGICAL SCIENTIST/1985

CERTIFIED HAZARD CONTROL MANAGER (Master Level)/1986

EXPERIENCE SUMMARY

Mr. Barbour is a certified professional geological scientist and a certified hazard control manager. Mr. Barbour's 13 years experience in the geotechnical sciences and hazardous waste investigations includes hydrogeologic investigations, remedial investigations and feasibility studies; development and implementation of health and safety programs; aquifer hydrodynamic evaluation; aquifer protection/restoration; development of groundwater decontamination and monitoring programs; computer modeling; field supervision of geotechnical, geochemical, environmental sampling, and geophysical programs.

Mr. Barbour's duties include development and implementation of RI/FS investigations at hazardous waste sites; hydrogeologic investigations; well field decontamination studies; data analysis; and groundwater computer modeling. Mr. Barbour has worked over 2,300 hours on sites containing or leaching hazardous wastes into the environment. Mr. Barbour has designed and provided construction supervision for the installation and development of nearly 300 monitoring wells and the collection of over 5,000 soil and water samples. He has prepared work plans and QA/QC documentation for hazardous waste investigations at 10 hazardous waste sites which have been reviewed and approved by New York State Department of Environmental Conservation and the New Jersey Department of Environmental Protection. Mr. Barbour has identified, evaluated and/or performed conceptual design for landfill liners, landfill caps, slurry walls, runoff collection systems, diking, recovery wells, carbon adsorption treatment, oil water separators, air stripping, and excavation of contaminated soils. Mr. Barbour has evaluated on-site vs. off-site treatment and disposal of 5,000 buried drums containing hazardous and toxic liquids and sludges. Mr. Barbour is currently working on 3 hydrogeologic studies and two NYSDEC Phase II Inactive Hazardous Waste Investigations. Phase II investigations require development of work plans (health and safety; geophysical surveys; environmental sampling; drilling, well installation and development; and laboratory analysis); site reconnaissance; subsurface exploration; in-situ hydrologic testing; sampling of contaminated substances; atmospheric monitoring and report preparation.

TECHNICAL SEMINARS

Mr. Barbour has directed four short courses on hazardous waste where he has trained professionals from the USEPA, NYSDEC, NJDEP, NYCDOS, Port Authority of NY & NJ, and professionals from numerous industries. Short courses directed by Mr. Barbour include Health and Safety Procedures at Hazardous Materials Sites (1983 and 1984), Toxicological Assessments at Hazardous Waste Sites (1986), and Endangerment Assessments at Hazardous Waste Sites (1986). Mr. Barbour has given numerous technical papers at professional society meetings and conferences.

CONTINUED EDUCATION

- o Modeling Groundwater Pollution and Hydrology - 1980**
- o Minimizing Professional Risk and Liability - 1983**
- o Aquifer Restoration and Groundwater Monitoring - 1983**
- o Safety and Operational Procedures at Hazardous Material Sites - 1983/1984**
- o International Conference on New Frontiers on Hazardous Waste Management - 1985**
- o Risk and Endangerment Assessments at Hazardous Material Sites - 1986**
- o Hazardous Materials Management - 1987**

STACEY GOGOS

Title: Environmental Engineer

Education: BS Chemical Engineering/Columbia University

Experience: Ms. Gogos has an extensive background in the field of hazardous waste site investigation, assessment and remediation. She has served as project manager on soil and groundwater contamination investigations and has been involved in asbestos assessment and removal projects, hazardous waste investigations and environmental assessments of real properties.

As field manager of an investigation of kerosene contaminated soil, Ms. Gogos is responsible for the initial field sampling survey, for determining the extent of contamination, recommendations for remedial actions, proper disposal and the post-remedial sampling survey. She was also involved in the sampling phase of the environmental investigation for People Express Airlines. This investigation included area reconnaissance, laboratory data review and evaluation for air quality, groundwater and surface and subsurface soils.

Ms. Gogos was a member of the team responsible for the oversight of an asbestos removal and disposal project in the Village of Bayville.

She participated in the preparation of the environmental assessment study of the reconstruction of a section of Route 25 in the Town of Brookhaven. She identified the impacts on groundwater, area ecology and wildlife.

She also participated in the site reconnaissance and the development of a risk assessment evaluation of a property for the Town of Huntington. She developed an environmental assessment evaluation of a property in Long Beach to identify soil and groundwater contamination resulting from leaking underground gasoline tanks.

For more than two years Ms Gogos was employed by the U.S. Environmental Protection Agency in Region II - Surveillance and Monitoring Branch. As a member of the Hazardous Waste Management Team, she was:

- Project Manager of sampling investigations of major industrial facilities in Region II, to insure compliance with RCRA and NPDES regulations.
- Project Manager of Compliance Evaluation Inspections.
- Participant in sampling investigations of industrial facilities, petroleum refinery landfills, RCRA wells, lagoons, drums, tanks, hazardous waste landfills, industrial effluents, ocean sludge dumping grounds, New York and New Jersey beaches and rivers.

- Project Manager of oversight inspections of New York State Department Environmental Conservation and New Jersey State Department of Environmental Protection field investigations teams.
- Responsible for oversight of abandoned truck containing chemicals - cleanup.

**Professional
Societies:**

American Institute of Chemical Engineers, Environmental Division

APPENDIX C

RESUMES OF KEY PERSONNEL

RICHARD D. GALLI, P.E.
Supervising Environmental Engineer

Education
Manhattan College, B.C.E., 1977; M.C.E., 1978
(Magna Cum Laude)

Societies
American Society of Civil Engineers
Water Pollution Control Federation
Chi Epsilon
Tau Beta Pi

Professional Engineer Licenses
New York, New Jersey

Mr. Galli has 11 years of experience in design and engineering of municipal, industrial and hazardous waste treatment facilities including municipal landfills and surface impoundments. He is responsible for the design of industrial waste and hazardous waste treatment facilities, solid waste management studies, resource recovery facilities, environmental licensing studies for the power industry and landfills and garbage-burning facilities. He has extensive experience in the areas of biological waste and heavy metal removal treatment systems. Specific projects include:

UTILITY SOLID WASTE ACTIVITY GROUP (USWAG),
Edison Electric Institute, Washington, D.C.

Mr. Galli assisted in the preparation of review of reports which documented past and current solid waste management and disposal practices utilized by the electric power industry. The effort was initiated to determine the impact of the Resource Conservation and Recovery Act upon the power industry's solid and hazardous waste management activities. Mr. Galli studied and designed several landfills for the disposal of fly ash bottom ash and flue gas desulfurization scrubber sludges from coal-fired power plants and gasification plants.

PENNSYLVANIA AVENUE LANDFILL - Brooklyn, New York

Mr. Galli was involved with the design of the closure and post-closure of the Pennsylvania and Edgemere landfills for the City of New York. These included installing methane gas collection system, leachate collectors and treatment system, monitoring wells and final cover of the landfill.

NIAGARA POWER PROJECT - Niagara Falls, New York

Mr. Galli was responsible for the design of a double-lined landfill and leachate treatment system for the storage of contaminated soils resulting from excavation activities at the Niagara Power

Project in Niagara Falls, New York. Mr. Galli engineered and designed a portable air stripping system for the Larry Tyree Equipment Company of Farmingdale, New York, gasoline station contractors, for the treatment of contaminated groundwater resulting from leaking underground gasoline storage tanks. Contamination consisted of benzene, ethyl benzene, toluene, xylene and other gasoline compounds.

Mr. Galli was the senior engineer responsible for the design and engineering of waste treatment systems to treat contaminated groundwaters resulting from the proposed construction of the Robert Moses Power Project (Underground Powerhouse) Expansion. The waste treatment system consisted of a heavy metals removal system followed by an air stripping tower and polishing activated carbon adsorption system. The chemical contamination consisted of methylene chloride, carbon tetrachloride, carbon disulfide, dichloroethane and tetrachloroethylene. They resulted from former operation of a chemical manufacturing and repackaging facility located adjacent to the hydro-electric facility.

Client: Power Authority State of New York

MOUNT TOM GENERATING STATION - Northampton, Massachusetts

Mr. Galli prepared drilling, geophysical, and monitoring specifications for the geohydrology study to determine the extent of groundwater contamination under an existing coal ash pile. Mr. Galli was responsible for the design of a new landfill to handle the disposal of fly ash and bottom ash generated by the coal-conversion at the Mount Tom Generating Station.

ARTHUR KILL POWER PLANT - Staten Island, New York

Mr. Galli was responsible for the wastewater treatment and solid waste disposal sections of the environmental impact statement conducted for the New York Power Authority (NYPA)'s proposed 800MW Arthur Kill coal-fueled power plant.

NORTH RIVER WATER POLLUTION CONTROL PROJECT (WPCP) - New York

Mr. Galli performed detailed engineering, design and specification preparation for various unit process operations for the 170 million-gallon-per-day (MGD) North River WPCP for the City of New York. Specific areas of concern included sedimentation tanks, activated sludge system, and sludge thickening equipment.

ESSEX COUNTY RESOURCE RECOVERY FACILITY- Newark, New Jersey

Mr. Galli engineered and designed an air stripping system for the proposed Essex County Resource Recovery Facility located in Newark, New Jersey for the removal of benzene, ethyl benzene and other hydrocarbons from groundwater on the project site. Client: Port Authority of New York & New Jersey.

SPECTRUM FINISHING CORPORATION - West Babylon, New York

Mr. Galli engineered, designed and supplied a wastewater treatment facility for the removal of chromium, cadmium, cyanide and other heavy metals resulting from the rinsewater discharge of this electroplating facility. Currently a hazardous waste site investigation is being performed to determine the extent of groundwater and soil contamination resulting from past disposal ultrafiltration, multi-effect evaporators, practices of heavy metals and organic solvents. Mr. Galli designed and supplied a waste treatment facility to treat plating rinse wastewaters generated by SPECTRUM. He also directed the Phase II site investigation report to determine the extent of groundwater contamination due to the facility's past operations.

FOREMOST DAIRIES - Lemoore, California

Mr. Galli directed the design and construction of an anaerobic biological waste treatment facility for the disposal of cheese whey and treatment of dairy process wastewaters. He was responsible for performing feasibility studies to determine the suitability of anaerobic technologies to perform the required degree of treatment.

INDUSTRIAL GRAIN PRODUCTS (IGP), - Thunder Bay, Ontario

Mr. Galli was responsible for the engineering and design of an anaerobic waste treatment facility for IGP. He directed equipment specification and procurement, subcontractor contract control, and process instrumentation.

Mr. Galli is currently providing the following types of consulting engineering services to the companies related to the electroplating and metal finishing industry:

1. Analysis of process and waste streams.
2. Complete laboratory analyses for liquid, solids, sludge and air streams.
3. Preparation of baseline and discharge monitoring reports.
4. Review of waste generating processes to identify waste reduction options and streamline waste handling procedures.
5. Review of alternative treatment systems, feasibility studies and cost estimates.
6. Prepare programs for treatability and pilot plant studies, process development.
7. Preliminary and final design, engineering reports, plans and specifications.

8. Construction management, contractor liaison, project administration, cost estimates.
9. Preparation of permits including all necessary submittals for Pretreatment Program, (municipal sewer system) and State Pollution Discharge Elimination System Program (surface/groundwaters discharge).
10. Permitting and regulatory affairs.

Companies include:

1,2,3,4	L&L White Metal Castings Co., Carlstadt, NJ (60K)
1,2,3,4,7,8,9	Ferris Plating, Co., Moonachie, NJ (25K)
9	RAI Research, Hauppauge, NY (1K)
1,2,3,4,7,8,9	Record Plating Company, NJ (25K)
2,7,9,10	Astro Electroplating, Farmingdale, NY (45K)
9,10	Compliance Recovery Systems, Central Islip, NY (3K)
10	Diamond Communications, Garwood, NJ (45K)
9,10	Sun Metal Finishing, NJ (30K)

Other Clients include:

10	Connecticut Aerosal, Inc., Milford, CT (45-60K)
	Engineer and designed a water treatment system to remove suspended and dissolved solids from its process wastewaters. This system allows then to recirculate their wastewaters for other process uses. Wastewaters contain isopropanol, methylene chloride, tetrachlore ethylene, etc.

DEAN ANSON II

Title: Project Manager/Supervising Environmental Scientist

Education: BA/Ohlo Wesleyan University
MS/New York University
MBA/New York University

Experience: In the past six months, Dean Anson has managed three asbestos projects. Bayville's Municipal Building had three boiler rooms, crawl spaces and 1,200 feet of pipe insulation. Dean and his staff developed specifications and bid documents to remove the asbestos as well as supervised the removal contractor.

Prior to its demolition, Dean managed the asbestos survey of a 20,000 square foot turn of the century commercial building in the Village of Great Neck Plaza.

Dean managed a survey for asbestos and other hazardous materials in a 40,000 square foot commercial building and maintenance garage. This work was completed for the Town of Huntington.

Dean Anson has recently evaluated the environmental impacts associated with the location of a resource recovery facility in Old Westbury, New York. Disciplines reviewed included air quality, noise, groundwater, ecology, traffic, and roadway conditions and capacity.

He is managing the review of environmental impact statements for several proposed condominium developments in the Village of Great Neck Plaza. In this role, Storch Associates is functioning as the Village's environmental consultant and planner.

Dean Anson is managing the environment assessment, site development, traffic analysis and topographic survey for People Express Airlines Corporate headquarters facility.

For the 13 years prior to joining Storch Associates, Dean Anson has managed and coordinated feasibility studies for a coal gasification plant in Kentucky and an industrial park in Brooklyn, N.Y., including evaluation of economic, financial, regulatory, and environmental conditions in the region surrounding the project; overall management of Environmental Report and Permits and Licenses Plan for a \$400-million coal gasification plant in Illinois and coal-fired 700-MW power plant in New York City; prepared and monitored job schedules and budgets, assigning and monitoring subcontractor field programs, and functioning as Gibbs & Hill's principal representative with the client; he was responsible for satisfactory completion of work in accordance with project requirements. He coordinated preparation of aquatic and terrestrial biological scopes of work; selected field sampling locations; evaluated and selected subcontractors; monitored subcontractor field studies for USERDA-funded Illinois Coal Gasification Project; prepared baseline descriptions of aquatic communities in the Mississippi River and evaluation of impacts on biological communities.

HAZARDOUS WASTES - REPRESENTATIVE PROJECTS AND PUBLICATIONS

Plating wastes centralized treatment facilities - investigations and preliminary design for treatment plant to serve 20 job shop platers discharging chrome, cyanide, copper, nickel, lead, cadmium, zinc, oil and grease - Plating City, Brooklyn, NY; for Brooklyn Economic Development Agency, 1984.

Investigations and remedial design for solvents contaminated groundwater; Newark, NJ; McKesson Environmental Systems, 1982.

Base line monitoring and analysis of ground and surface water, and ecology; impacts assessment and permitting documents for coal preparation plant and coal wastes disposal at Coburn, VA; for Virginia Iron Coal and Coke Company, 1980.

Conceptual and detail engineering/design, and permitting including air pollution source permits for \$1 billion, 170 million gallon per day North River sewage treatment plant; City of New York; in construction, startup 1986.

Investigations to identify and quantify toxic wastes residues from mining and the resulting stream pollution; preparation of remedial plan for the 1,250 sq mi Youghiogheny River Basin; for Pennsylvania Department of Environmental Resources, 1972.

Carcinogenic and heavy metals wastes handling and disposal impacts analysis and permitting related to coal gasification/liquification projects sponsored by U.S. Energy Research and Development Agency and its successor U.S. Department of Energy:

- o Coalcon Project, New Athens, IL
(independent evaluation of sites in seven states and review of Environmental Impact Assessment; for U.S. ERDA)
- o Illinois Coal Gasification Group Project, Perry County, IL
(complete base line monitoring, impacts assessment and preparation of permitting documents)
- o CNG Energy Company
(site selection for coal gasification project; assessment of permitting feasibility, and conceptual design for water supply and wastes disposal)

"Site Evaluation Survey, Clean Boiler Fuel Demonstration Plant," U.S. Energy Research and Development Administration, FE-1772-3, August 1975.

Environmental Report - 650-MW Coal Fueled Nebraska City Power Plant - Submitted to US-COE, Kansas City, by Omaha Public Power District, June 1975.

STACEY GOGOS

Title: Environmental Engineer

Education: BS Chemical Engineering/Columbia University

Experience: Ms. Gogos has an extensive background in the field of hazardous waste site investigation, assessment and remediation. She has served as project manager on soil and groundwater contamination investigations and has been involved in asbestos assessment and removal projects, hazardous waste investigations and environmental assessments of real properties.

Prior to joining Galli Anson Environmental she was a field manager for an investigation of kerosene contaminated soil, Ms. Gogos is responsible for the initial field sampling survey, for determining the extent of contamination recommendations for remedial actions, proper disposal and the post-remedial sampling survey. She was also involved in the sampling phase of the environmental investigation for People Express Airlines. This investigation included area reconnaissance, laboratory data review and evaluation for air quality, groundwater and surface and subsurface soils.

Ms. Gogos was a member of the team responsible for the oversight of an asbestos removal and disposal project in the Village of Bayville.

She participated in the preparation of the environmental assessment study of the reconstruction of a section of Route 25 in the Town of Brookhaven. She identified the impacts on groundwater, area ecology and wildlife.

She also participated in the site reconnaissance and the development of a risk assessment evaluation of a property for the Town of Huntington. She developed an environmental assessment evaluation of a property in Long Beach to identify soil and groundwater contamination resulting from leaking underground gasoline tanks.

Ms. Gogos was employed by the U.S. Environmental Protection Agency in Region II - Surveillance and Monitoring Branch. As a member of the Hazardous Waste Management Team, she was:

- Project Manager of sampling investigations of major industrial facilities in Region II, to insure compliance with RCRA and NPDES regulations.
- Project Manager of Compliance Evaluation Inspections.
- Participant in sampling investigations of industrial facilities, petroleum refinery landfarms, RCRA wells, lagoons, drums, tanks, hazardous waste landfills, industrial effluents, ocean sludge dumping grounds, New York and New Jersey beaches and rivers.
- Project Manager of oversight inspections of New York State Department Environmental Conservation and New Jersey State Department of Environmental Protection field investigations teams.
- Responsible for oversight of abandoned truck containing chemicals - cleanup.

Professional
Societies:

American Institute of Chemical Engineers,
Environmental Division