FOCUSED REMEDIAL INVESTIGATION
Work Plan

98-335

To Be Conducted At:

Site Code # 1-30-043S
299 Main Street
Westbury, New York

Client:

2632 Realty Development Corp.
1025 Old Country Road
Westbury, New York

User:

New York State Department of Environmental Conservation
Bureau of Eastern Remedial Action
Division of Environmental Remediation
50 Wolf Road
Albany, New York

Dated:

September 18, 1998

Impact Environmental
Geotechnical Services · Environmental Consulting · Environmental Engineering · Environmental Contracting
Forty-Six East Northport Road · Kings Park · New York 11754 · 516-269-8800 · Facsimile 516-269-1599 · e-mail ie4enviro@aol.com

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Exhibits

Appendices

1.0 INTRODUCTION

This work plan details the various tasks that will be performed in the investigation of 299 Main Street in Westbury, New York (located in the western portion of the New Cassel Industrial Area), herein identified as the "Site". A Multisite PSA Task 4 Report prepared by Lawler, Matusky and Skelly Engineers (LMS) for the New York State Department of Environmental Conservation (NYSDEC) in 1997 identified chlorinated organic solvent contamination in the New Cassel Industrial Area (NCIA). The PSA suggested that the Site was a source of chlorinated organic solvent-related contaminants and that it should remain on the State Registry of Inactive Hazardous Waste Disposal Sites ("State Registry").

2632 Realty Development Corp. is a past owner and is the current contract vendee to repurchase the Site. The NYSDEC contends that past site operations have led to groundwater contamination beneath and hydraulically down gradient of the Site with trichloroethylene (TCE), perchloroethylene (PCE) and their transformation compounds. As such, the Site has been designated by the NYSDEC as an inactive hazardous waste disposal site, as defined in ECL 27-1301.2, because the department contends that the site presents a significant threat to the public health and the environment. The site has been listed in the State Registry as Site Number 01-30-043S.

This Focused Remedial Investigation ("Focus Study") will provide more data from which to confirm or refute the findings and recommendations of the LMS Multisite PSA Task 4 Report. The results will be submitted in a Focused Remedial Investigation Report in accordance with the provisions of the Draft Order on Consent between the NYSDEC and 2632 Realty Development Corp.

2.0 PROPOSED SITE BACKGROUND STUDY

2.1 Site Location

The subject property is located at 299 Main Street in Westbury, New York. This location is on the north side of Main Street between Hopper Street and Garden Street. The areal extent of the subject property is approximately 51,200 square feet or 1.2 acres. A site location map is provided in Plate 1. A base map for the subject property is given in Figure #1.

2.2 Site History

A 50-year site history will be conducted that will include information on past land uses on-site and uses in the immediate vicinity of site. Historic information will be compiled from various private and public

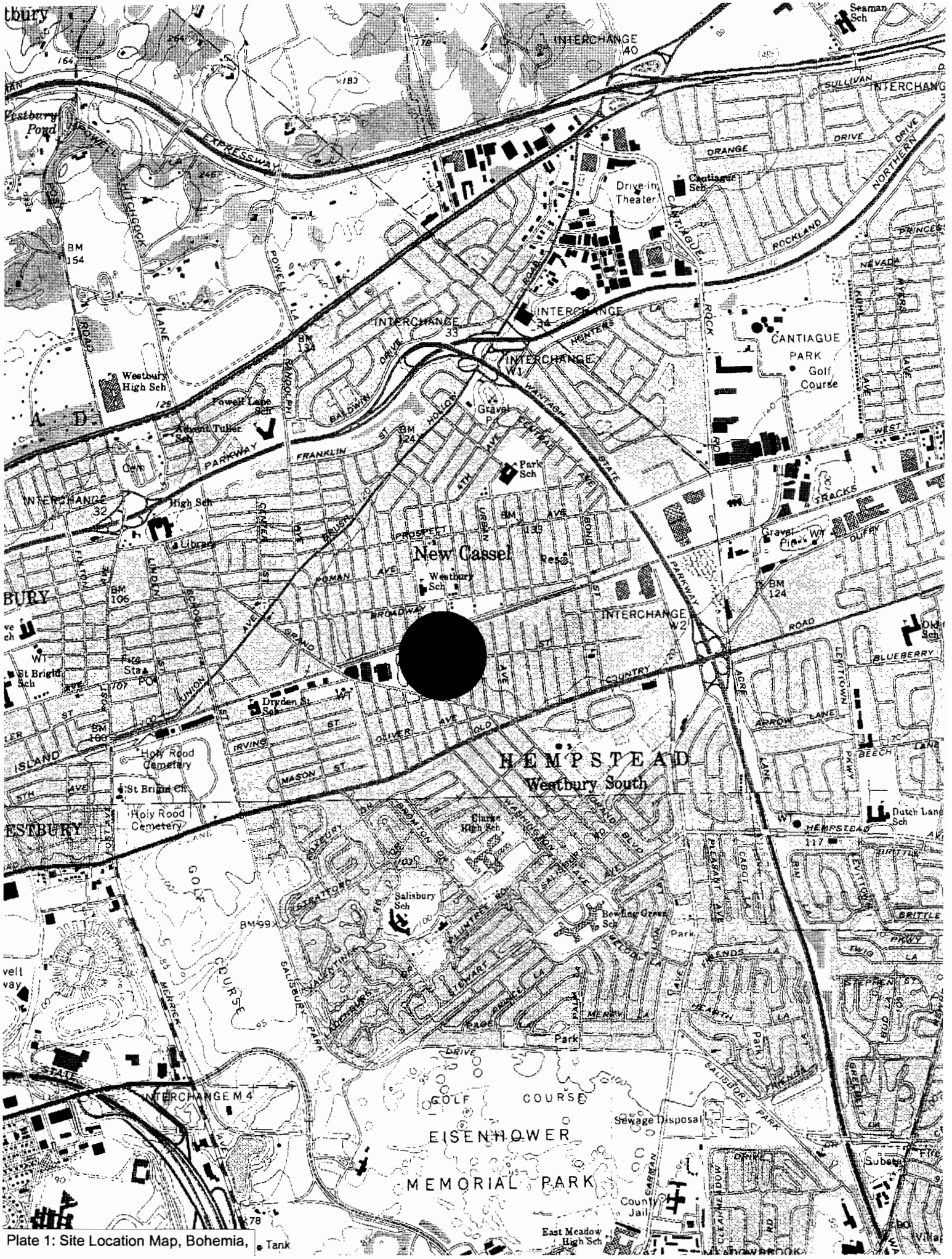

Plate 1: Site Location Map, Bohemia,

Garden Street

storage container

suspected sanitary leaching cesspool

sanitary cleanout

Awning

One Story Masonry Building

ASTs in bermed enclosure

storage container

Main Street

Hopper Street

NORTH

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Figure #1: Base Map

New Cassel, New York

Legend;
groundwater probe node
soil probe node
monitoring well

scale: 1" = 20'

sources including the Cole reverse telephone directories, Sanborn fire insurance maps, E. Belcher Hyde maps, LILCO (LIPA) records and aerial photographs.

2.3 Site Geology

A thorough discussion of site geology will be presented that will include descriptions of surficial geology, unconsolidated deposits and the underlying bedrock.

2.4 Site Geohydrology

The geohydrology of the Site will be examined using available groundwater potentiometric surface maps and data obtained from the results of the subsurface investigative activities proposed in this document. Additionally, the investigation data will be used to compile a potentiometric map of the water table, determine groundwater transport rates and understand the dynamics of on-site contaminant migration. On-site soils, as well as the location of underground aquifers and the presence of pre-existing wells, will be discussed.

3.0 SITE INVESTIGATIVE ACTIVITIES

3.1 Site Visit

A site survey will be performed in the presence of an official from the NYSDEC. The survey will identify the present location of on-site buildings, parking lots, drains, underground injection wells, and potential areas of surface contamination (as indicated by the presence of drums, stored or spilled liquid contaminants, or stains). All information collected during the site visit will be entered in a site survey form (See Appendix A).

3.2 Remote Sensing Survey

A ground penetrating radar (GPR) survey will be performed to confirm or refute the presence of suspected underground storage tanks on the subject property. The GPR survey will also be used to locate subsurface anomalies that could represent underground storage tanks or inaccessible underground injection wells.

The data collected during the survey will be reviewed by the operator and compared against past experience, technical judgment, and prior Site knowledge to classify the anomalies. When an underground storage tank (UST) or injection well is identified, the location will be marked using a small flag and plotted onto the site plan. On asphalt, spray paint will be used to delineate the size and orientation of any UST or injection well.

3.3 Locating and Mapping Subsurface Sampling Locations

Soil probes will be installed at locations on the surface of the site on a 50-ft. x 50-ft. square grid. The proposed arrangement of the probe locations is presented in Figure #2. The probe locations will be surveyed on the site and marked using small flags. Any potential point pollution sources identified from the remote survey will be marked with a different flag and subsequently mapped onto the site plan.

The proposed location of the groundwater wells and geoprobe sampling probes are presented in Figure #3. These locations will be surveyed on the site from the site plan and marked using a small flag.

3.4 Evaluation of Emergency Procedures

The routes of emergency egress will be evaluated and marked with surveyor's flagging if necessary. This will be done to ensure that routes of emergency egress from all boring locations cannot be temporarily blocked by equipment or on-site vehicles. Additionally, the site safety plan will be reviewed on-site by all workers to insure compliance.

4.0 PROPOSED INVESTIGATION OF SITE SOIL AND GROUNDWATER QUALITY

4.1 Soil Sampling

Nine soil probes will be installed at locations on the surface of the site on a 50-ft. x 50-ft. square grid. Samples will be obtained from each probe location on a 15-ft. vertical interval to groundwater. Accordingly, the total number of soil samples proposed for collection will be 27. Analysis of these samples will be performed using USEPA test method 8260 for volatile organic compounds. Table 1 below provides a target analyte list for USEPA Method 8260.

A visual inspection of all samples that will be recovered during the installation of each of the probes will be conducted to identify any gross signs of chemical contamination and to classify the sample media.

Garden Street

storage container

suspected sanitary leaching cesspool

sanitary cleanout

Awning

One Story Masonry Building

ASTs in bermed enclosure

storage container

Main Street

Hopper Street

NORTH

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Figure #2: Soil Acquisition Plan

New Cassel, New York

Legend;
groundwater probe node
soil probe node
monitoring well

scale: 1" = 20'

Garden Street

storage container

suspected sanitary leaching cesspool

sanitary cleanout

ASTs in bermed enclosure

Awning

One Story Masonry Building

storage container

Main Street

Hopper Street

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98–335

Figure #3: Groundwater Acquisition Plan

New Cassel, New York

Legend;
- groundwater probe node
- soil probe node
- monitoring well

scale: 1" = 20'

Table 1 USEPA Target Analyte Compounds Determined by Method 8260

Benzene
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromoform
Boromethane
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
2-Chlorotoluene
4-Chlorotoluene
Dibromochloromethane
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
Dibromomethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,2-Dichloropropane
1,3-Dichloropropane
2,2-Dichloropropane
1,1-Dichloropropene
Ethylbenzene
Hexachlorobutadiene
Isopropylbenzene
p-Isopropyltoluene
Methylene chloride
Naphthalene
n-Propylbenzene
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
1,2,3-Trichlorobenzene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluormethane
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Vinyl chloride

4.2 Groundwater Sampling

A total of three groundwater monitoring wells will be installed, developed and sampled using the procedures outlined in *A Compendium of Superfund Field Operations Methods*, USEPA, 1987, and 6 NYCRR Part 360.2.11 (C) (1) (I). Twelve additional groundwater samples will be acquired from Geoprobe temporary well points. Analysis of these samples will be performed using USEPA test method 624 for volatile organic compounds.

4.3 Proposed Investigation of Point Source Pollution Areas

The information obtained from the site survey (Section 3.1) and the remote survey (Section 3.2) will be used to determine the locations in which hazardous materials, if any were processed, handled, or stored on the subject property (identified as point sources).

4.3.1 Underground Injection Wells

Soil probes will be installed within the confines of any storm water drywells, leaching lagoons, waste water disposal wells, retention pits or cesspools identified on-site. Samples will be secured from the probes on a 15-foot vertical interval to groundwater. Analysis of these samples will be performed using USEPA test method 8260 for volatile organic compounds.

4.3.2 Storage Tanks

Soil probes will be installed at locations adjacent to any underground storage tanks identified on-site. Samples will be taken from the probes at intervals of eight (8) to ten (10) feet and twelve (12) to fourteen (14) feet below existing grade. Analysis of these samples will be performed using USEPA test methods relevant to the tank content.

In the case of above ground storage tanks, samples will be secured by hand from locations beneath the base. Analysis of these samples will be performed using USEPA test methods relevant to the tank content.

5.0 PROPOSED SUBSURFACE INVESTIGATION PROCEDURES

5.1 GPR Survey Procedures

A qualified Impact Environmental Consulting, Inc. technician will specify a coordinate system on the plainmetric surface of the site to map any subsurface dielectric anomalies detected on the premises. The operator uses knowledge of the subsurface soil composition to calibrate the SIR-2 system to site specific conditions. Factor settings such as range, gain, number of gain points, and scans per unit will be modified to yield the most accurate data to describe the subsurface conditions.

Upon finding a dielectric anomaly, a more spatially specific coordinate system will be designed over the area to determine its size, shape, and orientation.

5.2 Subsurface Geoprobe Installation

Subsurface probes will be installed using a Geoprobe hydraulically powered probing tool (see information on Geoprobe Systems in Appendix B, Figure 2.1, Page 5). Mechanized, vehicle mounted probe systems apply both static force and hydraulically powered percussion hammers for tool placement (static down forces up to 3,000 pounds combined with percussion hammers of eight horsepower continuous output). Recovery of large sample volumes will be facilitated with a probe-driven sampler. The probe-driven sampler consists of a hollow probe that opens via a remote control mechanism at the selected sampling depth in the soil profile to allow soil to enter as it is advanced. Discrete media samples will be secured at the desired depths and are contained within a non-reactive transparent plastic sleeve that lined the hollow probe. The plastic sleeves will be removed for subsequent inspection and sample aliquot acquisition.

5.3 Sample Characterization

A visual inspection of all samples that will be recovered during the installation of each of the probes will be conducted to identify any gross signs of chemical contamination and to classify the sample media. Gradation classifications will be performed in accordance with the Unified Soil Classification System. Color classifications will be made in accordance with the Munsell Classification System.

5.4 Geoprobe Temporary Well Point Sampling Procedure

The groundwater sampling system that will be used is the Screen Point 15 that is designed to accurately collect grab samples of groundwater. The Screen Point 15 uses a screen with a standard slot size of 0.004 inches that is sealed inside a 1.5-inch ID alloy steel sheath as it is driven to depth. The screen is sealed

inside the sheath with Neoprene O-rings, which prevents infiltration of formation fluids until the desired depth is attained. When the screen has been driven to the depth of interest in the formation, extension rods are used to hold the screen in position as the driving rods are retracted approximately 4 feet. The 4-foot long sampler sheath forms a seal above the screen as it is retracted. A total of 41.5 inches of slotted screen is placed into contact with the formation. The Screen Point 15 groundwater sampler has a total boring diameter of 1.5 inches, and the outside diameter of the screen is 1.0 inch. This provides for a maximum of 0.25 inches between the screen and the natural formation as the sampler sheath is retracted. These conditions approach the ideal for natural formation development that can be conducted when lower turbidity samples are required.

Each groundwater sample will be collected from the sampler utilizing 3/8-inch in diameter disposable tubing equipped with a bottom check valve. The tubing is extended from the surface down to the sampler. The tubing is oscillated up and down continuously until the check valve has trapped an adequate volume of a groundwater sample. The tubing is then removed and the water is poured into appropriate sample vessels for subsequent laboratory analysis.

5.5 Construction of Site Monitoring Wells

The new wells will be constructed using a five and one-half inch diameter hollow stem auger. The auger annulus will allow the installation of a four-inch monitoring well casing and wire wrapped screen section. The screen slot size will be a function of the gradation of the filter pack (able to hold back at 95% of the filter pack). A filter pack will be installed within the annular space of the auger. The filter pack will extend to a depth of six inches below the bottom of the well screen to a point one-foot above the water table. The material used for the filter pack will consist of clean siliceous sand. The grain size of the filter pack sand will be three to five times the average (50% passing) size of the formation material as determined from existing and proposed sieve analysis. This will minimize the amount of the material entering the well from the screened part of the formation and, at the same time, not inhibit water inflow into the well. A finer grained siliceous sand pack will be placed to a point one-foot above the water table (approximately thirty feet in thickness). A Bentonite seal will be placed above the sand pack using a tremie pipe to form a seal at least three feet thick. Above the seal, a one-foot, fine-grained siliceous sand will be placed to minimize grout infiltration.

Each of the wells will be constructed of four-inch schedule PVC riser, screened at a discrete interval in the saturated soil column. The screen depths of the proposed deep wells will range from twenty-feet below sea level to forty-feet below sea level. The screened length of each of the wells will be twenty-feet (the bottom twenty-feet). The wells will be constructed of PVC as it possesses the required tensile

strength (risers and threading) to accommodate the required installation depths. Additionally, PVC is resistant and non-reactive with contaminants typically found in landfill plumes and thus will be appropriate material for long term performance without contributing or removing contaminants from the groundwater. The PVC riser and screens will be interconnected with standard flush threaded couplings (ASTM F-480) containing fluorocarbon (Viton) O-rings. A filter pack will be installed around the outside of each well using a tremie pipe. The material used for the filter pack will consist of a uniform clean siliceous sand. The PVC screens will be wire wrapped.

A bentonite seal will be placed above the sand pack using a tremie pipe to form a seal at least three feet thick. Above the seal, a one-foot fine-grained siliceous sand pack will be placed to minimize grout infiltration. The balance of the casing annulus will be filled with grout to the surface. The grout will consist of a commercially available high-solids cement/bentonite grout. The grout mixture will set up without being diluted by formation of water, and will displace water in the annular space to ensure a continuous seal.. The grout will be placed under pressure using a tremie pipe.

An eight-inch steel casing (manway) will be placed over the four-inch diameter protective screened casing and secured in a surface well seal to adequately protect it. A drain hole will be drilled at the base of the steel casing. A vent hole will be located near the top of the steel casing to prevent explosive gas build up and to allow well water levels to respond naturally to changes in barometric pressure. The annulus of the casing will be filled with gravel. A twelve-inch weather sealed locking cap will have at least two inches of clearance between the top of each clustered well cap and the bottom of the locking cap. Duplicate keys to the locking cap will be submitted to the NYSDEC.

A concrete surface seal will be constructed. The surface seal will extend below the frost line. The top of the seal will be constructed by pouring concrete into a form with a minimum three-foot side. The seal will prevent surface runoff from ponding and entering the well casing. In areas of excessive vehicle traffic, protective bollards will be installed around the seal. Complete construction diagrams for the proposed wells are provided in Appendix C.

The wells will be developed between sampling events by purging three well volumes from each.

6.0 RECORD KEEPING AND DOCUMENTATION

A site field log and a master sample log will be used on-site to record notes pertaining to the sampling. For the groundwater wells, a well log sheet will be used to record information. A sample form is provided in Appendix D.

ICM Laboratories will be used for all laboratory work in this study. A statement of qualifications for ICM can be found in Appendix E.

6.1 Sample Tracking System

In order to provide for proper identification in the field, and proper tracking in the laboratory, all samples must be labeled clear and in a consistent fashion using the procedures and protocols described below and with the following subsections.

Sample labels will be waterproof and have a pre-assigned, unique number that is indelible.
Field personnel must maintain a field notebook. This notebook must be water resistant with sequentially numbered pages. Field activities shall be sequentially recorded at a later time. The notebook, along with the chain of custody form, must contain sufficient information to allow reconstruction of the sample collection and handling procedure at a later time. Each sample shall have a corresponding notebook entry that includes:

Sample ID number
Well location and number
Date and time
Analysis for which sample was collected
Additional comments as necessary
Sampler's name

Each sample must have a corresponding notebook entry on a chain-of-custody form. The manifest entry for sampling at any one well is to be completed before sampling is initiated by the same sampling team at any other well. In cases where the samples leave the immediate control of the sampling team, the samples must be sealed.

6.2 Sample Identification System

Each sample collected shall be designated by an alphanumeric code that shall identify the type of sampling location, the specific location, the matrix sampled, and a specific sample designation. Site specific procedures are described below.

Sample identifications shall contain a sequential code consisting of three segments. The first segment shall designate the project number. The second segment shall identify the location type. Location types shall be identified by a two-letter code. For example, MW will be used for monitoring well and GP for geoprobe. The third segment shall identify the specific sample location. The specific sampling location shall be identified using a three-digit number.

The fourth segment shall identify the matrix type and sample designation or identifier that identifies the sample depth, the sample event number, or other designation depending on the sample type. The matrix type shall be designated by a two-letter code. For example: GW will be used for groundwater. The sample identifier shall be represented by a two digit numeric code. Sampling events or rounds, such as for groundwater sampling shall be numbered in sequence beginning with "01" that corresponds to the round of sampling.

The following shall be a general guide for sample identification:

First Segment	**Second Segment**	**Third Segment**	**Fourth Segment**
NNN	AA	NNN	AANN
Project #	Location Type	Specific Type	Matrix Sample Identifier
963	MW	281	GW01

Symbol Definitions:	Location Type:	Matrix Type:
A = Alphabetic	MW = Monitoring Well	S = Soil
N = Numeric	GP = Geoprobe	GW = Groundwater

Sample Identifier:

1st round of sampling = 01

2nd round of sampling = 02

6.3 Sample Containers and Analytical Requirements

As required in the NYSDEC Analytical Sampling Protocol (ASP), all sample containers must be provided by the laboratory. If glass bottles are used, extra glass bottles will be obtained from the laboratory to allow for accidental breakage that may occur. Necessary preservatives will be placed in the sample bottles by the laboratory. The sample bottles will be handled carefully so that preservatives and glassware are not inadvertently spilled. All soil samples will be put into four 6-ounce glass jars with teflon liners. All liquid samples will be put into 40-ml glass vials with teflon liners.

6.4 Sample Packaging

Samples shall be packaged and shipped according to Section 6.2 of the USEPA's *Compendium of Superfund Field Operations Methods* entitled, "Packaging, Labeling, and Shipping." Chain of custody forms, sample labels, custody seals, and other sample documents shall be filled out as specified in the USEPA *CLP Users Guide*. Sample bottles and samples shall either be delivered/picked up at the site daily by ICM Laboratories, or delivered via overnight courier.

The proper procedures for packaging and shipping must be followed once the samples have been collected.

<u>Packaging</u>

Prior to shipment, samples must be packaged in accordance with current US DOT regulations. All required government and commercial carrier shipping papers must be filled out. The procedure below should be followed regardless of transport method.

As required in the NYSDEC ASP, samples will be transported in metal ice chests or sturdy plastic coolers.

Remove previously used labels, tape, and postage from cooler.

Ship filled sample bottles in same cooler in which empty bottles were received.

Check that all bottle labels are complete.

Check that all sample bottles are tightly capped.

Affix return address labels.

Be sure that chain-of-custody forms are complete.

Wrap sample bottles in bubble pack and place in cooler.

Pack bottles with extra bubble pack, vermiculite, or Styrofoam.

Keep samples refrigerated in cooler with bagged ice or frozen cold packs. Do not use ice for packing material.

Separate and retain the sampler's copy of chain-of-custody.

Tape paperwork in zipper bag to inside of cooler lid.

Close cooler and apply signed and dated custody seal in such a way that the seal must be broken to open the cooler.

Securely close cooler lid with packing or duct tape. Be sure to tape latches and drain plugs in closed position.

Shipping

Samples should arrive at the lab as soon as possible following sample collection to ensure holding times are not exceeded. All samples must be hand delivered on the same day as sampling or sent via overnight courier. Coolers will contain ice packs to maintain a temperature below 4 °F. Samples will be delivered to the laboratory within the seven-day holding period prescribed for VOC analysis.

6.5 Sampling Documentation

The sample team or individual performing a particular activity shall be required to keep a weatherproof field notebook. Field notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during projects and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. In a legal proceeding, notes, if referred to, are subject to cross examination and are admissible as evidence. The field notebook entries should be factual, detailed, and objective. All entries are to be signed and dated. All members of the field investigation team are to use this notebook, which shall be kept as a permanent record. The field

notebook shall be filled out at the location of sample collection immediately after sampling. It shall contain sample descriptions including: sample number, sample collection time, sample location, sample description, sampling method used, daily weather conditions, field measurements, name of sampler, and other site-specific observations. The field notebook shall contain any deviations from the protocol contained herein, visitor's names, community contacts made during sampling, and geologic and other site-specific information that may be noteworthy.

Chain-of-custody forms, sample labels, custody seals, and other documents shall be filled out as specified in Section 4.0 of the USEPA *A Compendium of Superfund Field Operations Manual,* 1987. Additionally, a dedicated sampling master log shall be maintained as the field program progresses. The sample log book shall contain the sample number, sample date/time, sampling team, and chain-of-custody.

6.6 Chain-of-Custody Protocol

The primary objective of the sample custody procedures is to create an accurate written record that can be used to trace the possession and handling of all samples from the moment of their collection, through analysis, until their final disposition. Sample custody for samples collected during the investigation will be maintained by the on-site hydrogeologist or the field personnel collecting the samples. Field personnel are responsible for documenting each sample transfer and maintaining custody of all samples until they are shipped to the laboratory.

Chain-of-custody forms will be completed at the time of sample collection and will accompany the samples inside the cooler for shipment to the selected laboratory.

7.0 PERFORMANCE CRITERIA

7.1 Field and Consulting Engineering Services

All field activities will be performed by Impact Environmental Consulting, Inc. ("contractor") and its designated subcontractors. The subcontractors that are anticipated to be used for the performance of the Focus Study are presented below:

ICM Laboratories, Inc.
1152 Route 10
Randolph, NJ 07869
(973) 584-0330

ADT Drilling Corp.
51-41 59th Place
Woodside, NY 11377
(800) 238-3745

Tank Specialists (Excavators)
2 Park Place
Glen Cove, New York
(516) 759-9318

7.2 Site Representation

All on-site activities will be supervised by a representative of 2632 Realty Development Corp. that is qualified to audit all field mobilization and investigative activities. Said representative will be identified as the Project Field Manager. The Project Field Manager will be on-site during the performance of all work performed by the contractor and its subcontractors. The qualifications of key personal including the Project Field Manager are provided in Appendix F.

7.3 Chronological Description of Focus Study

The time line that will be used for the study is outlined in Table 2.

Table 2

Time Line For Study

Week 1	Week 2	Week 3	Week 4	Week 5
Site Background Study				
				Site Investigation Activities

Week 6	Week 7	Week 8	Week 9	Week 10
		Investigation of Soil and Groundwater Quality		

Week 11	Week 12	Week 13	Week 14	Week 15
	Report Preparation			

8.0 REPORTING OF RESULTS

All laboratory-reporting procedures will comply with the NYSDEC ASP and the New York State Department of Health Environmental Laboratory Approval Program (NYSDOH ELAP).

9.0 HEALTH AND SAFETY PLAN

9.1 Emergency Response

In order to properly prepare for emergencies, personal protective equipment (PPE) will be worn by site workers and first aid equipment will be kept at the site. Material Safety Data Sheets (MSDS) will be maintained for all contaminants that workers may be exposed to.

9.1.1 Onsite Emergency Response

In the event of an accident or emergency situation, emergency procedures will be executed. Said procedures can and will be executed by the first person to observe an accident or emergency situation. The Project Field Manager will be notified about the situation immediately after emergency procedures are implemented.

A list of the pertinent personnel authorized to be present on site is as follows:

Title	Name	Telephone Number
Project Manager	George Wright	(516) 269-8800
Health & Safety Officer	Richard S. Parrish	(516) 269-8800
Project Field Manager	Keith Franzen	(516) 269-8800
Site Safety Officer	Jim Mulvey	(516) 269-8800
Client Contact	Charlotte Biblow	(516) 357-3000
Site Contact	Paula Scappatura	(516) 333-4005
State Agency Contact (NYS DEC)	Chittibabu Vasudevan	(518) 457-1708

9.1.2 Emergency Contacts

Ambulance/Emergency:	*Nassau County Medical Center* 516-572-6655
Police:	911 or *Westbury Police Dept.* 516-573-5275
Fire Department:	*Westbury Fire Dept.* 516-921-0000
Poison Control Center:	800-336-6997
Hospital:	*Nassau County Medical Center* 516-572-0123
Directions:	Take Garden Street south and turn left onto Grand Blvd. Continue east on Grand Blvd. and turn right onto Carman Ave. Travel approximately two miles south on Carman Ave. and the hospital will be on the left immediately after the Nassau County Jail.
State Police:	516-756-3300
National Response Center:	800-424-8802
US EPA (24 hour hotline):	800-424-9346

9.1.3 Who to Contact Before Initiating Subsurface Investigation Work

Impact Environmental Consulting, Inc. ("Impact") representatives are responsible for contacting appropriate agencies prior to conducting on-site activities when applicable.

Gas Company:	*Brooklyn Union Gas* 718-643-4050
Telephone Company:	*Bell Atlantic* 516-661-6000
Electric Company:	*Marketspan* 516-222-7700

9.1.4 Contingency / Evacuation Plan

It may be possible that a site emergency could necessitate the evacuation of all personnel from the site. If such a situation develops, an audible alarm shall be given for site evacuation (consisting of an air horn). Personnel shall evacuate the site in a calm and controlled fashion and regroup at a predetermined location. The route of evacuation will be dependent on wind direction, severity, type of incident, etc.

The site must not be re-entered until back-up help, monitoring equipment, and/or personal protective equipment are on hand and the appropriate regulatory agencies have been notified.

9.1.5 Standard Procedures for Injury

1. Telephone for ambulance/medical assistance if necessary. Whenever possible, notify the receiving hospital (listed in 9.1.2) of the nature of physical injury or chemical overexposure. If no phone is available, transport the person to the nearest hospital. Refer to Appendix for map to hospital.
2. Bring this Health and Safety Plan with the attached MSDS's to the medical facility with the injured person.
3. If the injury is minor, proceed to administer first aid.
4. Notify the Site Safety Officer, Project Manager, and the Regional Safety Director of all accidents, incidents, and near emergency situations.

9.1.6 Emergency Treatment

When transporting an injured person to a hospital, bring this Health and Safety Plan to assist medical personnel with diagnosis and treatment. In all cases of chemical overexposure, follow standard procedures as outlined below for poison management, first aid, and, if applicable, cardiopulmonary resuscitation. Different routes of exposure and their respective first aid/poison management procedures are outlined below.

9.1.7 Ingestion

Do not induce vomiting unless prompted by a health professional. Transport person to nearest hospital immediately.

9.1.8 Inhalation / Confined Space

Do not enter a confined space to rescue someone who has been overcome unless properly equipped and a standby person is present.

9.1.9 Inhalation / Other

Move the person from the contaminated environment. Initiate CPR if necessary. Call or have someone call for medical assistance. Refer to MSDS for additional specific information. If necessary, transport the victim to the nearest hospital as soon as possible.

9.1.10 Skin Contact / Non-Caustic Contaminant (Petroleum, Gasoline, etc.)

Wash off skin with a large amount of water immediately. Remove any affected clothing and rewash skin using soap, if available. Transport person to a medical facility if necessary.

9.1.11 Skin Contact / Corrosive Contaminant (Acids, Hydrogen Peroxide, etc.)

Wash off skin with a large amount of water immediately. Remove any affected clothing and rewash skin with water. Transport person to a medical facility if necessary.

9.1.12 Eyes

Hold eyelids open and rinse the eyes immediately with large amounts of water for 15 minutes. Never permit the eyes to be rubbed. Transport person to a medical facility as soon as possible.

9.2 Informational Summary

9.2.1 Health and Safety Summary

Chemicals of Concern: Benzene, MTBE, Tetrachloroethene, Toluene, Trans 1,2 Dichloroethane, Trichloroethene, Xylene(s), Vinyl Chloride.

These chemicals are of moderate to low hazard. Therefore, modified level D personal protective equipment will be required at all times when on site. Changes to this requirement will be required as follows.

Level C protection, as described in this plan, will be available at a minimum for those activities that involve surface and subsurface soil (strata disturbance, such as well installation, and all subsurface media sampling activities such as split-spoon sampling and borings).

The Site Safety Officer will determine whether or not a level of protection can be upgraded or downgraded. Changes in the level of protection will be recorded in the dedicated site logbook along with the rationale for the changes. Level D protection may be used for those activities that do not pose a potential threat of exposure to toxic or hazardous substances. Typical Level D activities may include sediment, logging and groundwater sampling, as well as surficial site

surveys. Level C protection equipment should be readily available at all times. Consistent with OSHA training, prior to donning Level C, oxygen percent must be continuously monitored.

Action levels represent those conditions that a person requires an upgrade of personal protective equipment (PPE). Organic vapor concentrations are to be monitored in the field by the use of a flame ionization or photo ionization detector (FID or PID) with readings being taken in a breathing zone occupied by field personnel to determine whether an action level has been exceeded. The information presented below applies to the above chemical constituents. All air monitoring results should be logged on the Vapor Monitoring Sheet in Appendix.

All initial site access and activities will be done in Level D attire.

Ionization Detector Response

Flame Ionization Detector (FID)

Concentrations (in ppm)	Level of PPE Required
0.0 to 5.0	Level D
5.0 to 250.0	Level C
250.0 to 750.0	Level B
Above 750.0	Immediately withdraw from the area

Combustible Gas Response

Combustible Gas Indicator (CGI)

Results (% of LEL)	Procedure
0.0 to 20.0	Continue with normal activity
Above 20.0	Immediately withdraw from the area

Oxygen Detector Response

Combustible Gas Indicator (CGI)

Results (% Oxygen)	Procedure
0.0 to 19.5	Level B PPE is required
19.5 to 23.0	Continue with normal activity
Above 23.0	Immediately withdraw from the area

9.3 Introduction

This HASP describes the procedures to be followed in order to reduce employee exposure to potential health hazards that may be present at the project site. The emergency response procedures necessary to respond to such hazards are also described within this HASP.

9.3.1 Purpose

The purpose of this Health and Safety Plan (HASP) is to provide the contractor's field personnel, subcontractors, and other visitors with an understanding of the potential chemical and physical hazards that exist or may arise while the tasks of this project are being performed.

9.3.2 Objective

This Health and Safety Plan is required in accordance with OSHA 29 CFR 1910.120. The primary objective is to ensure the well being of all field personnel and the community surrounding this site. In order to accomplish this, project staff and approved subcontractors shall acknowledge and adhere to the policies and procedures established herein. Accordingly, all personnel assigned to this project shall read this HASP and sign the Agreement and Acknowledgment Statement (Appendix) to certify that they have read, understood, and agree to abide by its provisions.

The contractor's personnel have the authority to stop work performed by our sub-contractors at this site if said work is not performed in accordance with the requirements of this HASP.

9.3.3 Amendments

Any changes in the scope of work of this project and/or site conditions must be amended in writing and approved by the Regional Health and Safety Manager.

9.4 Hazard Evaluation

9.4.1 Site Tasks

The field tasks covered by the HASP may include well installation, development, gauging, and bailing; soil & groundwater handling/sampling; and confined space (excavation) entry and job task hazards.

9.4.2 Job Task Hazards

The following hazards may be encountered.

• Organic Vapors

The inhalation of volatile organic vapors during all operations can pose a potential health hazard. Hazard reduction procedures include monitoring the ambient air with a FID and the use of appropriate PPE. Workers should stand upwind of the source of contamination whenever possible.

• Flammable Vapors

The presence of flammable vapors can pose a potential fire and health hazard. Hazard reduction procedures include monitoring the ambient air with an oxygen/LEL meter (combustible gas indicator). If the LEL reading exceeds 20%, leave the site immediately and contact the fire department.

• Oxygen

Atmospheres that contain a level of oxygen greater than 23% pose an extreme fire hazard (the usual ambient oxygen level is approximately 20.5%). This hazard can be compounded by the fact that vapors associated with this site are highly flammable. All personnel encountering atmospheres that contain a level of oxygen greater than 23% must evacuate the site immediately and must notify the Fire Department. If the oxygen level is less than 19.5%, do not enter the space without level B PPE.

• Vehicular Traffic

All employees will be required to wear a fluorescent safety vest at all times while on site. In addition, supplemental traffic safety equipment use can be exercised when warranted by specific task. Supplemental equipment can be items such as cones, flags, barricades, and/or caution tape.

9.4.3 Well Installation, Development, Gauging, Bailing; Soil & Groundwater Sampling

Skin and eye contact with contaminated groundwater and/or soil may occur during these tasks. Nitrile gloves and approved safety glasses must be worn.

9.4.4 Sample Preservation

When hydrochloric acid is used, skin and eye contact can occur. This hazard can be reduced with the use of Nitrile gloves and safety glasses. Safety goggles should be worn if there is a potential for a splash hazard.

9.4.5 Cleaning Equipment

Skin and eye contact with methanol, "Alconox", or other cleaning substances can occur while decontaminating equipment. This hazard can be reduced with the use of Nitrile gloves and safety glasses.

9.4.6 Confined Space Entry

Excavation pits, storage tanks, soil trenches, subsurface vaults, basements, and sheds are examples of confined spaces. Confined spaces can be identified as an area having one of the following characteristics:

- Limited access and egress
- Unfavorable for natural ventilation
- Not designed for continuous human occupancy

Organic and/or combustible vapors may be trapped in confined spaces, resulting in lack of oxygen (anoxia) and/or overexposure to vapors. When site work takes place in a confined space, the air must be monitored for oxygen level, flammable vapors, and toxic vapors. The following air monitoring procedures must be followed before entering a confined space.

a. Oxygen Level

   Monitor for percent oxygen with an oxygen/LEL meter (e.g., CGI) to ensure an oxygen level between 19.5 and 23%. Because of the high vapor density of the contaminants associated with this site, there is a high probability that vapors in the enclosed spaces or vaults will replace any oxygen that is present, even if the space is open to the air. Therefore, oxygen level monitoring will be done at the top, middle, and bottom of the enclosed space to determine if there is a minimum acceptable oxygen level of 19.5%

prior to entry. The oxygen/LEL meter is factory-set to sound an alarm at levels less than 19.5% oxygen. **If oxygen is less than 19.5% or greater than 23%, do not enter the space.**

b. Explosive Vapors

Monitor the percentage of the Lower Explosive Limit (LEL) with an oxygen/LEL meter to determine whether vapor concentrations within the confined space are within the flammable range. If LEL readings exceed 10%, personnel should exercise extreme caution, use non-sparking tools, and utilize ventilation engineering controls to reduce LEL levels. The oxygen/LEL meter is factory set to sound an alarm at levels greater than 20% LEL. If LEL readings exceed 20%, **personnel MUST leave the site immediately and contact the project manager.**

c. Toxic Vapors

Monitor for toxic vapors with a FID (e.g., Photovac OVA) to determine whether toxic vapors within the confined space exceed the action levels. PID readings will be taken at the top, middle, and bottom of a vault, shed, or other confined space to determine vapor levels.

Summary

Do not enter the confined space unless:

- the oxygen concentration is between 19.5 and 23%;
- the LEL is less than 20%; and
- FID readings are less than 250 ppm (a respirator must be worn if the readings exceed 5 ppm)

All monitoring equipment must be calibrated and maintained in accordance with manufacturer's recommendations.

9.4.7 Occupational Noise

Requirements set forth in the OSHA Hearing Conservation Regulation (OSHA 1910.95) shall be adhered to during work on-site. Hearing protection shall be provided to the employees where sound pressure levels exceed 85 dB. Hearing protection shall be worn where sound pressure levels in areas and/or on equipment exceeds 90 dB. Typical drilling operations have been

monitored with a sound level meter and indicate that hearing protection is required for all personnel while engaged in this action.

9.4.8 Heat Stress

Since climatic changes cannot be avoided, work schedules will be adjusted to provide time intervals for intake of juices, juice products, and water in an area free from contamination and in quantities appropriate for fluid replacement.

Heat stress may occur even in moderate temperature areas and may present any or all of the following:

a. Heat Rash

   Result of continuous exposure to heat, humid air, and chafing clothes. Heat rash is uncomfortable and decreases the ability to tolerate heat.

b. Heat Cramps

   Result of the inadequate replacement of body electrolytes lost through perspiration. Signs include severe spasms and pain in the extremities and abdomen.

c. Heat Exhaustion

   Result of increased stress on the vital organs of the body in the effort to meet the body's cooling demands. Signs include shallow breathing; pale, cool, moist skin; profuse sweating; and dizziness.

d. Heat Stroke

   Result of overworked cooling system. Heat stroke is the most serious form of heat stress. Body surfaces must be cooled and medical help must be obtained immediately to prevent severe injury and/or death. Signs include red, hot, dry skin; absence of perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma; and death.

Heat Stress Prevention

A. Replace body fluids (water and electrolytes) lost through perspiration. Solutions may include a 0.1% salt and water solution or commercial mixes such as "Gatorade". Employees must be encouraged to drink more than the amount required to satisfy thirst.

B. Use cooling devices to aid the natural body ventilation. Cooling occurs through evaporation of perspiration and limited body contact with heat-absorbing protective clothing. Utilize fans and air conditioners to assist in evaporation. Long, cotton underwear is suggested to absorb perspiration and limit any contact with heat-absorbing protective clothing (i.e., coated Tyvek suits).

C. Conduct non-emergency response activities in the early morning or evening during very hot weather.

D. Provide shelter against heat and direct sunlight to protect personnel. Take breaks in shaded areas.

E. Rotate workers utilizing protective clothing during hot weather.

F. Establish a work regime that will provide adequate rest periods, with personnel working in shifts.

Heat Stress Monitoring

Heat stress may occur even in moderate temperatures and may present heat rash, heat cramps, heat exhaustion, and/or heat stroke.

Monitoring procedures should be implemented to prevent heat stress arising from environmental conditions, use of PPE, and/or intensity of workload.

For temperatures above 70 °F, the following regime shall be followed for workers wearing permeable coveralls:

Adjusted Temperature	Normal Ensemble	Impermeable Ensemble
90 °F or above	After 45 min. of work	After 15 min. of work
87.5 to 90 °F	After 60 min. of work	After 30 min. of work
82.5 to 87.5 °F	After 90 min. of work	After 60 min. of work
77.5 to 82.5 °F	After 120 min. of work	After 90 min. of work
72.5 to 77.5 °F	After 150 min. of work	After 120 min. of work

Workers wearing semipermeable or impermeable encapsulating protective clothing should be monitored for heart rate and temperature when the temperature in the work area is above 70 °F. To monitor the worker, measure:

A: Heart rate - Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third.

B: Oral temperature - Use a clinical thermometer or similar device to measure the oral temperature at the end of the work period (before drinking). If oral temperature exceeds 99.6 °F, shorten the next work cycle by one-third.

Do not permit a worker to wear a semipermeable or impermeable garment if the core body temperature exceeds 100.6 °F.

Workers shall not be required to continue working if they feel any of the symptoms of heat stress. Rest periods should be a minimum of 15 minutes. Length of rest period should be extended as appropriate or as recommended by the Site Safety Officer or alternate.

9.4.9 Exposure: Cold Stress

Work schedules will be adjusted to provide sufficient rest periods in a heated area for warming up during operations conducted in cold weather. Also, thermal protective clothing such as wind and/or moisture resistant outerwear is recommended to be worn.

If work is performed continuously in the cold at or below -7 °C (20 °F), including wind chill factor, heated warming shelters (tents, cabins, company vehicles, rest rooms, etc.) shall be made available nearby and the worker should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, frostnip, the feeling of excessive fatigue, drowsiness, irritability, or euphoria, are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing shall be removed and the remainder of the clothing loosened to permit sweat evaporation. A change of dry work clothing shall be provided as necessary to prevent workers from returning to their work with wet clothing.

Dehydration, or the loss of body fluids, occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities. Warm sweet drinks and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of a diuretic and circulatory effect. (Adapted from TLV's and Biological Exposure Indices 1988-1989; ACGIH)

9.5 Personal Protective Equipment

The following is a breakdown of the types of protective clothing and equipment to be used during the site activities. Personal protective equipment (PPE) is in conformance with EPA criteria for Level B, C, and D protection. All respiratory protective equipment used will be approved by NIOSH/MSHA.

Level C protection, as described in this plan, will be available at a minimum for those activities that involve surface and subsurface soil (strata disturbance such as well installation, and all subsurface media sampling activities such as split-spoon sampling and borings). Some activities may require Level B protection. In atmospheres potentially containing toluene and xylenes, the protective ensemble should include chemical resistant clothing since the two compounds have skin absorption potential.

The Site Safety Officer will determine whether or not a level of protection can be upgraded or downgraded. Changes in the level of protection will be recorded in the dedicated site logbook along with the rationale for the changes. Level D protection may be used for those activities that do not pose a potential threat of exposure to toxic or hazardous substances. Typical Level D activities may include sediment, logging and groundwater sampling, as well as surficial site surveys. Level C protection equipment should be readily available at all times. Consistent with OSHA training, prior to donning Level C, the percentage of oxygen must be continuously monitored.

<u>Level D</u>

- hard hat
- safety glasses

- steel toe and shank boots
- fluorescent vest
- splash goggles
- hearing protection (as appropriate)

Modified Level D

- hard hat
- safety glasses
- steel toe and shank boots
- fluorescent vest
- Nitrile "N-Dex" inner gloves
- latex outer boots (chemical resistant)
- splash goggles
- polyethylene coated Tyvek suit
- hearing protection (as appropriate)

Level C

- buddy system required at all times
- full face respirator with NIOSH approved OV/AG/HEPA combination cartridges (MSA GMC-H)
- Saranex coated Tyvek Suit
- inner Nitrile "N-Dex" gloves
- outer Nitrile (NBR) gloves
- steel toe and shank boots
- outer boots (chemical resistant)
- hard hat
- hearing protection (as appropriate)

Level B

- Regional Health and Safety representatives must be on site upon start-up of any project requiring level B protection. This should be understood to include subcontractors conducting

Level B activity.

- buddy system required at all times
- supplied air respirator or SCBA
- Saranex coated Tyvek Suit
- inner Nitrile "N-Dex" gloves
- outer Nitrile (NBR) gloves
- steel toe and shank boots
- outer boots (chemical resistant)
- hard hat
- hearing protection (as appropriate)

Note: Respirator cartridges will be changed once per day at a minimum. This can be accomplished at the end of the work day during respirator decontamination. If odor breakthrough is detected while wearing the respirator or if breathing becomes difficult, change cartridges immediately.

Contact with contaminated surfaces, or surfaces suspected of being contaminated, should be avoided. This includes walking through, kneeling in, or placing equipment in puddles, mud, discolored surfaces, or on drums and other containers. Eating. smoking, drinking, and/or the application of cosmetics in the immediate work area is prohibited.

When utilizing protective garments such as Tyvek suits, gloves, and booties, all seams between protective items will be sealed with duct tape.

The use of contact lenses on the job site is strongly advised against. However, when glasses are not available, contact lenses are preferred over faulty vision. When contact lenses are worn, safety glasses and/or goggles must be worn at all times while on the job site.

9.6 Decontamination

9.6.1 General

Personnel involved in work activities at the site may be exposed to compounds in a number of ways, despite the most stringent protective procedures. Site personnel may come in contact with vapors, gases, mists, or particulates in the air, or other site media while performing site duties. Use of monitoring instruments and site equipment can also result in exposure and transmittal of hazardous substances.

In general, decontamination involves scrubbing with a detergent water solution followed by clean water rinses. All disposable items shall be disposed of in a dry container. Certain parts of contaminated respirators, such as harness assemblies and leather or cloth components, are difficult to decontaminate. If grossly contaminated, they may have to be discarded. Rubber components can be soaked in detergent and water and scrubbed with a brush. In addition to being contaminated, all respirators, non-disposable protective clothing, and other personal articles must be sanitized or replaced before they can be used again if they become soiled from exhalation, body oils, and perspiration. The manufacturer's instructions should be followed in sanitizing the respirator masks.

The Site Safety Officer will be responsible for the proper maintenance, decontamination, and sanitizing of all respirator equipment.

The decontamination zone layout and procedures should match the prescribed levels of personal protection. A detailed discussion for the establishment of the project decontamination zone and the procedures required for the various levels of personnel protection follows.

<u>Exclusion Zone (EZ)</u>

It is within this zone that the work activities are performed. No one shall enter this zone unless the appropriate PPE is donned.

Contaminant Reduction Zone (CRZ)

It is within this zone that the decontamination process is undertaken. Personnel and their equipment must be adequately decontaminated before leaving this zone for the support zone. This zone will be set up between the EZ and a well-ventilated open area.

Support Zone (SZ)

The support zone is considered to be uncontaminated; as such, protective clothing and equipment are not required but should be available for use in emergencies. All equipment and materials are stored and maintained within this zone. Protective clothing is put on in the SZ before entering the CRZ. The SZ will be established in a safe environment.

The following procedures have been established to provide site personnel with minimum guidelines for proper decontamination. These minimum procedures must be followed by personnel leaving the point of operations designated as the EZ. The decontamination process shall take place at a reasonable distance away from any area of potential contamination.

9.6.2 Minimum Decontamination Procedure

Personnel leaving the point of operations should wash outer gloves and boots. At a minimum, the outer boots shall be removed first and stored in an appropriate area or disposed of properly. Outer boots must be properly washed where gross contamination is evident. Personnel shall then remove and dispose of the Tyvek suits. Personnel should remove the Tyvek suits so that the inner clothing does not come in contact with any contaminated surfaces. After Tyvek removal, personnel shall remove and discard outer Nitrile gloves. Personnel shall then remove the respirator, where applicable. Respirators shall be disinfected between uses with towelettes or other sanitary methods. Potable water, at a minimum, will be present so that site personnel can thoroughly wash hands and face after leaving the point of operations.

Portable wash stations shall be utilized for easy and efficient access. The wash station shall consist of a potable water supply, hand soap, and clean towels. Portable sprayer units filled with Alconox solution and potable water should also be available to wash and rinse off grossly contaminated boots, gloves, and equipment. The Site Safety Officer will monitor

decontamination procedures to ensure their effectiveness. Modifications of the decontamination procedure may be necessary as determined by the Site Safety Officer's observations.

9.6.3 Standard Decontamination Procedure

The following decontamination procedures should be implemented during site operations for the appropriate level of protection.

Level B

Segregated equipment drop

Deposit equipment (tools, sampling devices, notes, monitoring instruments, radios, etc.) used on the site onto plastic drop cloths.

Boot covers and glove wash

Outer boots and outer gloves should be scrubbed with a decontamination solution of detergent and water or replaced.

Rinse off boot covers and gloves

Decontamination solution should be rinsed off boot covers and gloves using generous amounts of water. Repeat as many times as necessary.

Tape removal

Remove tape from around boots and gloves and place into container with plastic liner.

Boot cover removal

Remove disposable boot covers and place into container with plastic liner.

Outer glove removal

Remove outer gloves and deposit in container with plastic liner.

Suit / safety boot wash

Completely wash splash suit, SCBA, gloves, and safety boots. Care should be exercised that no water is allowed into the SCBA regulator. It is suggested that the SCBA regulator be wrapped in plastic.

Suit / safety boot rinse

Thoroughly rinse off all decontamination solution from protective clothing.

Tank or canister changes

This is the last step in the decontamination procedure for those workers wishing to change air tanks and return to the EZ. The worker's air tank or cartridge is exchanged, new outer glove and boot covers are donned, and joints taped.

Removal of safety boots

Remove safety boots and deposit in container with a plastic liner.

SCBA backpack removal

Without removing the face piece, the SCBA backpack should be removed and placed on a table. The face piece should then be disconnected from the remaining SCBA unit and then proceed to the next station.

Splash suit removal

With care, remove the splash suit. The exterior of the splash suit should not come in contact with any inner layers of clothing.

Inner glove wash

The inner gloves should be washed with a mild decontamination solution (detergent / water)

Inner glove rinse

Generously rinse the inner gloves with water.

Face piece removal

Without touching the face with gloves, remove the face piece. The face piece should be deposited into a container that has a plastic liner.

Inner glove removal

Remove the inner glove and deposit into a container that has a plastic liner.

Field wash

Wash hands and face thoroughly. If highly toxic, skin corrosive, or skin absorbent materials are known or suspected to be present, a shower should be taken.

Level C and Level D

The decontamination procedure for Level C and Level D personal protection will employ applicable steps detailed in the Level B decontamination process.

9.6.4 Sampling Equipment and Sample Container Decontamination

All non-disposable sampling equipment will be decontaminated with an Alconox / water solution followed by a clean water rinse. As an added precaution against cross-contamination, all non-disposable sampling equipment will be rinsed with distilled water. All disposable sampling equipment will be properly disposed of in dry containers.

Before leaving the site, all sample containers will be thoroughly decontaminated using a detergent and water solution followed by a clean water rinse. The decontamination procedure should include a complete scrubbing of the container's surface to remove possible contamination. Care must be exercised to prevent damage to sample container identification labels.

9.7 Health and Safety Requirements

9.7.1 Medical Monitoring Program

A baseline physical examination must be conducted on all employees before they are permitted to engage in sampling, cleanup, and remedial action work. A complete medical survey should be

completed on each employee upon start of employment. Yearly re-examination should be performed to update information on employee health status. Additional re-evaluation will be considered in the event of a chemical overexposure. These medical surveillance requirements shall comply with OSHA regulations as defined in 29 CFR 1910.120.

9.7.2 Training

All personnel working at this site should have received a minimum of 40 hours of initial hazardous waste activity instruction, and a minimum of three days of field experience under direct supervision of a trained, experienced person. Personnel assigned to the site will also receive eight hours refresher training per year. On-site managers and supervisors directly responsible for employees engaged in hazardous waste operations have received an additional eight hours of supervisory training. These training requirements comply with the OSHA Hazardous Waste Operations and Emergency Response Regulation, 29 CFR 1910.120.

9.7.3 Visitor Policy

All visitors and/or trainees on site must submit to the limitations described herein.

9.7.4 Work Zone Area

Work and support areas shall be established based on ambient air data and proposed work sites. They shall be established in order to contain contamination within the smallest areas possible and shall ensure that each employee has the proper PPE for the area or zone in which work is to be performed.

9.7.5 First Aid Equipment

Vehicles used for site work will be equipped with a first aid kit and safety equipment including:

- fluorescent vests
- cones (and flags as needed)
- hazard tape (barricades as needed)
- mounted fire extinguisher (10 pound A/B/C type)

- working flashlight
- water, suitable for drinking
- portable eye wash
- first aid kit with appropriate bandage material
- full body harness with lifeline (for confined space entry)

9.7.6 Fire Prevention

During equipment operation, periodic vapor concentration measurements should be taken with an explosimeter or combustimeter. If at any time the vapor concentrations exceed 20% of the LEL, then the Site Safety Officer or designated field worker should immediately shut down all operations.

Only approved safety cans will be used to transport and store flammable liquids.

All gasoline and diesel-driven engines requiring refueling must be shut down and allowed to cool prior to filling.

Smoking is not allowed during any operations within the work area in which petroleum products or solvents in free-floating, dissolved, or vapor forms, or other flammable liquids may be present.

No open flame or spark is allowed in any area containing petroleum products or other flammable liquids.

9.7.7 Heavy Machinery / Equipment

All site employees must remain aware of those site activities that involve the use of heavy equipment and machinery. Respiratory protection and protective eyewear may be worn frequently during site activities. This protective equipment significantly reduces peripheral vision of the wearer. Therefore, it is essential that all employees at the site exercise extreme caution during operation of equipment and machinery to avoid physical injury to themselves or others.

9.7.8 Additional Safety Practices

The following are important safety precautions that will be enforced during work activities.

1. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated.
2. Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activity.
3. Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garments are removed.
4. No excessive facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required to wear respiratory protection equipment. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges attached to the respirator. Fit-testing shall be performed prior to respirator use to ensure a proper seal is obtained by the wearer.
5. Contact with potentially contaminated surfaces should be avoided whenever possible. One should not walk through puddles; kneel on the ground; lean, sit, or place equipment on drums, containers, vehicles, or the ground.
6. Medicine and alcohol can potentate the effect from exposure to certain compounds. Prescribed drugs and alcoholic beverages should not be consumed by personnel involved in the project.
7. Personnel and equipment in the work areas should be minimized, consistent with effective site operations.
8. Work areas for various operational activities should be established.
9. Procedures for leaving the work area must be planned and implemented prior to going to the site. Work areas and decontamination procedures must be established on the basis of prevailing site conditions.
10. Respirators will be issued for the exclusive use of one worker and will be cleaned and disinfected after each use.
11. Safety gloves and boots shall be taped to the disposable, chemical-protective suits as necessary.

12. All unsafe equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.
13. Noise mufflers or earplugs may be required for all site personnel working around heavy equipment. This requirement will be at the discretion of the Site Safety Officer. Disposable, form-fitting plugs are preferred.
14. Cartridges for air-purifying respirators in use will be changed daily at a minimum.

9.8 Project Personnel

9.8.1 Project Manager

The Project Manager will be responsible for implementing the project and obtaining any necessary personnel or resources for the completion of the project. Specific duties will include:

- coordinating the activities of all subcontractors, to include informing them of the required PPE and insuring their signature acknowledging this Site Safety Plan
- selecting a Site Safety Officer and field personnel for the work to be undertaken on site
- ensuring that the tasks assigned are being completed as planned and on schedule
- providing authority and resources to ensure that the Site Safety Officer is able to implement and manage safety procedures
- preparing reports and recommendations about the project to clients and affected personnel
- ensuring that all persons allowed to enter the site (i.e., EPA, contractors, state officials, visitors are made aware of the potential hazards associated with the substances known or suspected to be on site, and are knowledgeable as to the on-site copy of the specific site safety plan.
- ensuring that the Site Safety Officer is aware of all of the provisions of this site safety plan and is instructing all personnel on site about the safety practices and emergency procedures defined in the plan
- ensuring that the Site Safety Officer is making an effort to monitor site safety, and has designated a Field Team Leader to assist with the responsibility when necessary.

9.8.2 Site Safety Officer

The Site Safety Officer shall be responsible for the implementation of the site safety plan on site. Specific duties will include:

- monitoring the compliance of field personnel for the routine and proper use of the PPE that has been designated for each task.
- routinely inspecting PPE and clothing to ensure that it is in good condition and is being stored and maintained properly.
- stopping work on the site or changing work assignments or procedures if any operation threatens the health and safety of workers or the public.
- monitoring personnel who enter and exit the site and all controlled access points.
- reporting any signs of fatigue, work-related stress, or chemical exposures to the Project Manager and/or Health and Safety Officer.
- dismissing field personnel from the site if their actions or negligence endangers themselves, co-workers, or the public, and reporting the same to the Project Manager.
- reporting any accidents or violations of the site safety plan to the Project Manager and documenting the same for the project in the records.
- knowing emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire and police departments.
- ensuring that all project-relating personnel have signed the personnel agreement and acknowledgments form contained in this site safety plan.
- coordinate upgrading and downgrading PPE as necessary due to changes in exposure levels, monitoring results, weather, and other site conditions.
- perform air monitoring with approved instruments in accordance with requirements stated in this Site Safety Plan.

9.8.3 Project Field Manager

In the event that the Project Manager and the Site Safety Officer are not on site, the Project Field Manger will assume all responsibility of the Site Safety Officer.

9.8.4 Other Field Personnel

All field personnel shall be responsible for acting in compliance with all safety procedures outlined in the Site Safety Plan. Any hazardous work situations or procedures should be reported to the Site Safety Officer so that corrective steps can be taken.

FOCUSED REMEDIAL INVESTIGATION
Work Plan

APPENDICES

To Be Conducted At:

Site Code # 1-30-043S
299 Main Street
Westbury, New York

Client:

2632 Realty Development Corp.
1025 Old Country Road
Westbury, New York

User:

New York State Department of Environmental Conservation
Bureau of Eastern Remedial Action
Division of Environmental Remediation
50 Wolf Road
Albany, New York

Dated:

September 18, 1998

Impact Environmental
Geotechnical Services · Environmental Consulting · Environmental Engineering · Environmental Contracting
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FOCUSED REMEDIAL INVESTIGATION
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Albany, New York

Dated:

September 18, 1998

APPENDIX A

SITE SURVEY FORM

SURVEY FORM

Date: _____
Time: _____
Inspector: _____

Age of Building & Present Use	
Previous Use of Building	
Type of Sewer System (sewer or sanitary)	
Type of Heat (oil, natural gas, or electric)	
Storage Tanks (location, capacity, consumption)	
Additional Material Use & Storage	
Wastes Entering, Generated On, or Leaving Site	
Past Spill Incidents (location, contaminants)	
Asbestos Survey	
Location of Tanks	
Location of Floor Drains	
Location of Dry Wells	

APPENDIX B

GEOPROBE SYSTEM INFORMATION

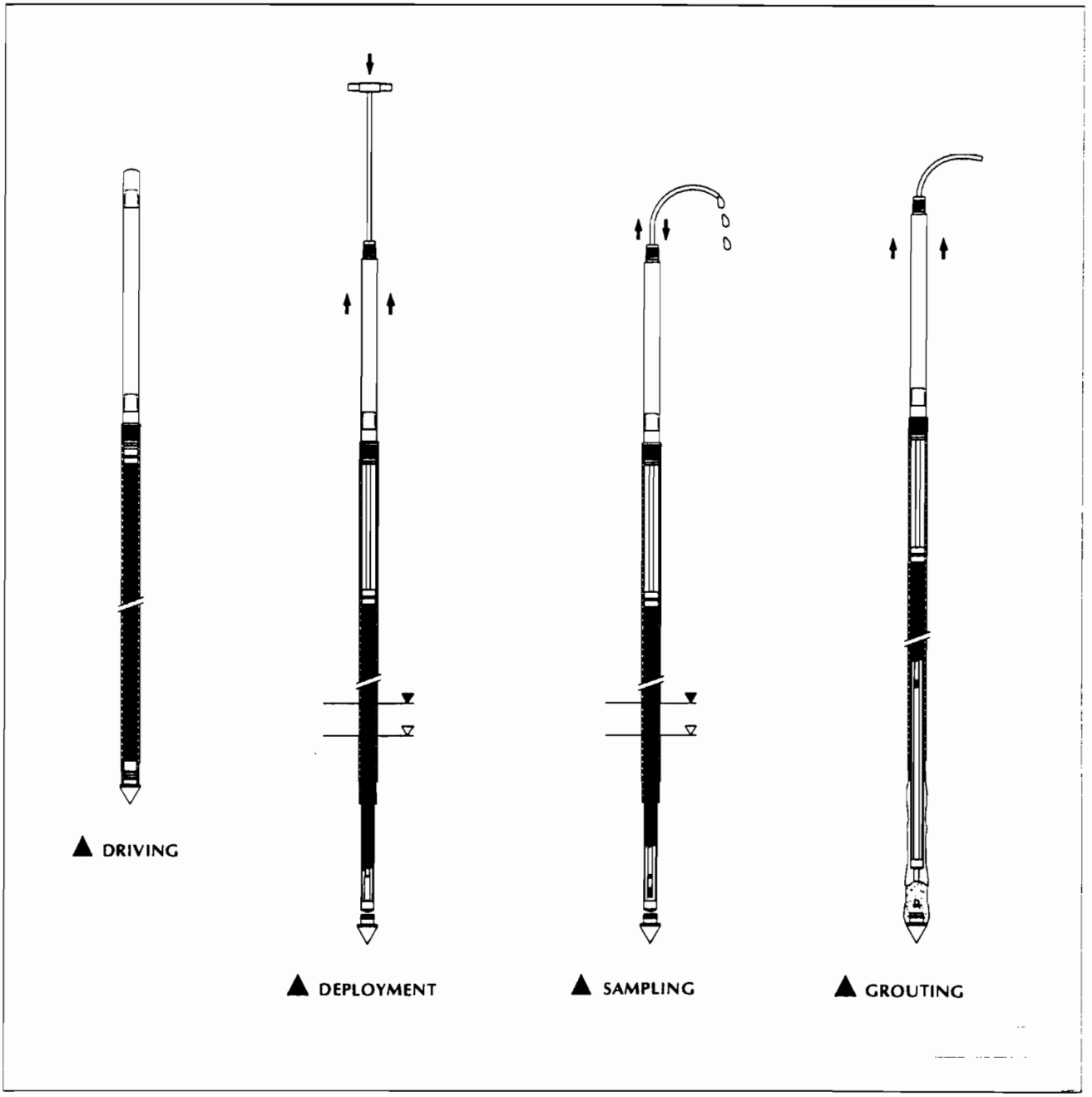
GEOPROBE SCREEN POINT 15 GROUNDWATER SAMPLER

STANDARD OPERATING PROCEDURE

Technical Bulletin No. 95-1500

PREPARED: October, 1995

REVISED: September, 1997



GEOPROBE SCREEN POINT 15 GROUNDWATER SAMPLER

Geoprobe® Systems

A DIVISION OF KEJR ENGINEERING

Geoprobe® is a Registered Trademark of
Kejr Engineering, Inc., Salina, Kansas
Screen Point 15 Groundwater Sampler manufactured
under U.S. Patent 5,612,498

1.0 OBJECTIVE

The objective of this procedure is to drive a sealed stainless steel or PVC screen to depth, deploy the screen, obtain a representative water sample from the screen interval, and grout the probe hole during abandonment. The Screen Point 15 Groundwater Sampler enables the operator to conduct abandonment grouting that meets American Society for Testing and Materials (ASTM) Method D 5299 requirements for decommissioning wells and borings for environmental activities (ASTM 1993).

2.0 BACKGROUND

2.1 Definitions

Geoprobe®: A brand name of high quality, hydraulically powered machines that utilize both static force and percussion to advance sampling and logging tools into the subsurface. The Geoprobe brand name refers to both machines and tools manufactured by Geoprobe Systems, Salina, Kansas. Geoprobe tools are used to perform soil core and soil gas sampling, groundwater sampling, soil conductivity and contaminant logging, grouting, and materials injection.

Screen Point 15 Groundwater Sampler: A direct push device consisting of a PVC or stainless steel screen that is driven to depth within a sealed, steel sheath and then deployed for the collection of representative groundwater samples. The assembled Screen Point 15 Sampler is 52 inches (1321 mm) long with an OD of 1.5 inches (38 mm). Upon deployment, up to 41 inches (1041 mm) of screen can be exposed to the formation.

Casing Puller: An assembly which makes it possible to retract the sampler string with extension rods protruding from the top of the probe rods. For units originally equipped with the GH40 Soil Probing Hammer, a Casing Pull Kit is available as part number GW4600K. Units originally equipped with the SK58 hammer, or retrofitted with the GH40 hammer require a different casing pull kit. Contact Geoprobe Systems for specific information.

Rod Grip Pull System: An attachment mounted on the GH40 Soil Probing Hammer which makes it possible to retract the sampler string with extension rods protruding from the top of the probe rods. The rod grip pull system utilizes hammer support brackets which greatly enhance probe unit durability. This system is therefore preferred over the Casing Pull Kit. The Rod Grip Pull System for use with 1.0- and 1.25-inch probe rods is available as GH1250K.

2.2 Discussion

In this procedure, the assembled Screen Point 15 Groundwater Sampler (Fig. 2.1A) is threaded onto the leading end of a Geoprobe probe rod and driven into the subsurface with a Geoprobe soil probing machine. Additional probe rods are subsequently added and driven until the desired sampling interval is reached. While the sampler is driven to depth, O-ring seals at the drive head and expendable drive point provide a watertight system. This system eliminates the threat of formation fluids entering the screen before deployment and assures sample integrity.

Once at the desired sampling interval, extension rods are sent downhole until the leading rod contacts the bottom of the sampler screen. The tool string is then retracted approximately 44 inches (1118 mm) while the screen is held in place with the extension rods (Fig. 2.1B). As the tool string is retracted, the expendable point is released from the sampler sheath. An O-ring on the screen head maintains the seal at the top of the screen. As a result, any liquid entering the sampler during screen deployment must first pass through the screen. The tool string and sheath may be retracted the full length of the screen or as little as a few inches if a small sampling interval is desired.

The Screen Point 15 Sampler utilizes either a stainless steel screen with a standard slot size of 0.004 inches (0.10 mm) or a PVC screen with a standard slot size of 0.010 inches (0.25mm). Both screen have an exposed length of 41 inches (1041 mm). Alternate slot sizes and lengths may be custom ordered. Contact Geoprobe Systems for available options. The screens are constructed such that a check valve or mini-bailer can be inserted into the screen cavity. This makes direct sampling possible from anywhere within the saturated zone. A removable plug in the lower end of the screens allows the user to grout as the sampler is extracted for further use.

Groundwater samples can be obtained in a number of ways. The most common method utilizes polyethylene or Teflon® tubing and a Tubing Bottom Check Valve (GW42). The check valve (with check ball) is attached to one end of the tubing and inserted down the casing until it is immersed in groundwater. Water is pumped through the tubing and to the ground surface by oscillating the tubing up and down. If oscillating the tubing is undesirable (such as when sampling for volatiles analysis), lower the check valve and tubing to the bottom of the sampler without the check ball. Then drop the check ball into the tubing from the ground surface. The ball will seat in the check valve and trap the sample in the tubing. Collect the sample by withdrawing and draining the tubing.

An alternative means of collecting groundwater samples is to attach a peristaltic or vacuum pump to the tubing. This method is limited in that water can be pumped to the surface from a maximum depth of approximately 26 feet (8 m). Another technique for groundwater sampling is to use a stainless steel Mini-Bailer Assembly (GW41). The mini-bailer is lowered down the inside of the casing below the water level where it fills with water and is then retrieved from the casing.

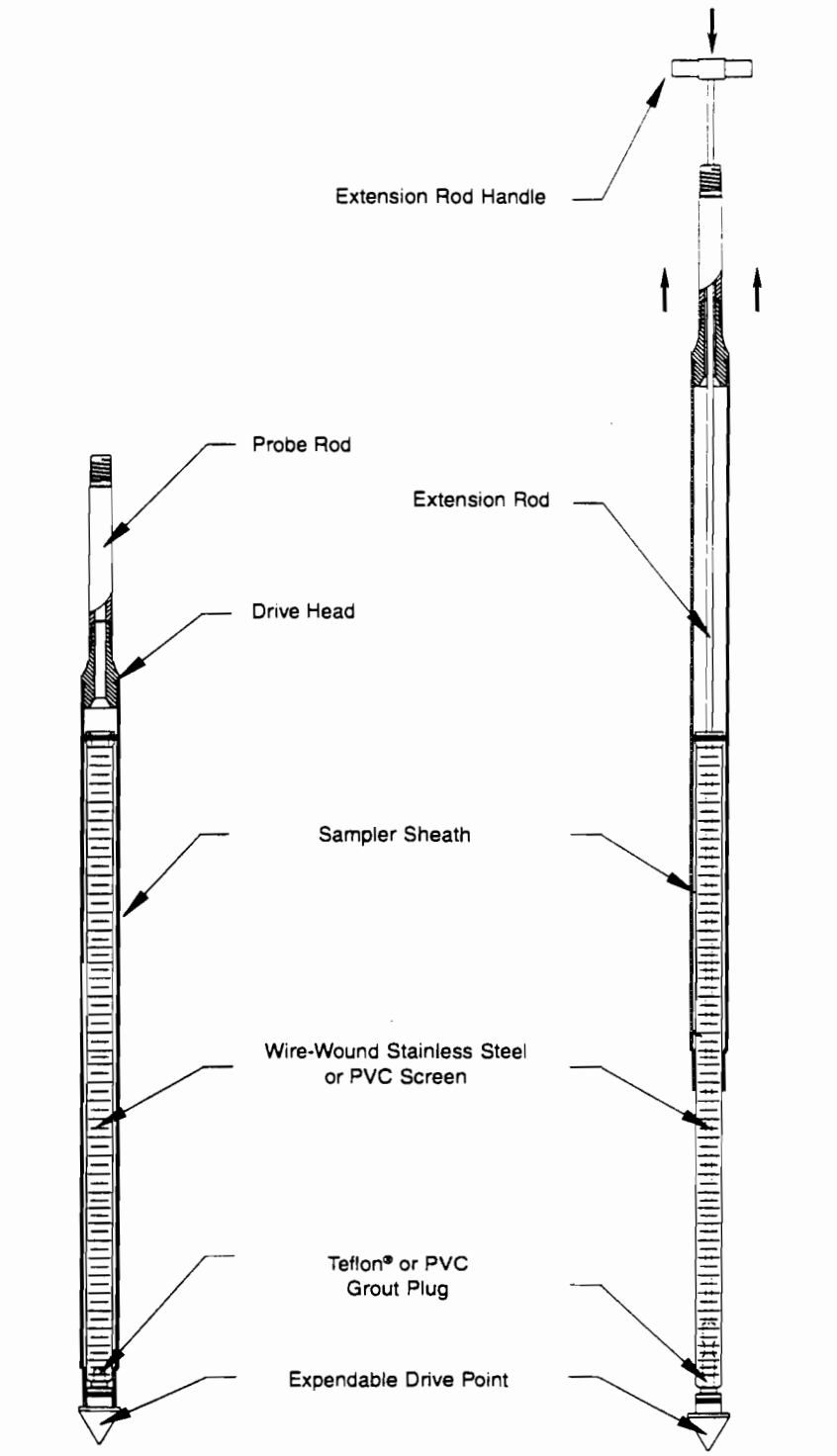


FIGURE 2.1
Screen Point 15 Groundwater Sampler

3.0 REQUIRED EQUIPMENT

The following equipment is required to successfully recover representative groundwater samples with the Geoprobe Screen Point 15 Groundwater Sampler and probing system. See Figure 3.1 for Screen Point 15 parts identification.

Screen Point 15 Groundwater Sampler Parts	**Quantity**	**Part Number**
O-ring Service Kit , 1.0-inch rods (100 of each O-ring)	-1-	GW1504K
O-ring Service Kit, 1.25-inch rods (100 of each O-ring)	-1-	GW1505K
Sampler Sheath	-1-	GW1510*
Drive Head, 0.625-inch bore, 1.25-inch rods (optional)	-1-	GW1512
Drive Head, 0.5-inch bore, 1.25-inch rods	-1-	GW1513
Drive Head, 1.0-inch rods	-1-	GW1515
Screen, Wire-Wound Stainless Steel, 4-Slot	-1-	GW1520*
Screen, PVC, 10-Slot (optional)	-1-	GW1530
Screen Push Adapter	-1-	GW1535*
Grout Plug Push Adapter	-1-	GW1540*
Grout Nozzle	-1-	GW1545
Grout Plugs, Teflon® (Pkg. of 25)	-1-	GW1550K
Grout Plugs, PVC (Pkg. of 25)	-1-	GW1551K*
Expendable Drive Points, Steel (Pkg. of 25)	-1-	GW1555K*
Expendable Drive Points, Aluminum (Pkg. of 25) (optional)	-1-	GW1555ALK
Screen Point 15 Groundwater Sampler Kit for 1.0-inch rods		GW1500K
Includes (*) items plus:		
O-ring Service Kit, 1.0-inch rods (100 or each O-ring)	-1-	GW1504K
Drive Head, 1.0-inch rods	-1-	GW1515
Screen Point 15 Groundwater Sampler Kit for 1.25-inch rods		GW1512K
Includes (*) items plus:		
O-ring Service Kit, 1.25-inch rods (100 or each O-ring)	-1-	GW1505K
Drive Head, 1.25-inch rods	-1-	GW1513

Geoprobe Tools	**Quantity**	**Part Number**
Drive Cap, 1.25-inch probe rods**	-1-	AT1200
Slotted Pull Cap, 1.25-inch probe rods (optional)**	-1-	AT1203
Pull Cap, 1.25-inch probe rods**	-1-	AT1204
Probe Rod, 1.25-inch x 48-inch***	Variable	AT1248
O-rings for 1.25-inch Probe Rods (Pkg. of 25)	Variable	AT1250R
Extension Rod, 36-inch (optional)	Variable	AT67
Extension Rod, 48-inch	Variable	AT671
Extension Rod, 1-meter (optional)	Variable	AT675
Extension Rod Coupler	Variable	AT68
Extension Rod Handle	-1-	AT69
Extension Rod Jig	-1-	AT690
Quick Link Extension Rod Connectors (Optional)	Variable	AT694K
Casing Pull Kit (for GH-40 hammer)	-1-	GW4600K
Rod Grip Pull System (may be used in place of GW4600K)	-1-	GH1250K

**Accessories for 1.0-inch OD probe rods are also available from Geoprobe Systems.
***Geoprobe 1.0-inch and 1.25-inch OD probe rods are available in lengths of 36-, 48-, and 60 inches, as well as 1 meter.

Additional Tools	**Quantity**
Adjustable Wrench	-1-
Pipe Wrenches	-2-

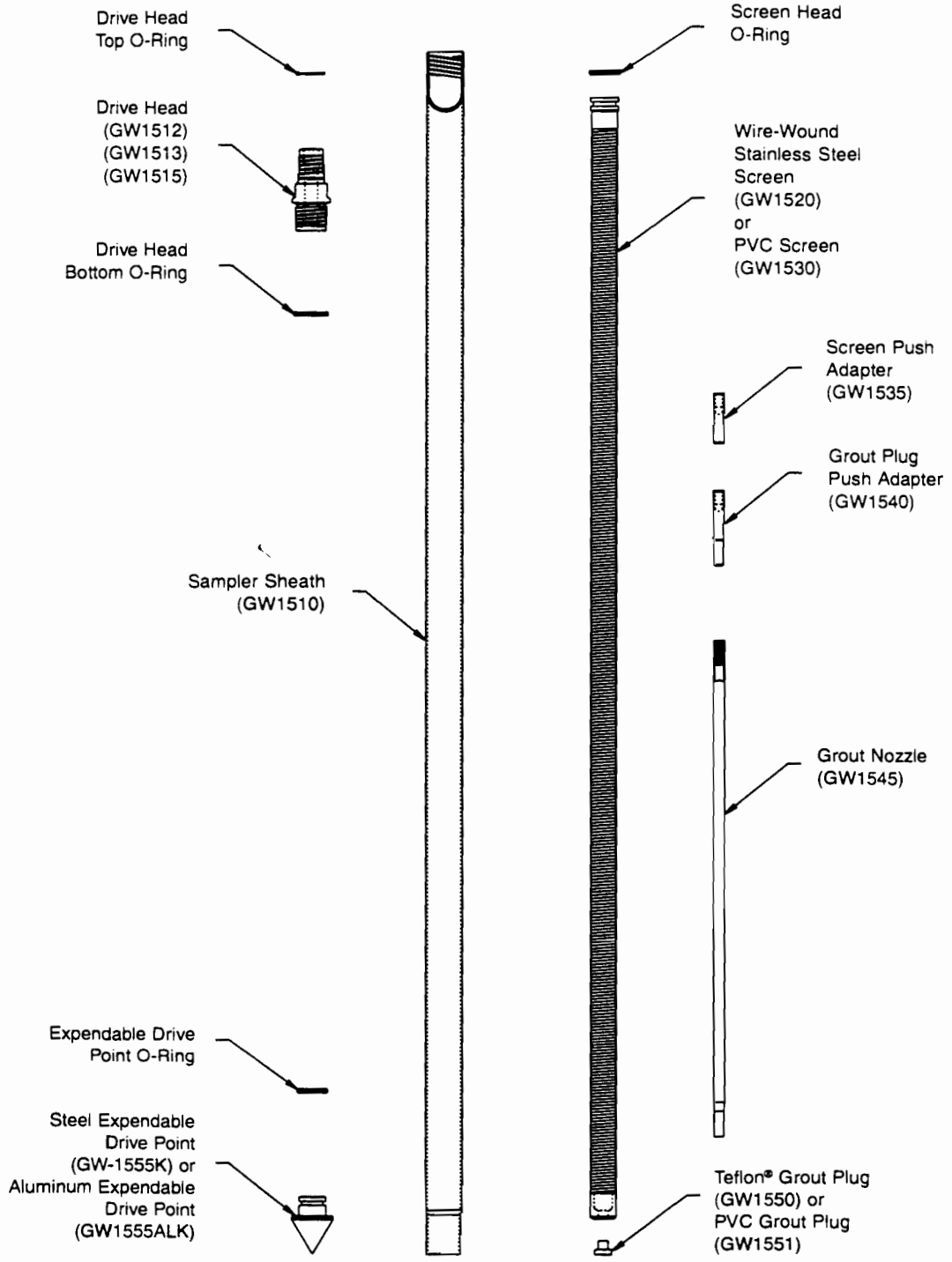


FIGURE 3.1
Screen Point 15 Groundwater Sampler Parts

4.0 OPERATION

4.1 Basic Operation

The Screen Point 15 Groundwater Sampler utilizes a stainless steel or PVC screen which is encased in an alloy steel sampler sheath. An expendable drive point is placed in the lower end of the sheath while a drive head is attached to the top. O-rings on the drive head and expendable point provide a watertight sheath which keeps contaminants out of the system as the sampler is driven to depth. Once the desired sampling interval is reached, extension rods equipped with a screen push adapter are inserted down the inside diameter of the probe rod string. The tool string is then retracted approximately 44 inches (1118 mm) while the screen is held in place with the extension rods. At this point the system is ready for groundwater sampling. When sampling is complete, a removable plug in the bottom of the screen allows for grouting below the sampler as the tool string is retrieved.

4.2 Decontamination

In order to collect representative groundwater samples, all Screen Point 15 parts must be thoroughly cleaned before and after each use. Scrub all metal parts using a stiff, long-bristle brush and a nonphosphate soap solution. Steam cleaning may be substituted for hand-washing if available. Rinse with distilled water and allow to air-dry before assembly.

4.3 Sampler Assembly (Fig. 4.1)

Part numbers are listed for a standard sampler using 1.25-inch x 48-inch probe rods. Refer to Page 6 for screen, grout plug, drive head, extension rod, and probe rod alternatives.

1. Install an O-ring on a steel expendable drive point (GW1555K). Firmly seat the expendable point in the necked end of a sampler sheath (GW1510).

2. Place a PVC grout plug (GW1551) in the lower end of a wire-wound stainless steel screen (GW1520). Install an O-ring in the groove on the upper end of the screen. Slide the screen inside of the sampler sheath with the grout plug toward the bottom of the sampler. Ensure that the expendable point was not displaced by the screen.

3. Install a bottom O-ring on a drive head (GW1513). Thread the drive head onto the sampler sheath. Attach a drive cap (AT1200) to the top of the drive head. Ensure that the threads engage completely. Tighten with an adjustable wrench if necessary.

4. Sampler assembly is complete.

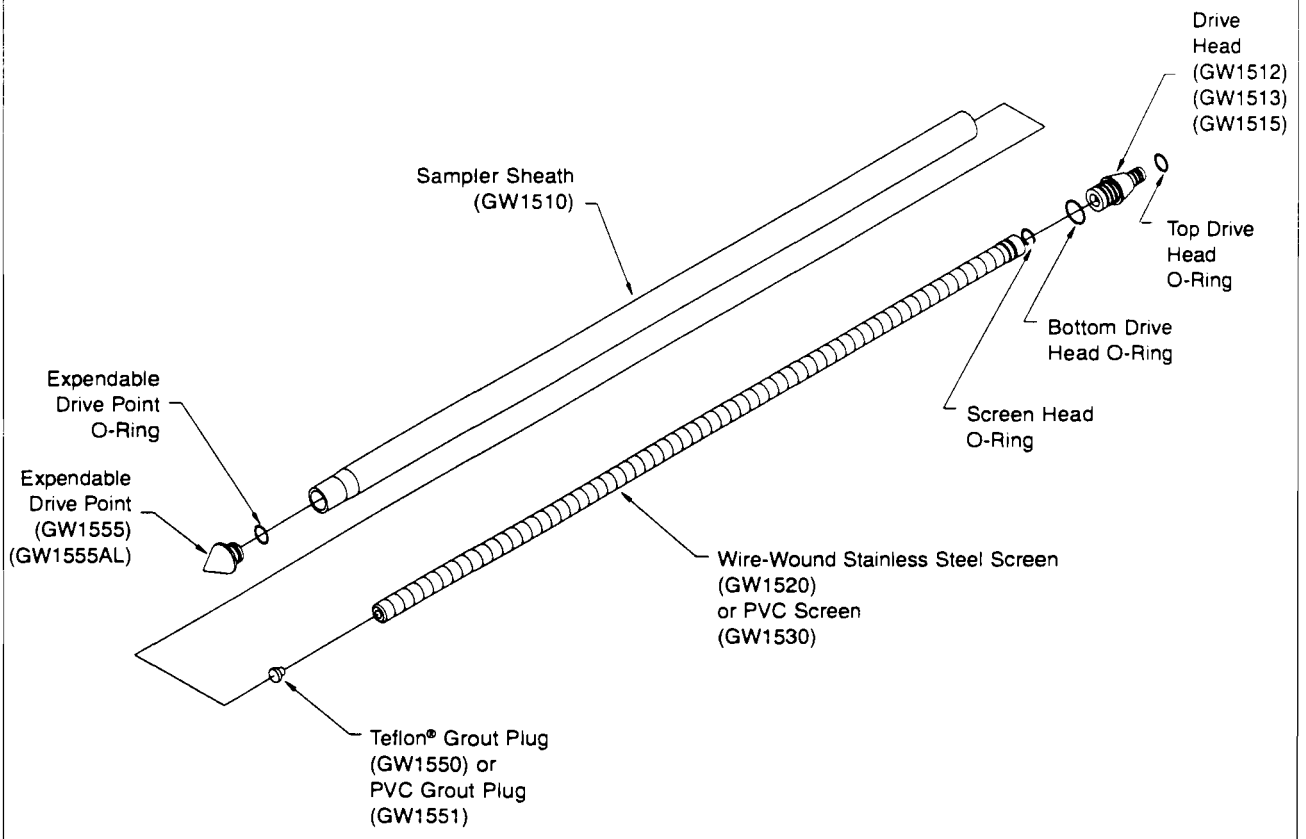


FIGURE 4.1
Screen Point 15 Groundwater Sampler Assembly

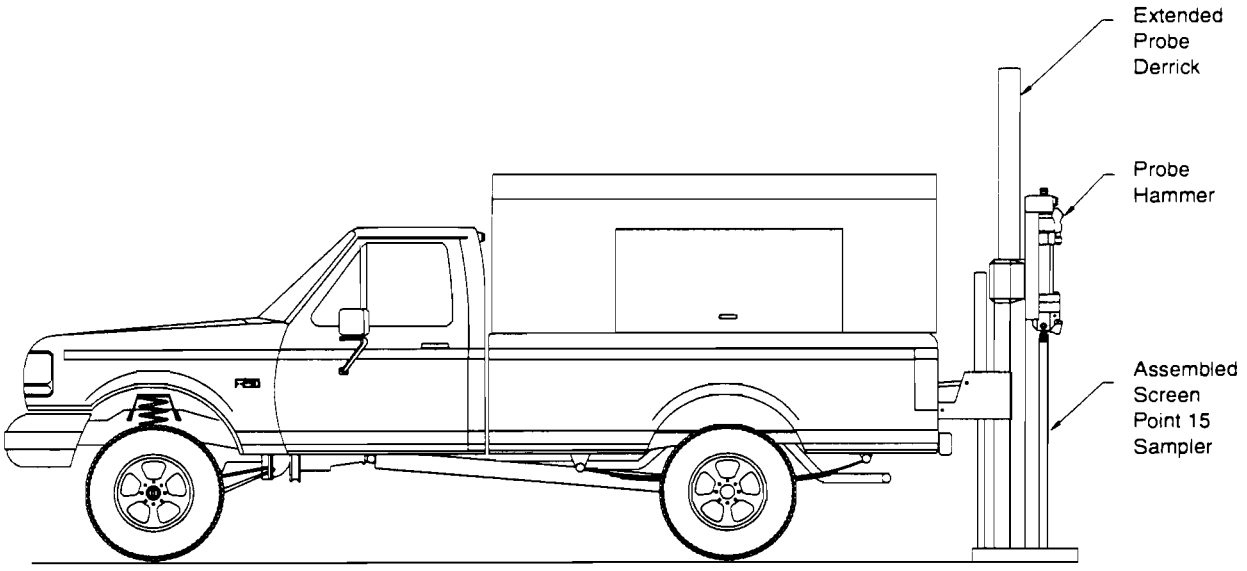


FIGURE 4.2
Screen Point 15 Groundwater Sampler in Driving Position

4.4 Driving the Screen Point 15 Sampler

To provide adequate room for screen deployment with the casing puller assembly, the probe derrick should be extended a little over halfway out of the carrier vehicle before driving the Screen Point 15 Sampler

1. Begin by placing the assembled sampler (Fig. 2.1) in the driving position beneath the hammer on the extended probe derrick (Fig. 4.2).

2. Drive the sampler with throttle control at slow speed for the first 1 or 2 feet to ensure that the sampler is driving straight. Switch the throttle control to fast speed for the remainder of the probe stroke.

3. Completely raise the hammer assembly. Remove the drive cap and place an O-ring in the top groove of the drive head. Distilled water may be used to lubricate the O-ring if needed. Add a 1.25-inch x 48-inch probe rod (AT1248) and reattach the drive cap to the rod string. Drive the sampler the entire length of the new rod with the throttle control at fast speed.

4. Repeat Step 3 until the desired sampling interval is reached. Approximately 12 inches (305 mm) of the last probe rod must extend above the ground surface to allow attachment of the puller assembly. A 12-inch (305 mm) rod may be added if the tool string is over-driven.

5. Remove the drive cap and retract the probe derrick away from the tool string.

4.5 Screen Deployment

1. Thread the screen push adapter (GW1535, Fig. 4.3) on an extension rod (AT67, AT671, or AT675). Attach a coupler (AT68) to the other end of the extension rod. Lower the extension rod inside of the probe rod taking care not to drop it down the tool string. An extension rod jig (AT690, Fig. 4.3) may be used to hold the rods.

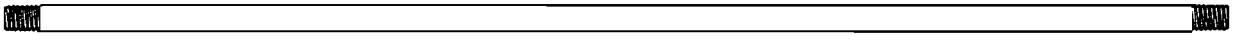
2. Add extensions until the adapter contacts the bottom of the screen. To speed up this step, extension rod Quick Links (AT694K, Fig. 4.3) are recommended.

3. Maneuver the probe assembly into position for pulling.

   Note: In this section, "Puller" refers to either the Casing Pull Kit (GW4600K) or Rod Grip Pull System (GH1250K). The operator may choose which option to use. Refer to Figures 4.4 and 4.5 for puller configurations.

4. Ensure that at least 48 inches (1219 mm) of extension rod protrudes from the probe rod. Thread an extension rod handle (AT-69, Fig. 4.3) on the top extension.

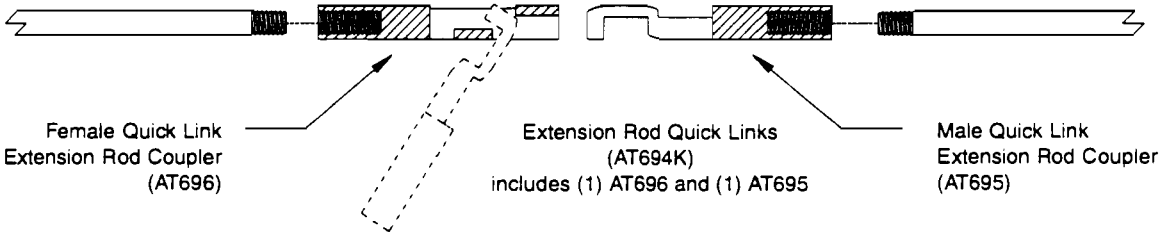
5. Retract probe rods and sampler sheath while physically holding the screen in place with the extension rods (Fig. 4.5B). A slight knock with the extension rod string will help to dislodge the expendable point and start the screen moving inside the sheath. Raise the hammer and pull bracket assembly about 44 inches (1118 cm). At this point the screen head will contact the necked portion of the sampler sheath (Fig. 4.5C.) and the extension rods will rise with the probe rods. The screen is now deployed. Use care when deploying a PVC screen so as not to break the screen when it contacts the bottom of the sampler sheath.



Extension Rod, 36-inch (AT67), 48-inch (AT671), or 1-meter (AT675)

Grout Plug Push Adapter
(GW1540)

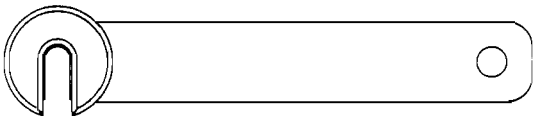
Screen Push Adapter
(GW1535)



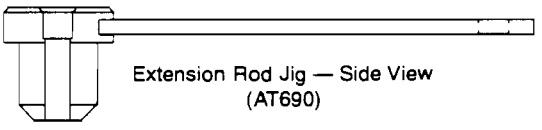
Female Quick Link
Extension Rod Coupler
(AT696)

Extension Rod Quick Links
(AT694K)
includes (1) AT696 and (1) AT695

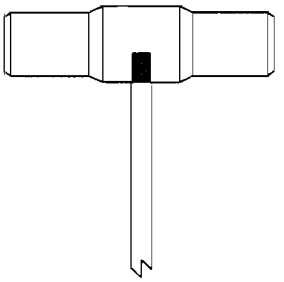
Male Quick Link
Extension Rod Coupler
(AT695)



Extension Rod Jig — Top View
(AT690)



Extension Rod Jig — Side View
(AT690)



Extension Rod Handle
(AT69)

FIGURE 4.3
Geoprobe Extension Rods and Accessories

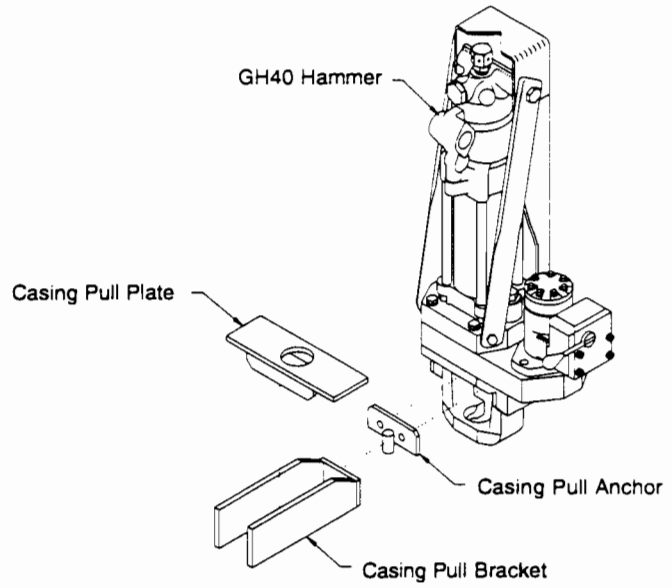


FIGURE 4.4
Casing Puller Assembly for Units Originally Equipped With The GH-40 Hammer

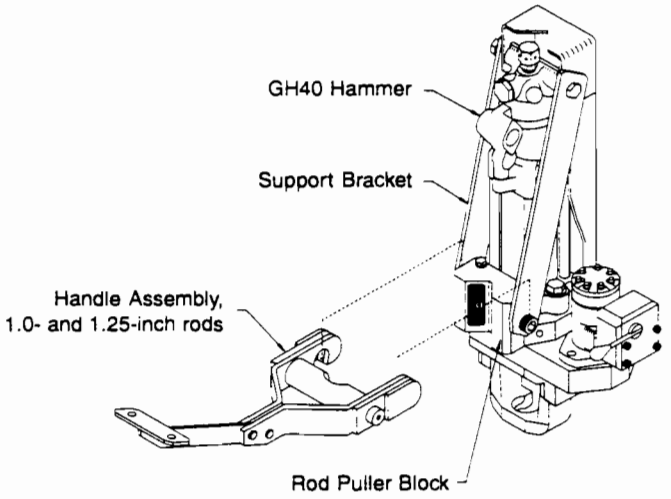


FIGURE 4.5
Rod Grip Pull System for Units Equipped With The GH-40 Hammer

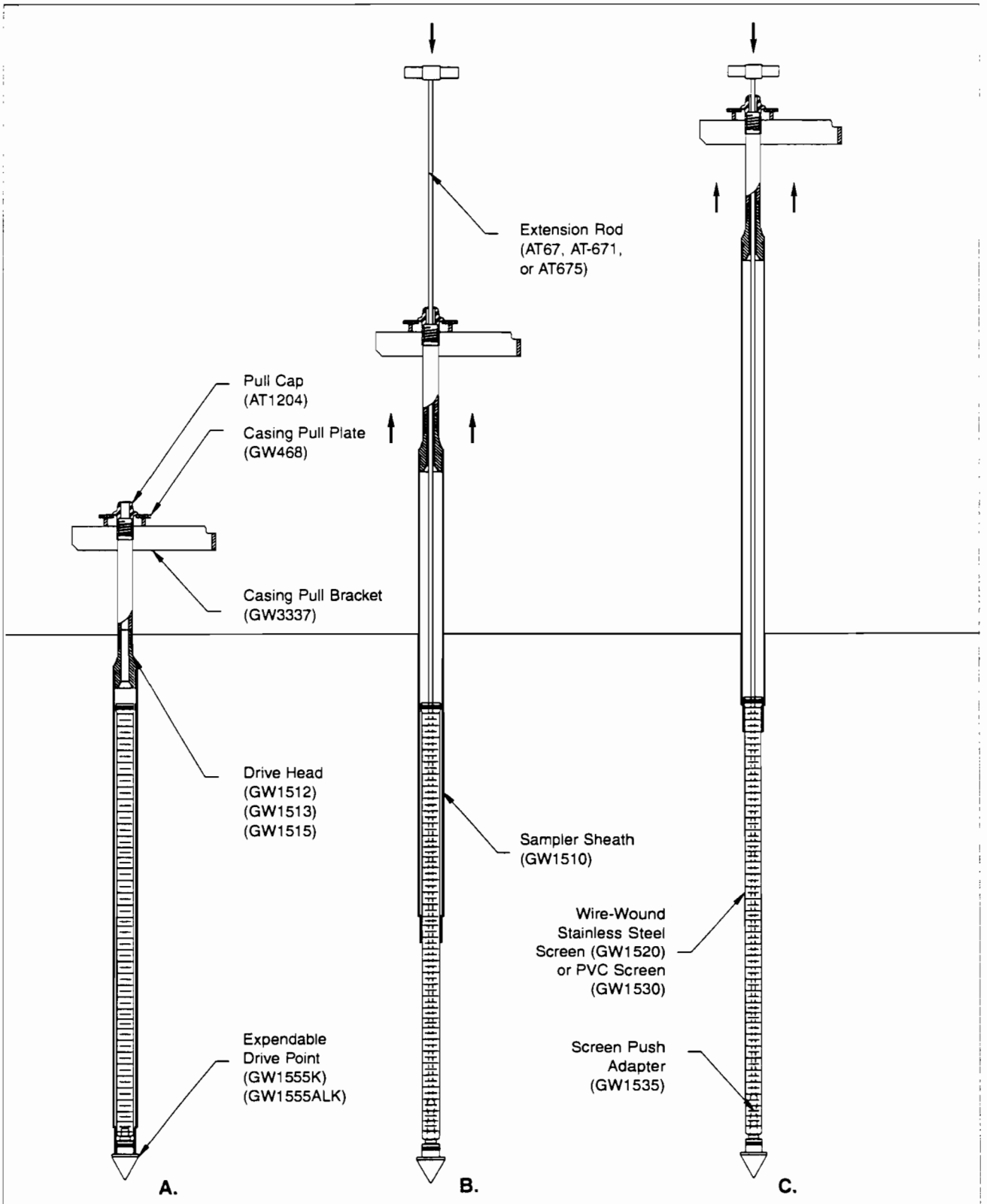


FIGURE 4.6
Screen Deployment Using a Casing Pull Kit

6. Lower the hammer assembly and retract the probe derrick. Remove the top extension rod and handle, pull cap, and top probe rod. Finally, extract all extension rods.

7. Groundwater samples can now be collected with a mini-bailer, peristaltic or vacuum pump, tubing bottom check valve assembly, or other acceptable small diameter sampling device.

8. When inserting the tubing down the rod string to collect a sample, ensure that the tubing enters the screen interval. The tubing will sometimes catch on the edge of the funnel opening of the screen head. An up-and-down motion combined with rotation helps move the tubing past the lip and into the screen.

4.6 Abandonment Grouting

The Screen Point 15 Sampler can meet ASTM D 5299 requirements for abandoning environmental wells or borings when grouting is conducted properly. A removable grout plug makes it possible to deploy tubing through the bottom of the screen. A GS500 or GS1000 Grout Machine is then used to pump grout into the open probe hole as the sampler is withdrawn. The following procedure is presented as an example only and should be modified to satisfy local abandonment grouting regulations.

1. Maneuver the probe assembly into position for pulling. Attach the puller to the top probe rod. Raise the tool string approximately 4 to 6 inches (102 to 152 cm) to allow removal of the grout plug.

   Note: A Slotted Pull Cap (AT1203) is needed if utilizing the Casing Pull Kit (GW4600K). This allows connection of the pull cap to the tool string with poly tubing extending from the top of the probe rod.

2. Thread the grout plug push adapter (GW1540, Fig. 4.3) onto an extension rod. Insert the adapter and extension rod inside the probe rod string. Add extensions until the adapter contacts the grout plug at the bottom of the screen. When the extension rods are slightly raised and lowered, a relatively soft rebound should be felt as the adapter contacts the grout plug. This is especially true when using a PVC screen.

3. Place a mark on the extension rod even with the top of the probe rod. Apply downward pressure on the extension rods and push the grout plug out of the screen. The mark placed on the extension rod should now be below the top of the probe rod. Remove all extension rods.

   Note: When working with a stainless steel screen, it may be necessary to raise and quickly lower the extension rods to jar the grout plug free. When the plug is successfully removed, a metal-on-metal sensation may be noted as the extension rods are gently "bounced" within the probe rods.

4. A grout nozzle (GW1545) is now connected to polyethylene tubing and inserted into the probe rods and down through the bottom of the screen (Fig. 4.7). It may be necessary to pump a small amount of clean water through the tubing during deployment to jet out sediments that settled in the bottom of the screen. Resistance will sometimes be felt as the grout nozzle passes through the drive head. Once again, rotate the tubing while moving it up-and-down to ensure that the nozzle has reached the bottom of the screen and is not hung up on the drive head.

   Note: All probe rods remain strung on the tubing as the tool string is pulled. Provide extra tubing length to allow sufficient room to lay the rods on the ground as they are removed. An additional 20 feet is generally enough.

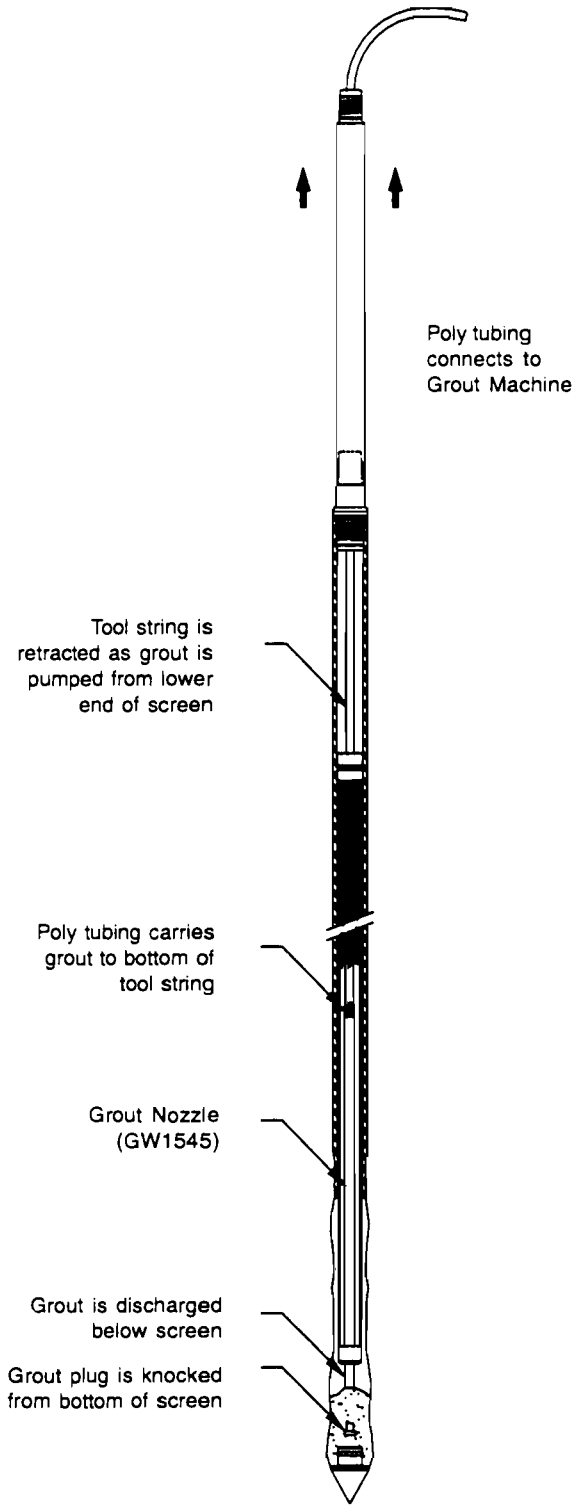


FIGURE 4.7
Grouting Through The Screen Point 15 Groundwater Sampler

Note: You may use the same poly tubing to grout the hole as was used to collect the groundwater sample. After sampling, completely lower the tubing to the bottom of the screen. Place a mark on the tubing even with the top of the rod string. Remove the tubing. Make a second mark on the tubing one grout nozzle length below the first mark. Now attach the nozzle to the leading end of the tubing and lower it to the bottom of the screen. The second mark on the tubing will be just below the top of the probe rods when the grout nozzle is fully deployed.

5. Position the probe assembly for pulling, taking care not to pinch or bind the tubing. Operate the grout pump while pulling the first rod. Coordinate pumping and pulling rates so that grout fills the void left by the sampler. Remove the split pull cap and unscrew the probe rod. Slide the rod over the tubing and place it on the ground near the end of the tubing to leave room for the remaining probe rods.

6. Repeat Step 5 until the sampler is retrieved. Do not bend or kink the tubing when pulling and laying out the probe rods. Sharp bends create weak spots in the tubing which may burst when pumping grout. Remember to operate the grout pump only when pulling the rod string. The probe hole is thus filled with grout from the bottom up as the rods are extracted.

7. Promptly clean all probe rods and sampler parts before the grout sets up and clogs the equipment.

4.7 Retrieving the Screen Point 15 Sampler

If grouting is not required, the Screen Point 15 sampler can be retrieved by pulling the probe rods as with most other Geoprobe sampling applications. The Rod Grip Pull System (GH1250K) should be used for this process as it allows the operator to remove rods without releasing the tool string. This keeps rods from falling to the bottom of the probe hole. If a rod grip pull system is not available, utilize a standard Pull Cap (AT1204). The process of retrieving the sampler with a standard pull cap is given below.

1. Position the probe derrick and hammer assembly over the tool string. Thread a pull cap (AT1204) onto the top probe rod.

2. Lower the hammer latch over the pull cap and retract the tool string one probe rod length.

3. Remove the pull cap and top probe rod and repeat Step 2 until the sampler sheath is at the ground surface.

4. Physically pull the sampler sheath and screen out of the ground taking care not to bend the screen on the way out. The Screen Point 15 Groundwater Sampler is now retrieved and ready to decontaminate for further use.

5.0 REFERENCES

American Society for Testing and Materials (ASTM), 1993. ASTM 5299 Standard Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities: *1993 Annual Book of ASTM Standards, Vol. 0408.* Philadelphia, PA.

Geoprobe Systems, 1997, "97-98 Tools and Equipment Catalog."

Geoprobe Systems, 1995, "1995-96 Tools and Equipment Catalog."

GEOPROBE MACRO-CORE® SOIL SAMPLER

STANDARD OPERATING PROCEDURE

Technical Bulletin No. 95-8500

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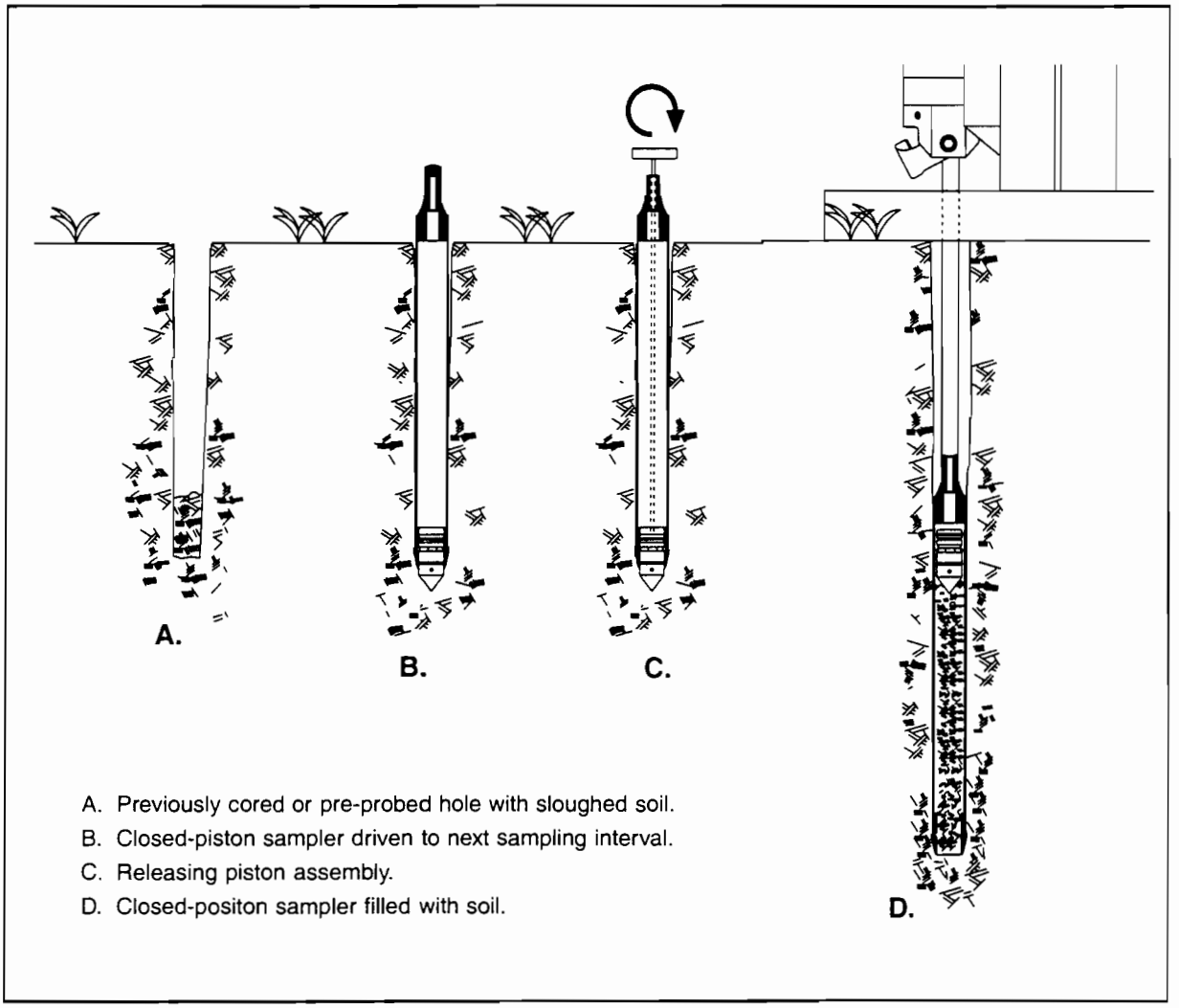


SAMPLING WITH THE MACRO-CORE® CLOSED-PISTON SOIL SAMPLER

Geoprobe® Systems

A DIVISION OF KEJR ENGINEERING

Geoprobe® is a Registered Trademark of Kejr Engineering, Inc., Salina, Kansas

Macro-Core® is a Registered Trademark of Kejr Engineering, Inc., Salina, Kansas

Macro-Core® Soil Sampler manufactured under US Patent 5,606,139.

Macro-Core® Closed-Piston Drive Point manufactured under US Patent 5,542,481

1.0 OBJECTIVE

The objective of this procedure is to collect a representative soil sample at depth and recover it for visual inspection and/or chemical analysis.

2.0 BACKGROUND

2.1 Definitions

Geoprobe®*: A brand name of high quality, hydraulically-powered machines that utilize both static force and percussion to advance sampling and logging tools into the subsurface.
** Geoprobe® is a registered trademark of Kejr Engineering, Inc., Salina, Kansas*

Macro-Core® Soil Sampler*: A solid barrel, direct push device for collecting continuous core samples of unconsolidated materials at depth. Although other lengths are available, the standard Macro-Core® Sampler has an assembled length of approximately 52 inches (1321 mm) with an outside diameter (OD) of 2.2 inches (56 mm). Collected samples measure up to 1300 ml in volume in the form of a 1.5-inch x 45-inch (38 mm x 1143 mm) core contained inside a removable liner. The Macro-Core® Sampler may be used for open-tube as well as closed-piston sampling.
** Macro-Core® is a registered trademark of Kejr Engineering, Inc., Salina, Kansas*

Liner: A 1.75-inch OD x 46-inch long (44 mm x 1168 mm) removable/replaceable, thin-walled tube inserted inside the Macro-Core® sample tube for the purpose of containing and storing soil samples. Liner materials include stainless steel, Teflon®, PVC, and PETG.

2.2 Discussion

In this procedure, the assembled Macro-Core Soil Sampler is attached to the leading end of a Geoprobe probe rod and driven into the subsurface using a Geoprobe soil probing machine. Additional probe rods are connected in succession to advance the sampler to depth. The Macro-Core Sampler may be used as an open-tube or closed-piston sampler.

The simplest and most common use of the Macro-Core Sampler is as an open-tube sampler (Fig. 2.1A). In this method, coring starts at the ground surface with an open-ended sampler. From the ground surface, the Macro-Core Sampler is advanced one sampling interval and then retrieved from the hole with the first soil core. In stable soils, the open-tube sampler is inserted back down the same hole to obtain the next core. Geoprobe operators have reported coring to depths exceeding 30 feet (9 m) with this method.

In unstable soils which tend to collapse into the core hole, the Macro-Core Sampler can be equipped with a piston assembly (Fig. 2.1B). This assembly actually locks into the cutting shoe and prevents soil from entering the sampler as it is advanced to the bottom of an existing hole.

The Macro-Core Closed-Piston Sampler is not designed to be driven through undisturbed soil. Soil is first removed to sampling depth with an open-tube sampler, or a pilot hole may be made with a Macro-Core Pre-Probe. A Macro-Core Piston Assembly is then installed and the sampler is inserted or driven back down the same hole. When the leading end of the sampler reaches the top of the next sampling interval, the piston is unlocked using extension rods inserted down the inside of the probe rods.

Once the piston is relieved, the tool string is simply driven another sampling interval. Soil entering the sampler pushes the piston assembly to the top of the sample liner where it is retrieved upon removal of the liner and soil core.

Loose soils will sometimes fall out of the Macro-Core Sampler as it is retrieved from depth. The Macro-Core Core Catcher (Fig. 2.1) was designed to alleviate this problem. Excellent results are obtained when the core catcher (sometimes called a basket retainer) is used with saturated sands and other non-cohesive soils. A core catcher is not necessary when sampling tight soils and may actually inhibit sample recovery. Constructed of PVC, the core catcher may be used with PVC, PETG, Teflon®, and stainless steel liners.

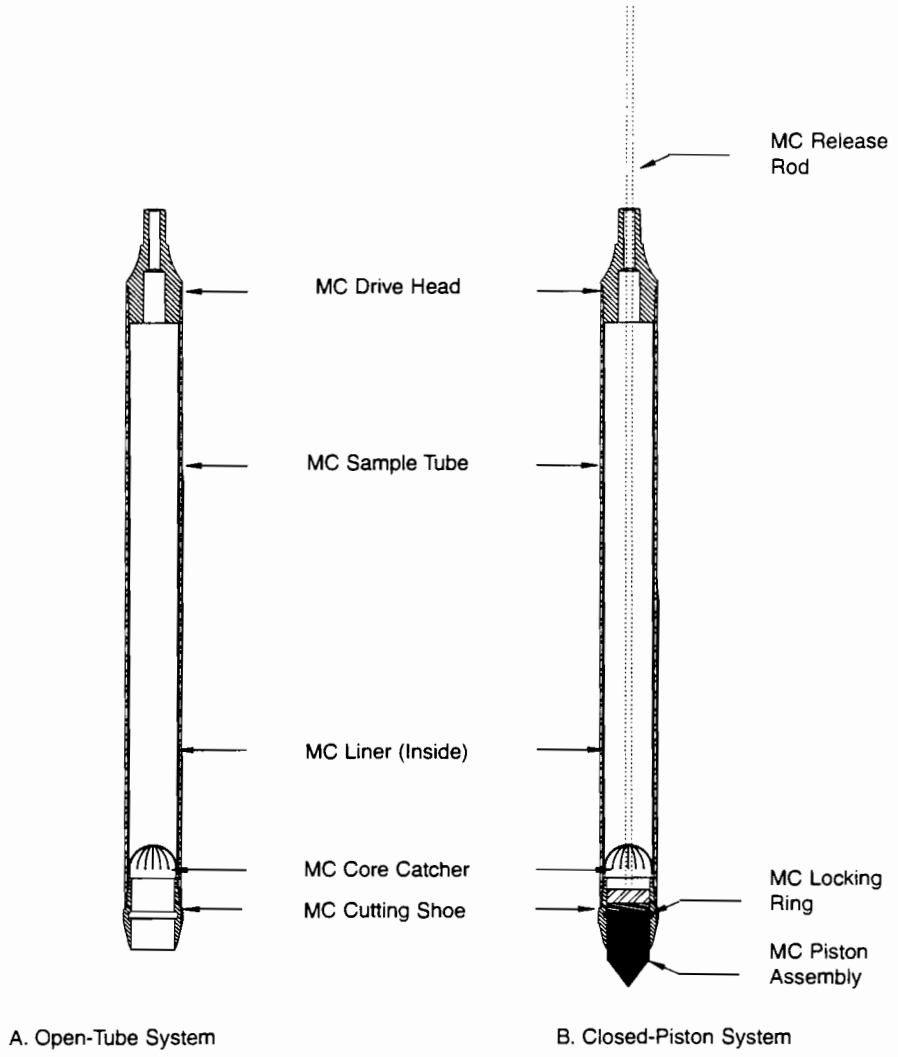


FIGURE 2.1
Macro-Core® Soil Sampler Assemblies

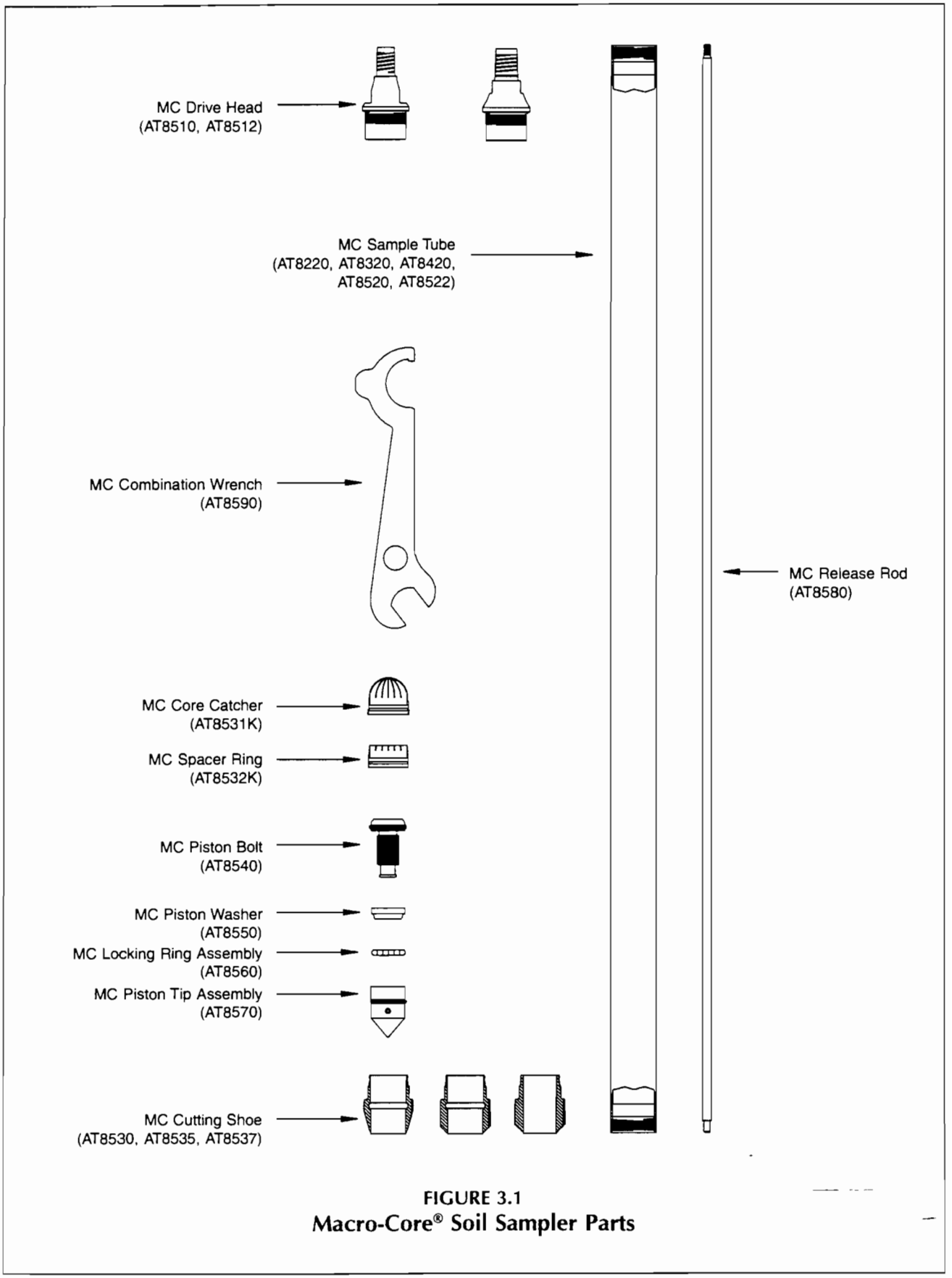


FIGURE 3.1
Macro-Core® Soil Sampler Parts

3.0 REQUIRED EQUIPMENT

The following equipment is used to recover samples using the Geoprobe Macro-Core Soil Sampler and probing system. Although many options are available (sampler length, liner material, etc.), the basic sampler configuration does not change. Refer to Figure 3.1 (previous page) to view the major components of the Macro-Core sampler.

MACRO-CORE SAMPLER PARTS	PART NUMBER
MC Drive Head, for use with 1.0-inch probe rods	AT8510
MC Drive Head, for use with 1.25-inch probe rods	AT8512
MC Sample Tube, 24-inch, unplated	AT8220
MC Sample Tube, 36-inch, unplated	AT8320
MC Sample Tube, 1-meter, unplated	AT8420
MC Sample Tube, 48-inch, Ni-plated	AT8520
MC Sample Tube, 48-inch, unplated	AT8522
MC Cutting Shoe, standard	AT8530
MC Cutting Shoe, heavy-duty	AT8535
MC Cutting Shoe, 0.125 inches undersized	AT8537
MC Combination Wrench	AT8590
Nylon Brush for MC Sample Tubes	BU700

MACRO-CORE PISTON PARTS	PART NUMBER
MC Closed-Piston Kit*	AT8501K
MC Piston Assembly*	AT8505
MC Piston Bolt	AT8540
MC Piston Washer	AT8550
MC Locking Ring Assembly	AT8560
MC Locking Ring Springs (pkg. of 10)	AT8561K
MC Locking Ring Pins (pkg. of 12)	AT8562
MC Piston Tip Assembly	AT8570
MC Piston O-rings (pkg. of 25)	AT8570R
MC Piston Tip Cup Point Set Screws (pkg. of 10)	AT8571
MC Piston Tip Half-Dog Set Screws (pkg. of 10)	AT8572
MC Piston Release Rod	AT8580

MACRO-CORE LINERS AND ACCESSORIES	PART NUMBER
MC Stainless Steel Liner Assembly, 48-inch	AT7235
MC Teflon® Liner Assembly, 48-inch	AT724
MC PETG Liner, thin-wall, 48-inch, (box of 66)	AT725K
MC Vinyl End Caps (66 pair)	AT726K
MC Heavy-Duty PETG Liner Assembly, 48-inch (box of 66)	AT825K
MC PVC Liner Assembly, clear, 24-inch (box of 66)	AT922K
MC PVC Liner Assembly, clear, 36-inch (box of 66)	AT923K
MC PVC Liner Assembly, clear, 1-meter (box of 66)	AT924K
MC PVC Liner Assembly, clear, 48-inch (box of 66)	AT925K
MC Liner Cutter Kit*	AT8000K
MC Liner Cutting Tool	AT8010
MC Liner Cutter Holder	AT8020
MC Liner Cutter Blades (pkg. of 5)	AT8030
MC Liner Circular Cutting Tool	AT8050
MC Core Catchers (pkg. of 25)	AT8531K
MC Spacer Rings (pkg. of 25)	AT8532K

*See Page 7 for component listing.

GEOPROBE TOOLS**	PART NUMBER
Drive Cap, for use with 1.25-inch probe rods	AT1200
Pull Cap, for use with 1.25-inch probe rods	AT1204
Probe Rod, 1.25 inches x 36 inches	AT1236
Probe Rod, 1.25 inches x 1 meter	AT1239
Probe Rod, 1.25 inches x 48 inches	AT1248
Probe Rod, 1.25 inches x 60 inches	AT1260
MC Pre-Probe, 2-inch OD	AT1247
MC Pre-Probe, 2.5-inch OD	AT1242
MC Pre-Probe, 3-inch OD	AT1252
Extension Rod, 36-inch	AT67
Extension Rod, 48-inch	AT671
Extension Rod, 1-meter	AT675
Extension Rod Coupler	AT68
Extension Rod Handle	AT69
Extension Rod Quick Links	AT694K
Machine Vise	FA300

ADDITIONAL TOOLS

Allen Wrench, 1/8 inch
Pipe Wrenches (2)

Three items in the parts listing on Pages 6 were identified with an asterick (*). A listing of the components of each item is given below.

MACRO-CORE KIT / COMPONENT	QUANTITY	PART NUMBER
MC Liner Cutter Kit		AT8000K
MC Liner Cutting Tool	-1-	AT8010
MC Liner Cutter Holder	-1-	AT8020
MC Liner Cutter Blades (pkg. of 5)	-1-	AT8030
MC Closed-Piston Kit		AT8501K
MC Locking Ring Springs (pkg. of 10)	-1-	AT8561K
MC Cutting Shoe, standard	-1-	AT8530
MC Piston Assembly	-1-	AT8505
MC Piston Assembly		AT8505
MC Piston Bolt	-1-	AT8540
MC Piston Washer	-1-	AT8550
MC Locking Ring Assembly	-1-	AT8560
MC Piston Tip Assembly	-1-	AT8570

**Geoprobe tools and accessories are also available for use with 1.0-inch OD (outside diameter) probe rods.

4.0 OPERATION

Size and material options have resulted in an extensive list of Macro-Core part numbers. To simplify the instructions presented in this document, part numbers are listed in the illustrations only. Refer to Pages 6 and 7 for a complete parts listing.

4.1 Decontamination

Before and after each use, thoroughly clean all parts of the soil sampling system according to project requirements. A new, clean liner is recommended for each use if using PETG, PVC, or Teflon® liners.

Stainless Steel Liners from Geoprobe Systems are cleaned at the factory with an agitated detergent bath at a temperature of approximately 180 degrees F. After rinsing with 180-degree tap water, the liner is air dried, wrapped in PVC outer cladding, and capped with vinyl end caps.

Thoroughly clean the sampler before assembly, not only to remove contaminants but also to ensure correct operation. Dirty threads complicate assembly and may lead to sampler failure. Sand is particularly troublesome as it can bind liners in the sample tube resulting in wasted time and lost samples.

4.2 Field Blank

It is suggested that a field blank be taken on a representative sample liner prior to starting a project and at regular intervals during extended projects. Liners can become contaminated in storage. A field blank will prove that the liners do not carry contaminates which can be transferred to soil samples. The following information is offered as an example method which may be used to take a field blank. Make the appropriate modifications for the specific analytes of interest to the investigation.

Example Procedure:

REQUIRED EQUIPMENT

MC Liner ..... (1)
MC Vinyl End Caps ..... (2)
Distilled Water ..... (100 ml)
VOA Vial (or other appropriate sample container) ..... (1)

1. Place a vinyl end cap on one end of the liner.
2. Pour 100 milliliters of distilled water (or other suitable extracting fluid) into the liner.
3. Place a vinyl end cap on the open end of the liner.
4. From the vertical position, repeatedly invert the liner so that the distilled water contacts the entire inner surface. Repeat this step for one minute.
5. Remove one end cap from the liner, empty contents into an appropriate sample container, and cap the container.
6. Perform analysis on the extract water for the analytes of interest to the investigation.

4.3 Open-Tube Sampler Assembly

1a. With MC Core Catcher. Place the open end of an MC Core Catcher over the threaded end of an MC Cutting Shoe as shown in Figure 4.1. Apply pressure to the core catcher until it snaps into the machined groove on the cutting shoe.

NOTE: AT725K (thin-wall PETG) liners have a swedged end which is generally slipped directly over the groove in the cutting shoe (Fig. 4.2). To use a core catcher with these liners, cut approximately 3/8 inches (10 mm) of material from the swedged end of the liner and proceed to Step 2.

1b. Without MC Core Catcher. Push the base of an MC Spacer Ring onto the threaded end of a cutting shoe until it snaps into place (Fig. 4.3).

NOTE: With the exception of AT-725K (thin-wall PETG) liners, all liners must utilize either a spacer ring or core catcher. PETG liners have a swedged end which slides directly over the end of the cutting shoe. Attach the liner to the cutting shoe (Fig. 4.2) before proceeding to Step 2.

2. Thread the cutting shoe into one end of an MC Sample Tube (Fig. 4.4). Tighten until the end of the sample tube contacts the machined shoulder of the cutting shoe.

3. Insert the appropriate liner into the sample tube (Figure 4.4). (The liner is all ready installed if using thin-wall PETG liners (AT725K) without a core catcher).

4. Connect an MC Drive Head to the top of the sample tube (Fig. 4.4) and securely tighten with the MC Combination Wrench (Fig. 4.5). Ensure that the end of the sample tube contacts the machined shoulder of the drive head.

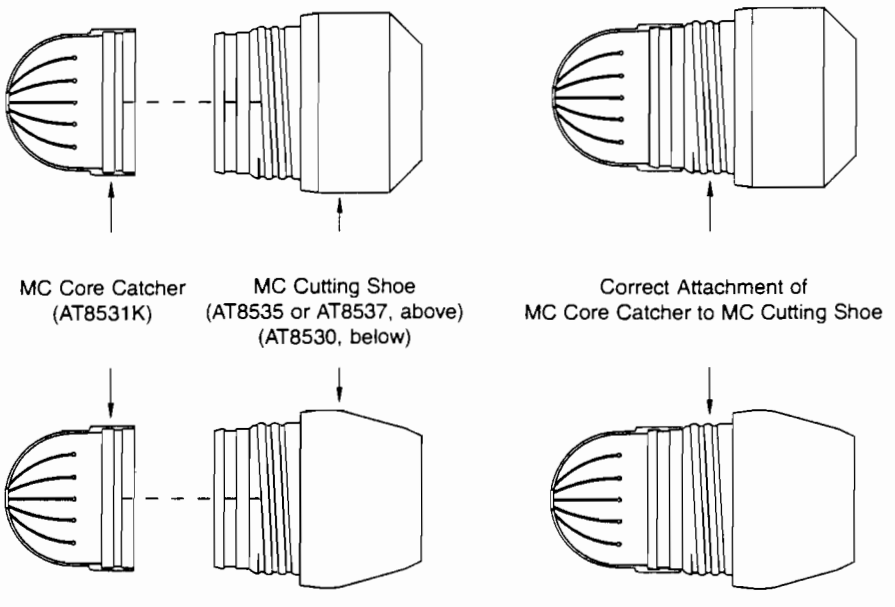


FIGURE 4.1
Macro-Core® Core Catcher Attachment

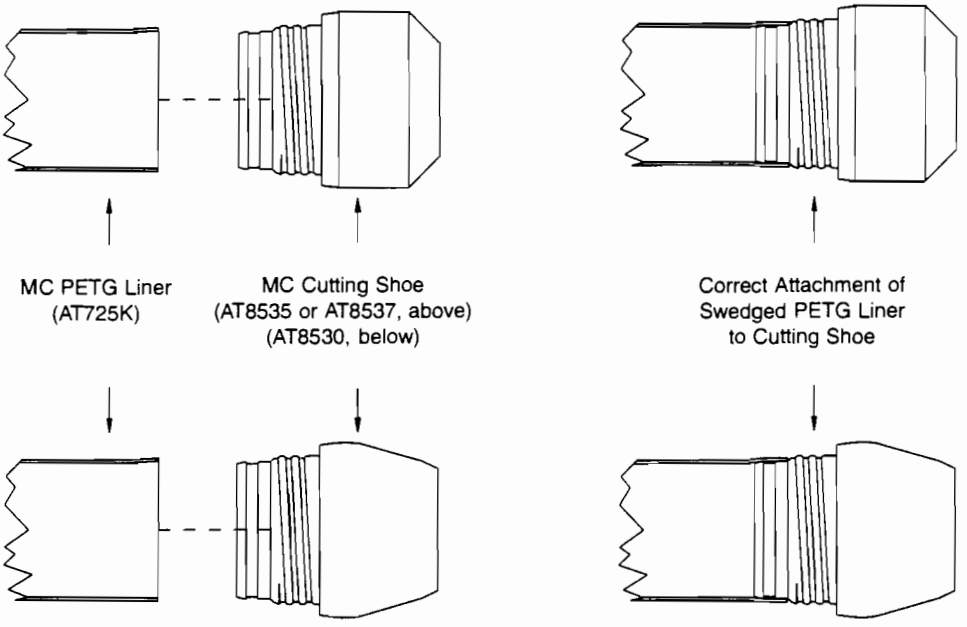


FIGURE 4.2
Macro-Core® PETG Liner Attachment

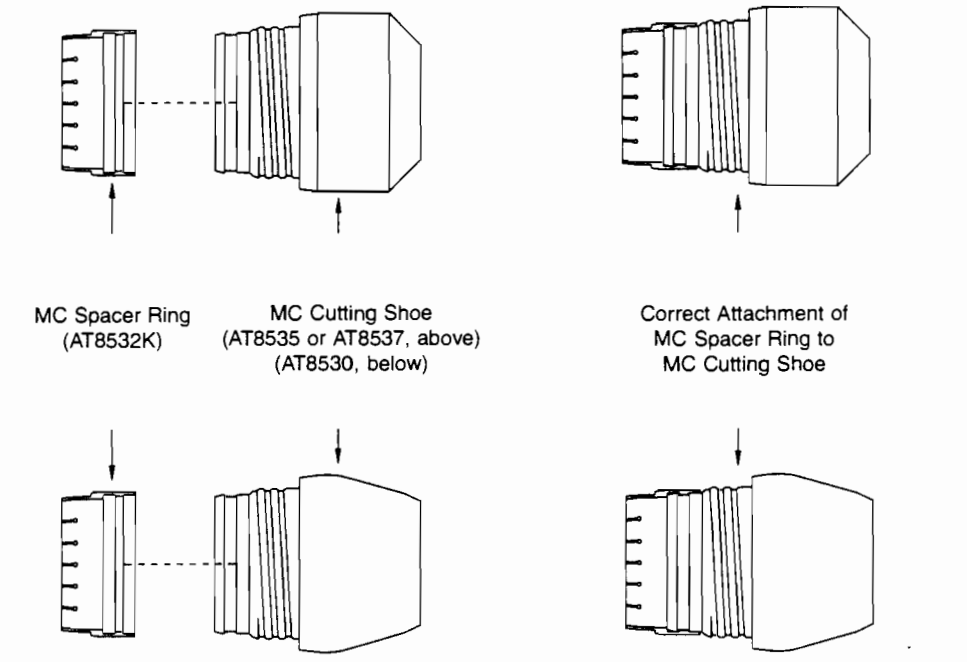


FIGURE 4.3
Macro-Core® Spacer Ring Attachment

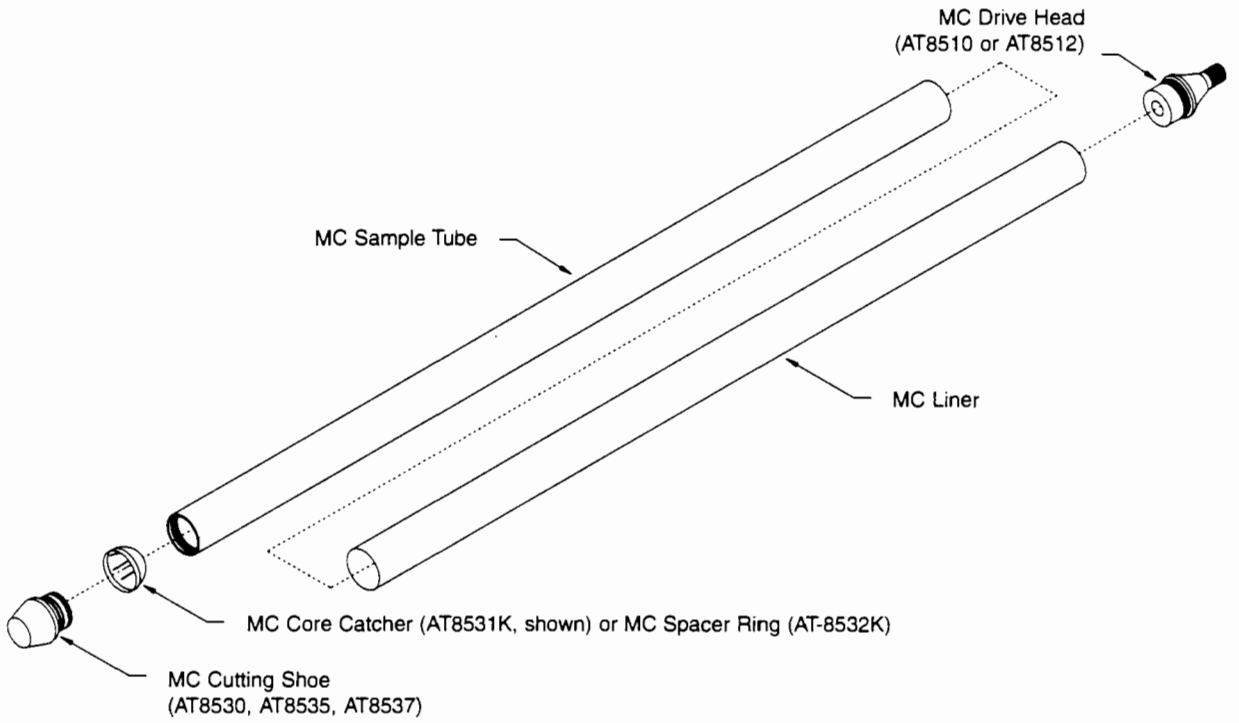


FIGURE 4.4
Macro-Core® Open-Tube Sampler Assembly

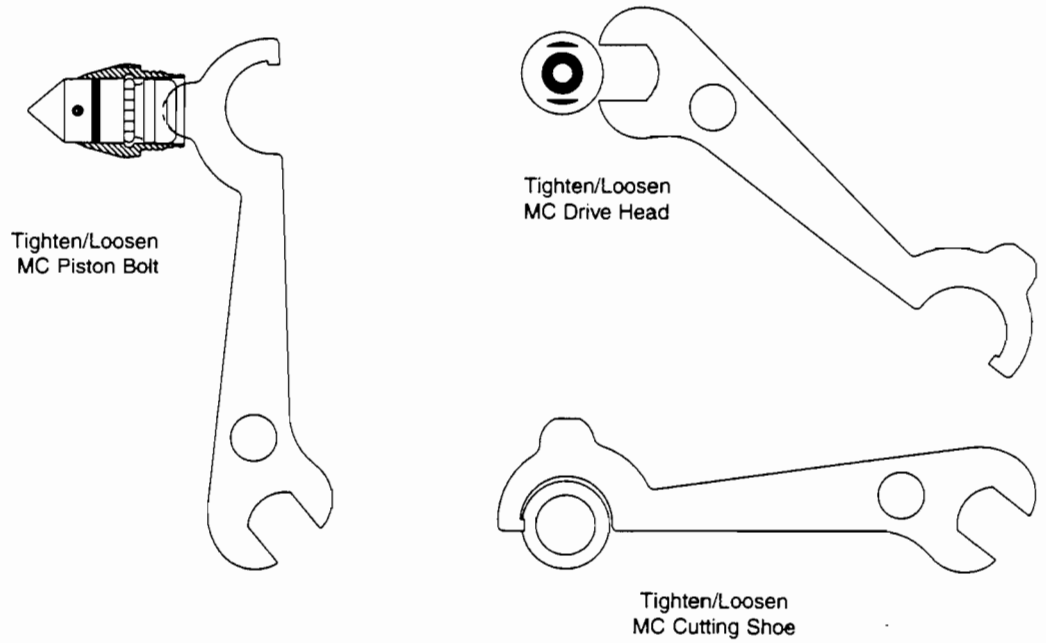


FIGURE 4.5
Macro-Core® Combination Wrench Applications

4.4 Closed-Piston Sampler Assembly (Fig. 4.6)

1. Install an O-ring in the machined groove on the piston bolt head (A) and piston tip (B).

2. Place a piston washer on a piston bolt with the radius side away from bolt head.

3. Position a locking ring on the piston bolt and thread the bolt into the piston tip.

   NOTE: Piston bolt and tip are left-hand threaded.

4. Screw the piston bolt down tight and install a half-dog set screw in the hole on the side of the piston tip. With a 1/8-inch allen wrench, tighten the set screw until it contacts the stem of the piston bolt, then back it out one-quarter turn.

5. Back the piston bolt out until the set screw hits the bottom shoulder on the bolt (approximately four full turns). The bolt must be tight against the set screw to prohibit the set screw from turning while completing Step 6.

6. Lock the half-dog set screw into place by installing a cup point set screw in the same hole. The cup point set screw should be tight but the piston bolt should remain free to turn approximately four full turns.

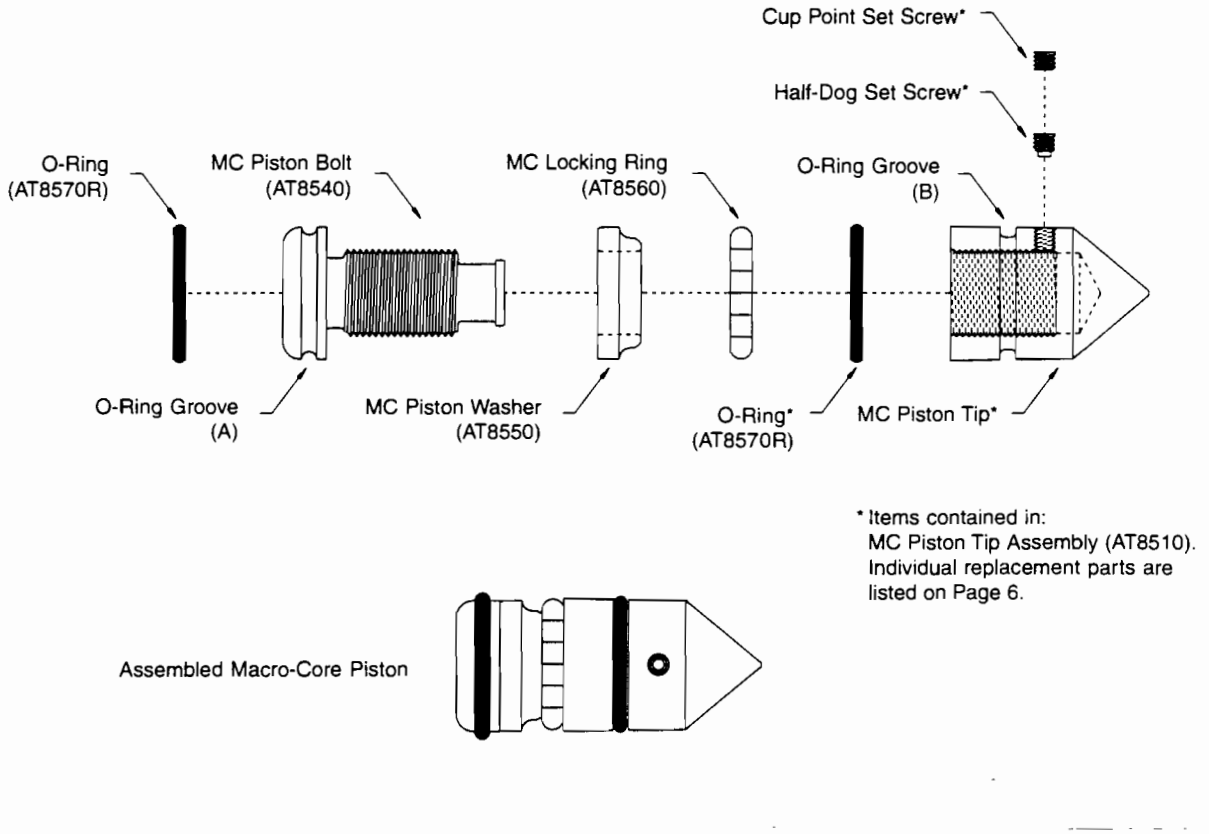


FIGURE 4.6
Macro-Core® Piston Assembly (AT8505)

NOTE: The top of the cup point set screw must not protrude from the piston tip. File or grind the set screw flush with the side of the tip if necessary. The piston assembly is ready to install in the cutting shoe.

7. Slide an assembled piston into a cutting shoe. The piston should be placed so that one half of the set screw (located on the side of the tip) protrudes from under the edge of the cutting shoe (Fig. 4.7).

8. Tighten the piston bolt (left-hand threads) using the combination wrench (Fig 4.8).

Figure 4.8. Using MC Combination Wrench to tighten MC Piston Bolt inside MC Cutting Shoe.

9a. With MC Core Catcher. Place the open end of a core catcher over the threaded end of a cutting shoe (Fig. 4.9). Apply pressure to the core catcher until it snaps into the machined groove on the cutting shoe.

NOTE: AT725K (thin-wall PETG) liners have a swedged end which is generally slipped directly over the groove in the cutting shoe (Fig. 4.10). To use a core catcher with these liners, simply cut approximately 3/8 inches (10 mm) of material from the swedged end of the liner and continue to Step 10.

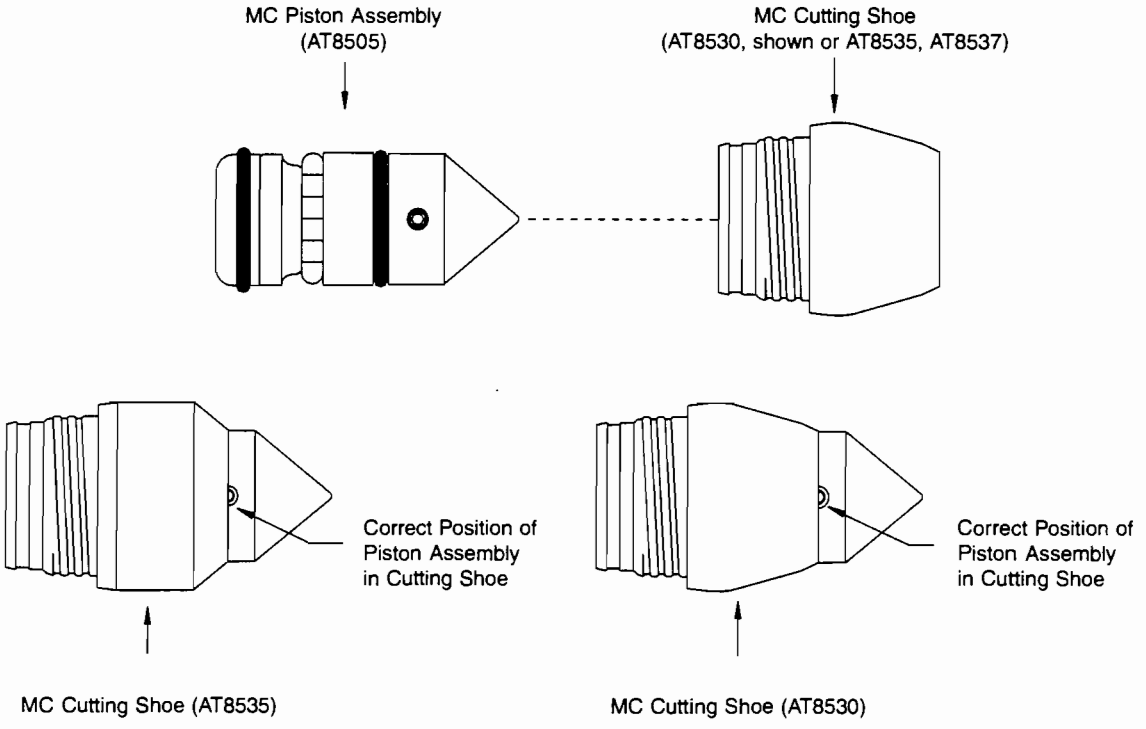


FIGURE 4.7
Installation of Macro-Core® Piston Assembly into Cutting Shoe

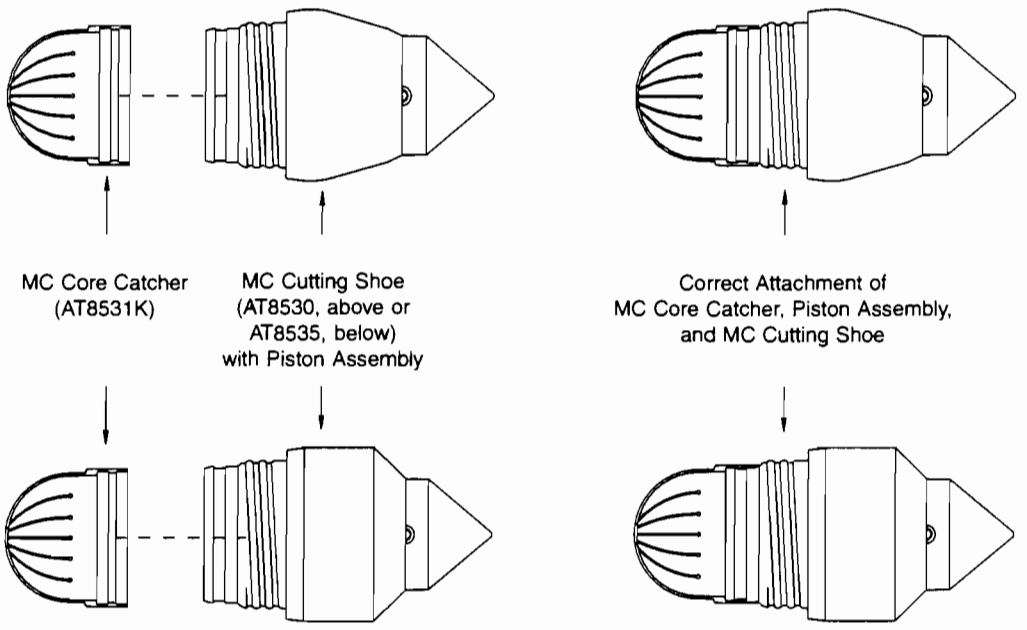


FIGURE 4.9
Macro-Core® Core Catcher Attachment with Piston Assembly

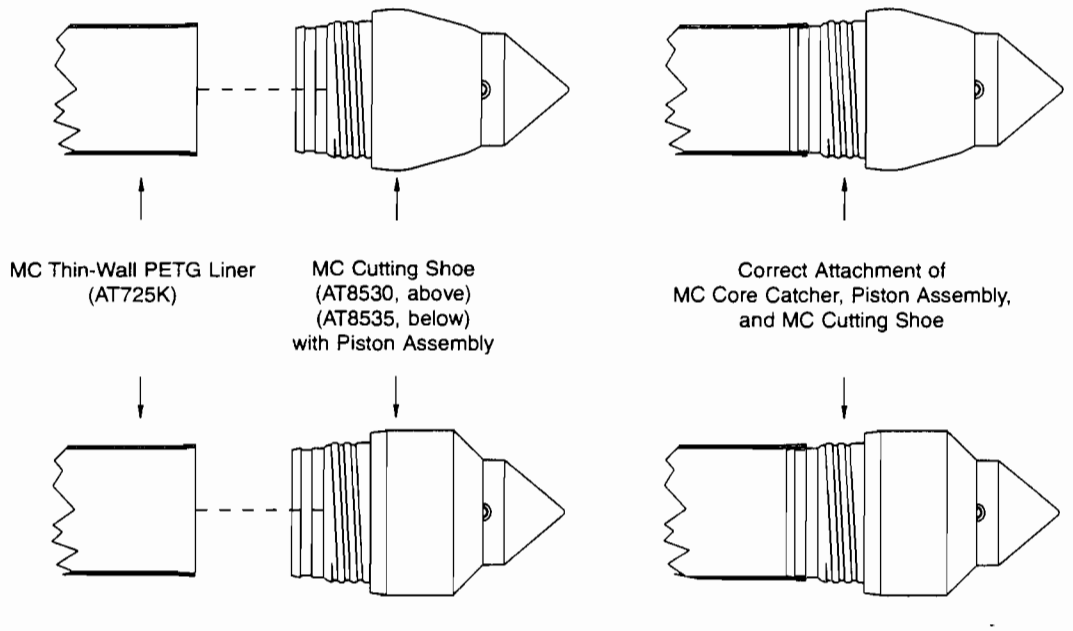


FIGURE 4.10
Macro-Core® Thin-Wall PETG Liner Attachment with Piston Assembly

9b. **Without Core Catcher.** Push the base of an MC Spacer Ring onto the threaded end of a cutting shoe until it snaps into place (Fig. 4.11).

NOTE: With the exception of AT725K (thin-wall PETG) liners, all liners must utilize either a spacer ring or core catcher. PETG liners have a swedged end which slides directly over the end of the cutting shoe. When using PETG liners, attach the liner to the cutting shoe (Fig. 4.10) before proceeding to Step 10.

10. Thread the cutting shoe into one end of an MC Sample Tube (Fig. 4.12). Tighten until the end of the sample tube contacts the machined shoulder of the cutting shoe.

11. Insert the appropriate liner into the sample tube (Fig. 4.12). (The liner is all ready installed if using PETG liners without a core catcher.)

12. Connect a drive head to the top of the sample tube (Fig. 4.12) and securely tighten with the combination wrench (Fig. 4.5) until the end of the sample tube contacts the machined shoulder of the drive head.

4.5 Pilot Hole

A pilot hole prevents excessive sampler wear in tough soils and saves time when a discrete soil core is desired. The pilot hole is created by driving a 2.0-, 2.5-, or 3.0-inch MC Pre-Probe (see page 6 for part numbers) to the top of the sampling interval. Soil surfaces containing gravel, asphalt, hard sands, or rubble should be pre-probed to reduce wear on the cutting shoe and to avoid damage to the sampler. To save time when collecting a discrete soil core, pre-probe to the sampling interval rather than coring to depth with the sampler.

4.6 Open-Tube Sampling

The Macro-Core Open-Tube Sampler is used to gather continuous soil cores from the surface to depths exceeding 30 feet. A representative soil sample is obtained by driving the sampler one sampling interval from ground surface into undisturbed soil. Upon retrieving the sampler, the liner and soil core are removed. The sampler is then properly decontaminated, reassembled with a new liner, and inserted back down the same hole to take the next soil core.

The Macro-Core Cutting Shoe is tapered to minimize the amount of soil scraped from the core walls when inserting the sampler back down an existing hole. In spite of this, non-cohesive soils will often collapse to the bottom of the hole. This slough material then enters the sampler as the next soil core is collected, resulting in a non-representative sample. A Closed-Piston Macro-Core Sampler is required under such conditions. Instructions for sampling with the Open-Tube Macro-Core Sampler follow.

1. Attach a drive cap to the sampler drive head of an assembled Open-Tube Macro-Core Sampler (Section 4.3).

2. Install a hammer anvil and anvil retainer cap assembly. Raise the hammer latch while driving the Macro-Core Sampler to avoid contact with the drive head.

3. Raise the hammer assembly to its highest position by fully extending the probe cylinder. If using a 48-inch or 1-meter sample tube with a Geoprobe Model 4200, 4220, or 420U Probe Unit, raise the machine foot to allow sufficient room to position the sampler below the hammer.

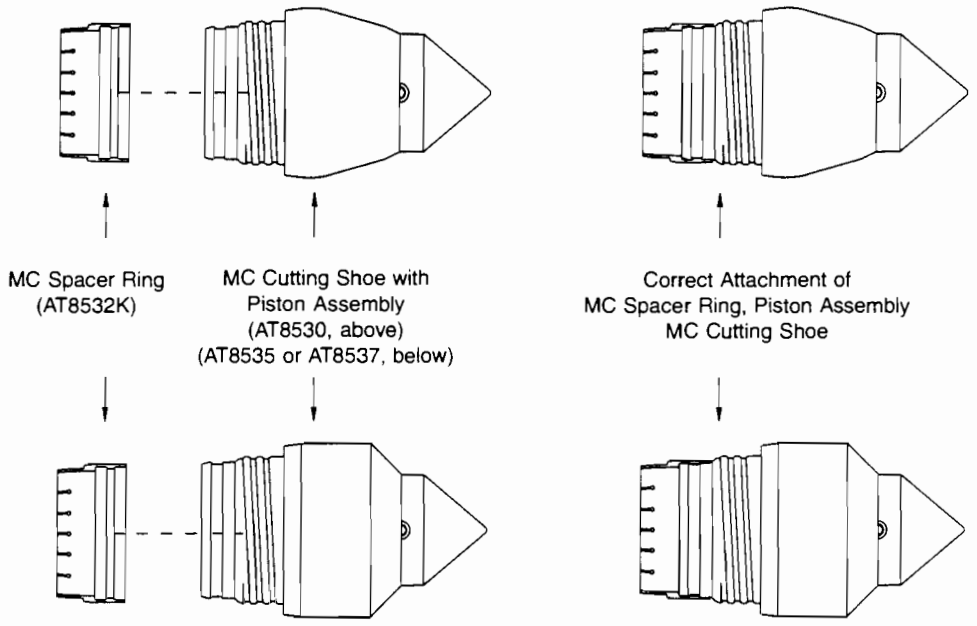


FIGURE 4.11
Macro-Core® Spacer Ring Attachment With Piston Assembly

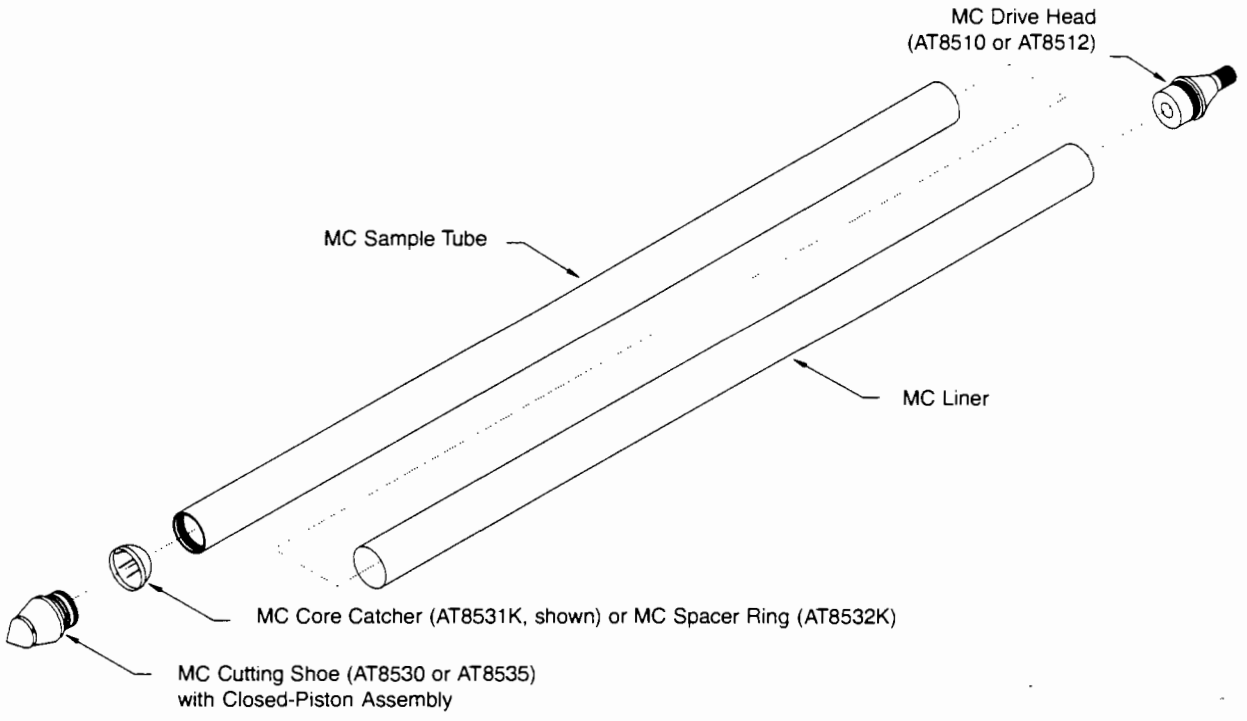


FIGURE 4.12
Macro-Core® Closed-Piston Sampler Assembly

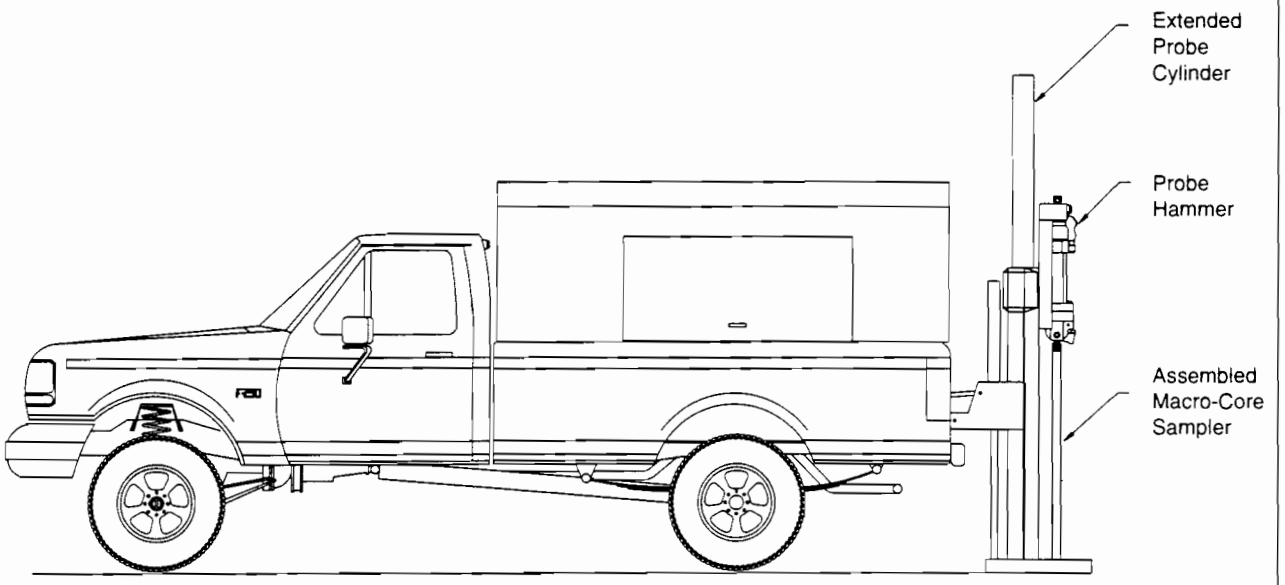


FIGURE 4.13
Macro-Core® Soil Sampler in Driving Position

4. Place the sampler in the driving position (Fig. 4.13). The sampler should always be positioned parallel to the derrick axis.

5. If using a 48-inch or 1-meter sampler tube with a Geoprobe Model 4200, 4220, or 420U Probe Machine, begin applying downward force on the sampler by lowering the machine foot. When the foot contacts the ground surface, apply downward force with the probe cylinder control only. All other Geoprobe units may start initially with the probe cylinder control.

   GEOPROBE TIP: Activate the hammer whenever collecting soil. Hammering forces soil into the sample tube and increases recovery.

6. Drive the sampler until the drive head reaches the ground surface (Fig. 4.14A).

*** CAUTION**

Some soil conditions may warrant using an MC Pre-Probe before attempting to collect a soil core. Damage may occur if the sampler is driven into rock or any other impenetrable layer.

7. To sample at consecutive intervals, push a sampler down the previously opened hole (Fig. 4.14B) until the top of the next sampling interval is reached (Fig. 4.14C). Drive the tool string another sampling interval to fill the sampler with soil (Fig. 4.14D). An open-tube sampler may be used for consecutive sampling or, if soil slough is expected, a closed-piston sampler is available.

*** CAUTION**

All parts must be completely threaded together before being driven. Driving an improperly assembled sampler will result in component damage.

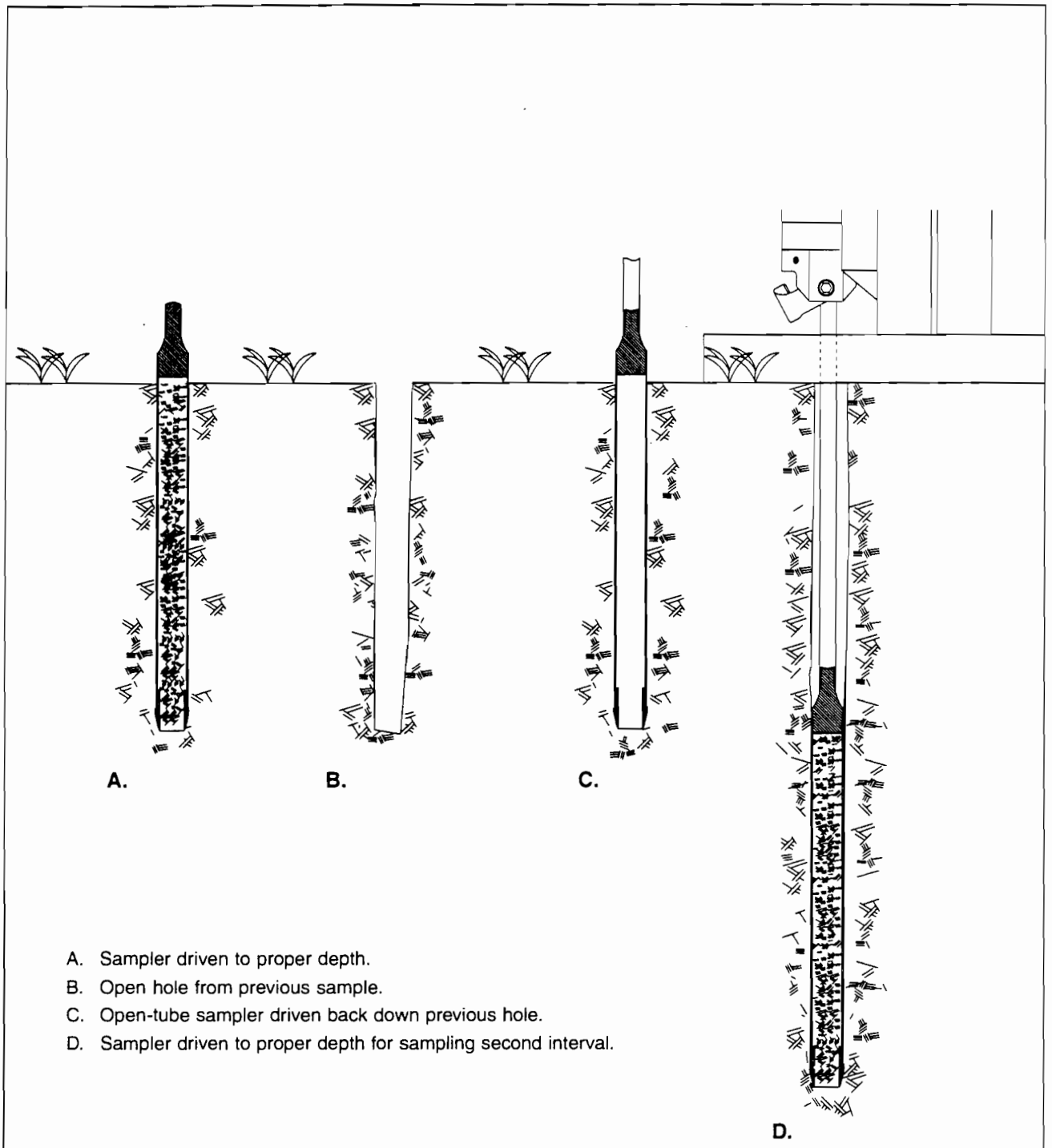
8. Retrieve the sampler as described in Section 4.8: Sampler Retrieval.

4.7 Closed-Piston Sampling

It is often difficult to collect representative soil cores from significant depths with an open-tube sampler due to soil slough. Because of this, the Macro-Core sampler can be equipped with a piston which locks into the cutting shoe. This allows the sealed sampler to pass through the slough material and be opened at the appropriate sampling interval.

NOTE: The closed piston system is meant to be inserted through previously opened holes. It is not designed to be driven from the surface through undisturbed materials.

The MC Closed-Piston System can be used only with AT8500 series Macro-Core tools. The AT8500 series replaces the AT720 series Macro-Core tools.



A. Sampler driven to proper depth.
B. Open hole from previous sample.
C. Open-tube sampler driven back down previous hole.
D. Sampler driven to proper depth for sampling second interval.

FIGURE 4.14
Phases of Macro-Core® Open-Tube Soil Sampling

1. Attach a drive cap to the drive head of an assembled Closed-Piston Macro-Core Sampler (Section 4.4).

2. Install a hammer anvil and anvil retainer cap assembly. Raise the hammer latch while driving the sampler to avoid contact with the drive head.

3. Raise the hammer assembly to its highest position by fully extending the probe cylinder. If using a 48-inch or 1-meter sample tube with a Geoprobe Model 4200, 4220, or 420U Probe Unit, raise the machine foot to allow sufficient room to place the sampler below the hammer.

4. Place the sampler tip in the **previously opened hole** (Fig. 4.15A). Lower the probe until the hammer anvil contacts the sampler drive head.

5. If using a 48-inch or 1-meter sample tube with a Geoprobe Model 4200, 4220, or 420U Probe Machine, begin applying downward force on the sampler by lowering the machine foot. When the foot contacts the ground surface, apply downward force with the probe cylinder control only. All other Geoprobe units may start initially with the probe cylinder control.

6. Drive the sampler until it reaches the desired sampling interval (Fig. 4.15B). Add probe rods as needed.

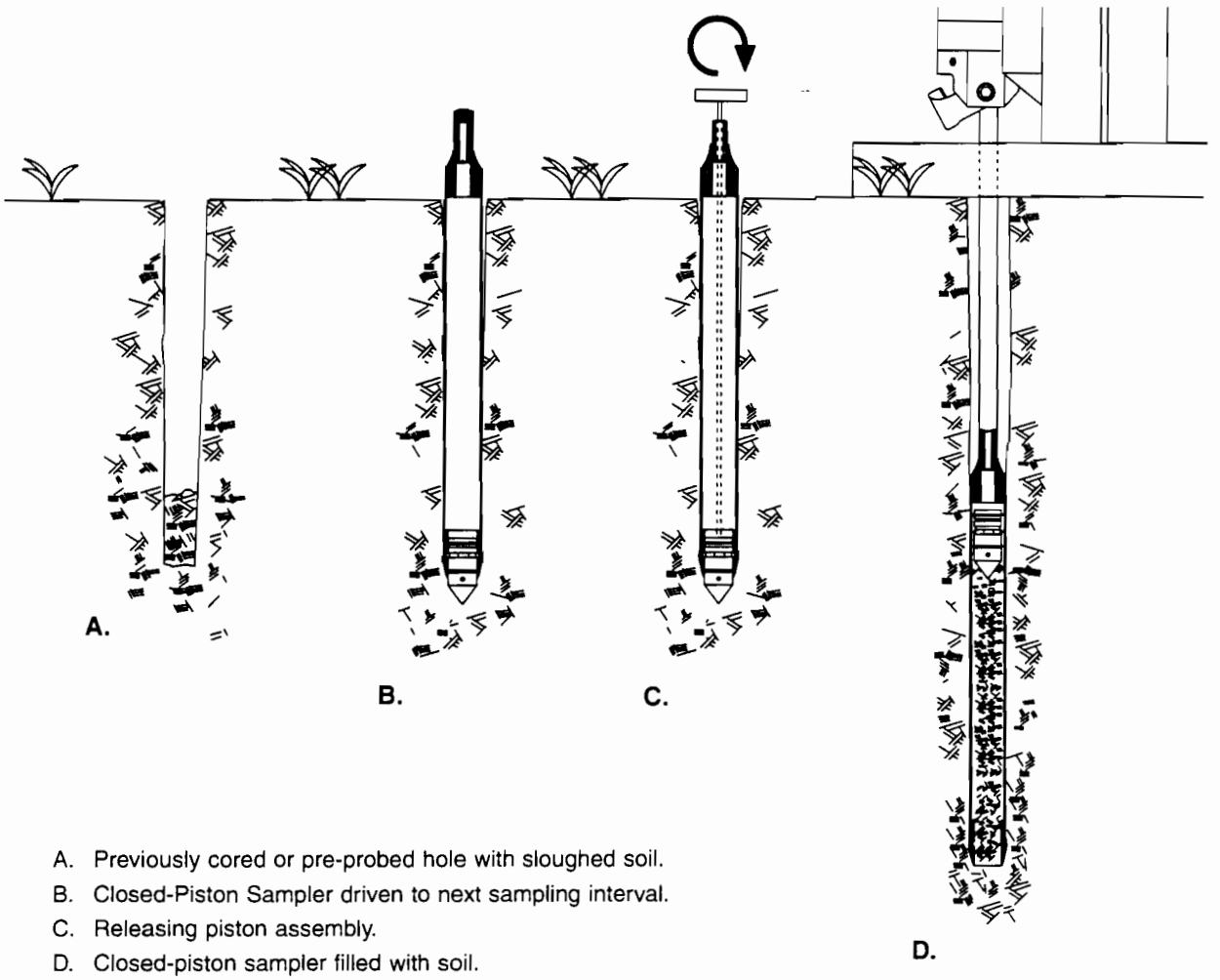
*** CAUTION**

Care should be taken when driving the Macro-Core Sampler down a previously opened hole. Low side friction may allow the sampler and probe rods to drop down the hole. To prevent equipment loss, attach a pipe wrench to the top of the rod string when advancing or retrieving the sampler.

7. Move the probe unit away from the top of the probe rods to allow room for work.

8. Remove the drive cap and insert an MC Piston Release Rod (Fig. 3.1) down the inside of the probe rods (Fig. 4.16). (Refer to Fig. 4.19 for identification of extension rod accessories.) Hold onto the release rod and attach an Extension Rod Coupler or Extension Rod Quick Links. Attach an Extension Rod to the release rod (Fig. 4.17) and lower the jointed rods down hole. Continue adding extensions until the release rod contacts the bottom of the sampler. The operator may opt to use the Extension Rod Jig to hold the down-hole extension rods while adding additional rods.

9. Attach an Extension Rod Handle to the top extension rod and slowly rotate the handle clockwise (Fig. 4.15C and 4.18). The release rod will drop into the groove in the piston bolt (Fig. 4.20). The operator should feel the extension rods move slightly as the release rod falls into the groove. Rotate the handle clockwise approximately four complete revolutions. Resistance to rotation is generally noted at this point. If the rods continue to rotate, however, do not continue for more than four complete revolutions. The piston assembly is now released and will be pushed to the top of the sampler as the liner is filled with soil (Fig. 4.15D).



A. Previously cored or pre-probed hole with sloughed soil.
B. Closed-Piston Sampler driven to next sampling interval.
C. Releasing piston assembly.
D. Closed-piston sampler filled with soil.

FIGURE 4.15
Phases of Macro-Core® Closed-Piston Soil Sampling

Figure 4.16. MC Release Rod is inserted down inside of the probe rods.

Figure 4.17. Extension Rods are attached to the MC Piston Release Rod using Extension Rod Quick Links.

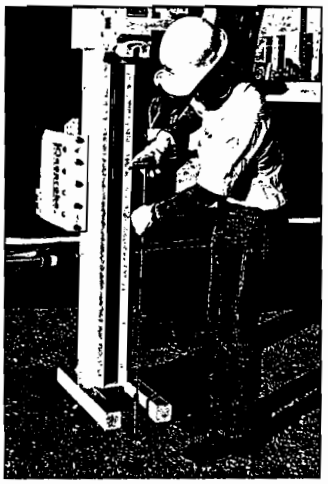


Figure 4.18. Extension Rods are rotated clockwise to release the MC Piston assembly.

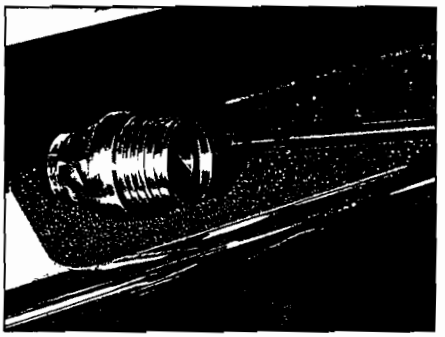
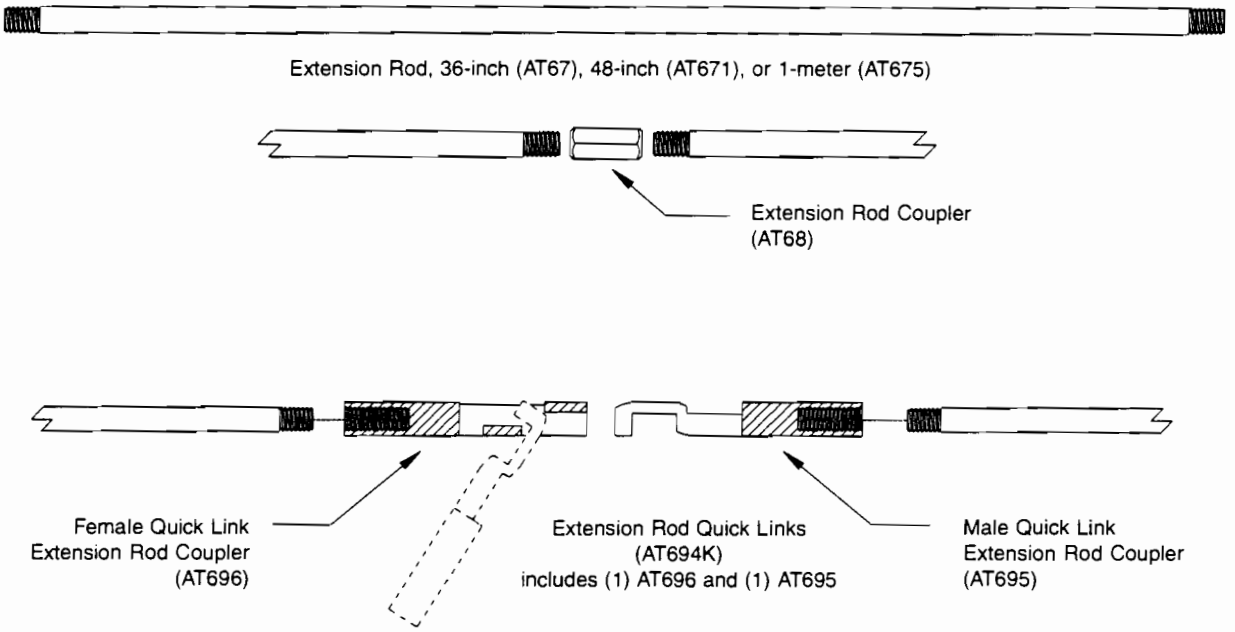
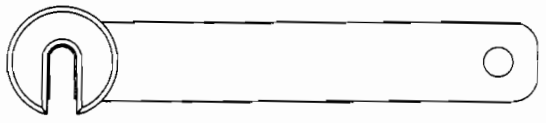
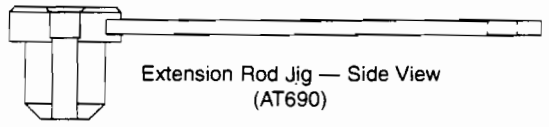


Figure 4.20. MC Release Rod fits into groove in MC Piston Bolt Head.

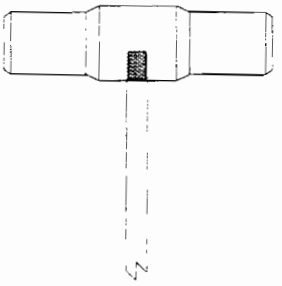




Extension Rod Jig — Top View
(AT690)



Extension Rod Jig — Side View
(AT690)



Extension Rod Handle
(AT69)

FIGURE 4.19
Geoprobe Extension Rods and Accessories

10. Remove the release rod and extension rods. The piston assembly will not be attached to the end of the extension rod but will remain inside the sample tube.

11. Add a probe rod to the tool string, attach the drive cap, and reposition the probe unit. Drive the tool string another sampling interval to fill the liner with soil. Do not over-drive the sampler.

GEOPROBE TIP: Activate the hammer whenever collecting soil. Hammering forces soil into the sampler tube and increases recovery.

4.8 Sampler Retrieval

1. Attach a pull cap to the top probe rod. Close the hammer latch over the pull cap and pull the tool string up one rod length by actuating the PROBE control lever.

2. Remove the rod and repeat Step 1 until the sampler drive head is just above the ground surface. Probe rods are sometimes difficult to loosen by hand. Use pipe wrenches to free tight threads.

*** CAUTION**

Care should be taken when retrieving the Macro-Core sampler. Low side friction may allow the sampler and probe rods to drop down the hole. Attach a pipe wrench to the top of the rod string to prevent equipment loss.

3. Attach the pull cap to the sampler drive head (Fig. 4.21). Pull the sampler out of the ground (Fig. 4.22) by raising the PROBE control lever. If using a 48-inch or 1-meter sample tube with a Geoprobe Model 4200, 420U, or 4220 Probe Machine, the probe cylinder will fully extend before the sampler is completely free. Attempt to raise the sampler by actuating the FOOT control.

*** CAUTION**

The rear of the carrier vehicle may be pulled downward as the foot cylinder is activated if the sampler is lodged tightly in the ground. Damage to the unit base frame may occur under such circumstances.

If the sampler cannot be retrieved without excessive resistance, follow these steps:

1. Lower the FOOT control and disengage the hammer latch from the pull cap.

2. Raise the probe foot at least 12 inches (305 mm) above the ground surface. Stack several boards or place timber blocks under the foot to act as a foot extension.

3. Lower the hammer assembly and close the hammer latch over the sampler pull cap.

4. Use the PROBE control to lift the sampler completely out of the ground.

4.9 Soil Core Recovery

The soil sample is easily removed from the Macro-Core Sampler by unscrewing the cutting shoe and pulling out the liner. A few sharp taps on the cutting shoe will often loosen the threads sufficiently to allow removal by hand. If needed, the exterior of the cutting shoe features a notch for attaching the combination wrench to loosen tight threads (Fig. 4.23). With the cutting shoe removed (Fig. 4.24), simply pull the liner and soil core from the sample tube (Fig. 4.25).

If the closed-piston sampler is used, the piston assembly is now retrieved from the end of the liner (Fig. 4.26). Secure the soil sample by placing a vinyl end cap on each end of the liner.

Undisturbed soil samples can be obtained from Teflon®, PVC, and PETG liners by splitting the liner. Geoprobe offers two tools for cutting sample liners. The MC Liner Cutter Kit (AT8000K) is used to make longitudinal cuts in the liner and includes a tool that holds the liner for cutting. The MC Liner Circular Cutting Tool (AT8050) is used to segment the liner by cutting around the outside circumference of the liner. Refer to Figures 4.27 and 4.28 for more information on liner cutting.

Figure 4.21. Pull Cap attached to MC Drive Head.

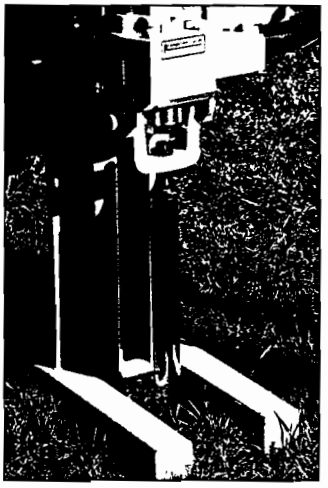


Figure 4.22. MC Soil Sampler is pulled with Geoprobe unit.

Figure 4.23. Loosening the MC Cutting Shoe with the MC Combination Wrench.

Figure 4.24. Removing MC Cutting Shoe and liner from MC Sampler Tube.

Figure 4.25. Macro-Core liner filled with soil core.

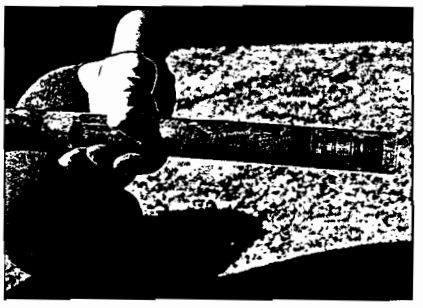


Figure 4.26. MC Piston assembly is retrieved from liner at the top of the soil core.

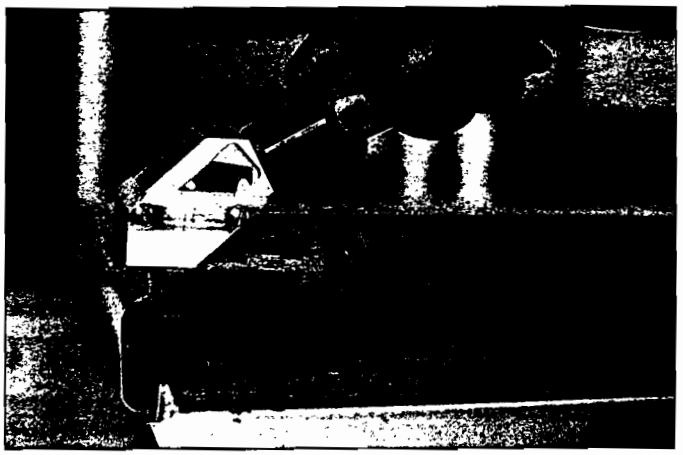


Figure 4.27. MC Liner Cutter (AT8000K) makes a quick, safe cut through even the toughest of liner materials.

Figure 4.28. MC Circular Cutting Tool (AT8050) cuts around the outside of the filled MC liner.

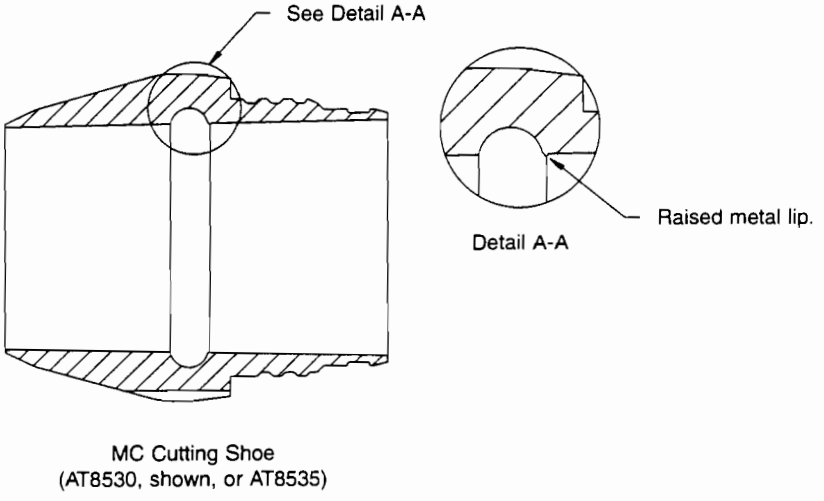


FIGURE 4.29
Macro-Core® Cutting Shoe with Mushroomed Locking Ring Groove

4.10 Macro-Core Closed-Piston Operating Tips

The Macro-Core piston assembly requires proper maintenance to ensure reliable operation. The following tips will increase the effectiveness of closed-piston sampling:

1. Cleanliness is the most important factor affecting piston operation. Ensure piston bolt threads and locking ring are free of soil particles and corrosion before each use. Completely thread and unthread the piston bolt to verify operation. Disassemble the piston tip and wash the individual parts using clean water and a Nylon Brush for MC Sample Tubes (BU700) if necessary. Allow parts to dry before assembling if piston is to be stored before use. Disassemble used pistons before storing to prevent piston bolt corrosion.

2. Never store a cutting shoe with the piston installed. Install the piston assembly immediately before sampling.

3. Lubricate piston assembly with distilled water before installing in the cutting shoe.

4. Once the assembly is fully seated in the cutting shoe, tighten the piston bolt with an oscillating movement; thread the bolt in 90 degrees then back 45 degrees. When the end of thread travel is reached, work the last 30 degrees of travel back and forth several times. Tightening the piston bolt in this manner allows the metal pins of the locking ring to correctly align in the cutting shoe.

5. Do not lock the piston bolt 100 percent counterclockwise. Fully tighten the bolt and then loosen approximately 10 degrees.

6. When releasing the piston downhole, only turn the piston bolt 4 clockwise revolutions.

7. Clean the piston assembly with distilled water and a nylon brush between samples. It is not necessary to completely disassemble the piston at this time. Pay particular attention to the locking ring and ensure that all sand and grit is removed from between the metal lock pins.

8. Locking rings are expensive but can be restrung on new springs. If a locking ring breaks, save the pieces for reuse. (Refer to Page 6 for replacement parts). To restring a locking ring, follow these simple steps:

   a. There is a small loop at each end of a new locking ring spring. Make sure one loop is bent perpendicular to the other. One loop should also be completely closed while the other is slightly open.

   b. Attach a clamp as close to the open end as possible (without contacting the loop) to hold the spring. Fisherman fly-tying pliers work well for this procedure. Take care not to damage the spring by applying too much pressure.

   c. String 12 locking ring pins (macaroni-shaped metal pieces) on the closed end, stretching the spring as necessary. Be careful not to overstretch and damage the spring.

   d. Hook the open end of the spring through the closed end and bend the loop closed.

   e. Remove the clamp and gently stretch the locking ring several times to ensure that the loops will not open.

9. A locking ring groove is machined into the cutting shoe. Over time, the edges of this groove may begin to mushroom from use (Fig. 4.29). The raised metal lip formed by the mushroomed groove may cause the locking ring (and subsequently the piston) to bind in the cutting shoe. Remove the raised metal with a file or die grinder

4.11 Tips to Maximize Sampling Productivity

The following suggestions are based on the collective experiences of Geoprobe operators:

1. Organize your truck or van to maximize efficiency. Assign storage areas to all tools and equipment for easy location. Store samplers, extension rods, and liners in racks. Above all, minimize the number of items lying loose in the back of the vehicle.

2. Take three or four samplers to the field. This allows the collection of several samples before stopping to clean and decontaminate the equipment. A system is sometimes used where one individual operates the probe while another marks the soil cores and decontaminates the used samplers.

3. A machine vise is a real plus. With the sampler held in a vise, the operator has both hands free to remove the cutting shoe (Fig. 4.30), drive head, and sample liner (Fig. 4.31). Cleanup is also easier with both hands free. Geoprobe offers an optional Machine Vise (FA300) which mounts directly on the probe derrick (Fig. 4.32).

4. Extension Rod Quick Links (Fig. 4.33) are the best choice among connectors. These are real time savers. The quickest and easiest method for deploying extension rods is to assemble sections of up to three rods with threaded connnectors. Each section is then connected with Quick Links. Up to three rods can be inserted or removed from the probe string at once, greatly reducing deployment time.

5. When releasing the piston assembly, a pair of locking pliers may be used to turn the extension rods. The locking pliers will be quicker and easier to install than the extension rod handle in some situations.

6. Organize your worksite. The best way to maximize sampling efficiency is to practice with the sampler and identify a comfortable setup. Lay out all tools and equipment before probing. An example layout is shown in Figure 4.34.

   A collapsible table or stand is handy to hold decontaminated sampler tubes and liners. Equipment may also be protected from contamination by placing it on a sheet of plastic on the ground.

   Keep probe rods separate by identifying a location for "new" rods as well as a "put down pile." Initially drive the sampler with a new rod. As the rod is removed during sampler retrieval, place it in the put down pile for reuse. Drive the sampler to the top of the next sampling interval by using all of the rods in the put down pile. A new rod (located in a separate pile) is added and the string is driven to collect the next soil core. Once again, each probe rod is removed and placed in the put down pile as the sampler is retrieved. The cycle is repeated until all of the soil cores are recovered. This method eliminates the need to count rods while driving the sampler.

7. Cleanup is very important from the standpoint of operation as well as decontamination. Remove all dirt and grit from the threads of the drive head, cutting shoe, and sample tube with a nylon brush (BU700). Without sufficient cleaning, the cutting shoe and drive head will not thread completely onto the sample tube. The threads may be damaged if the sampler is driven in this condition.

   Ensure that all soil is removed from inside the sample tube. Sand particles are especially troublesome as they can bind liners in the sampler. Full liners are difficult to remove under such conditions. In extreme cases the soil sample must be removed from the liner before it can be freed from the sample tube.

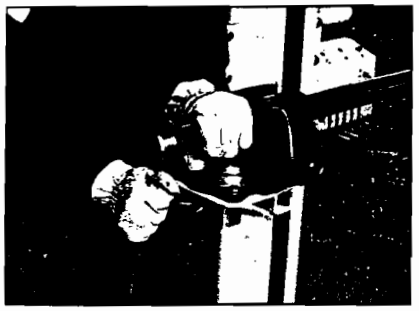


Figure 4.30. Removing MC Cutting Shoe with filled sampler tube held in Machine Vise.

Figure 4.31. Removing filled liner with sampler tube held in Machine Vise.

Figure 4.33. Machine Vise mounted directly on Geoprobe unit.

Figure 4.33. Using Extension Rod Quick Links to connect Extension Rods.

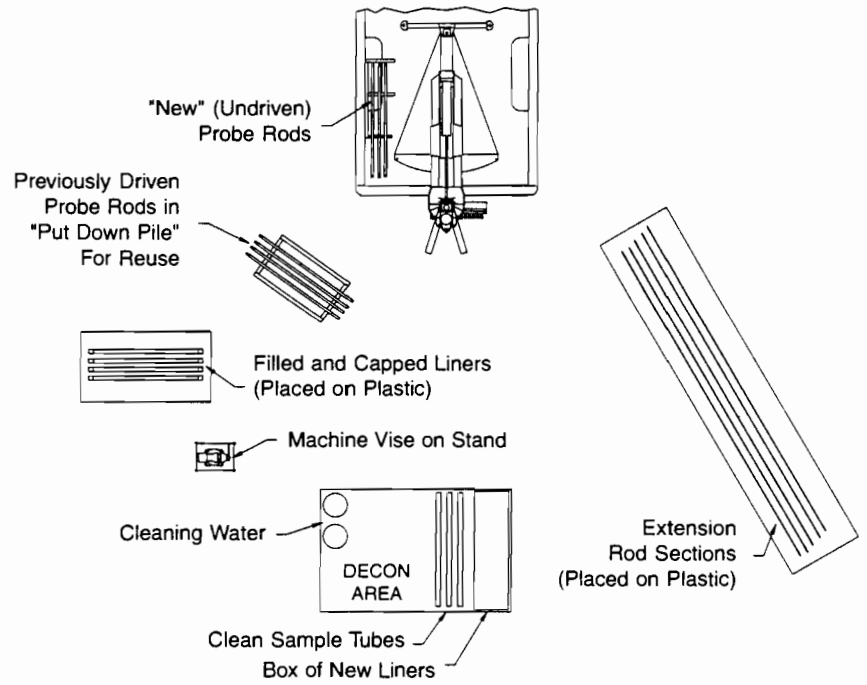


FIGURE 4.34
Equipment Layout Example to Maximize Sampling Productivity.

8. The piston assembly may remain lodged in the cutting shoe when disassembling by hand, even though the piston bolt is completely loosened. This is because the locking ring and piston washer do not release from the groove in the cutting shoe as the piston bolt unthreads out of the tip. Hammering on the piston tip will have no effect because you are, in essence, forcing the tip tighter against the locking ring. To dislodge the piston, turn the assembly over and tap the top of the cutting shoe on a solid object. If the assembly still does not release, tap on the piston bolt with a hammer (taking care not to damage the release rod slot). This will jar the piston tip and bolt enough to release the locking ring from the groove in the cutting shoe.

*** CAUTION**

Do not push the piston assembly out of the cutting shoe by placing your hands on the piston tip. The cutting shoe is sharp and may cause injury when the assembly suddenly comes free. It is best to place the tip against a solid object, grasp the cutting shoe, and push the shoe over the assembly.

9. Although available for use with two sizes of probe rods, 1.25-inch OD rods are recommended for the Macro-Core Sampler. The larger rod diameter limits downhole deflection of the tool string and ultimately provides a more durable system. A new thread design also makes the 1.25-inch rods quicker and easier to thread together than previous 1-inch probe rods.

10. The Heavy-Duty MC Cutting Shoe (AT8535) is machined with more material at the critical wear areas. It can be used in place of the Standard MC Cutting Shoe (AT8530) and is designed to lengthen service life under tough probing conditions.

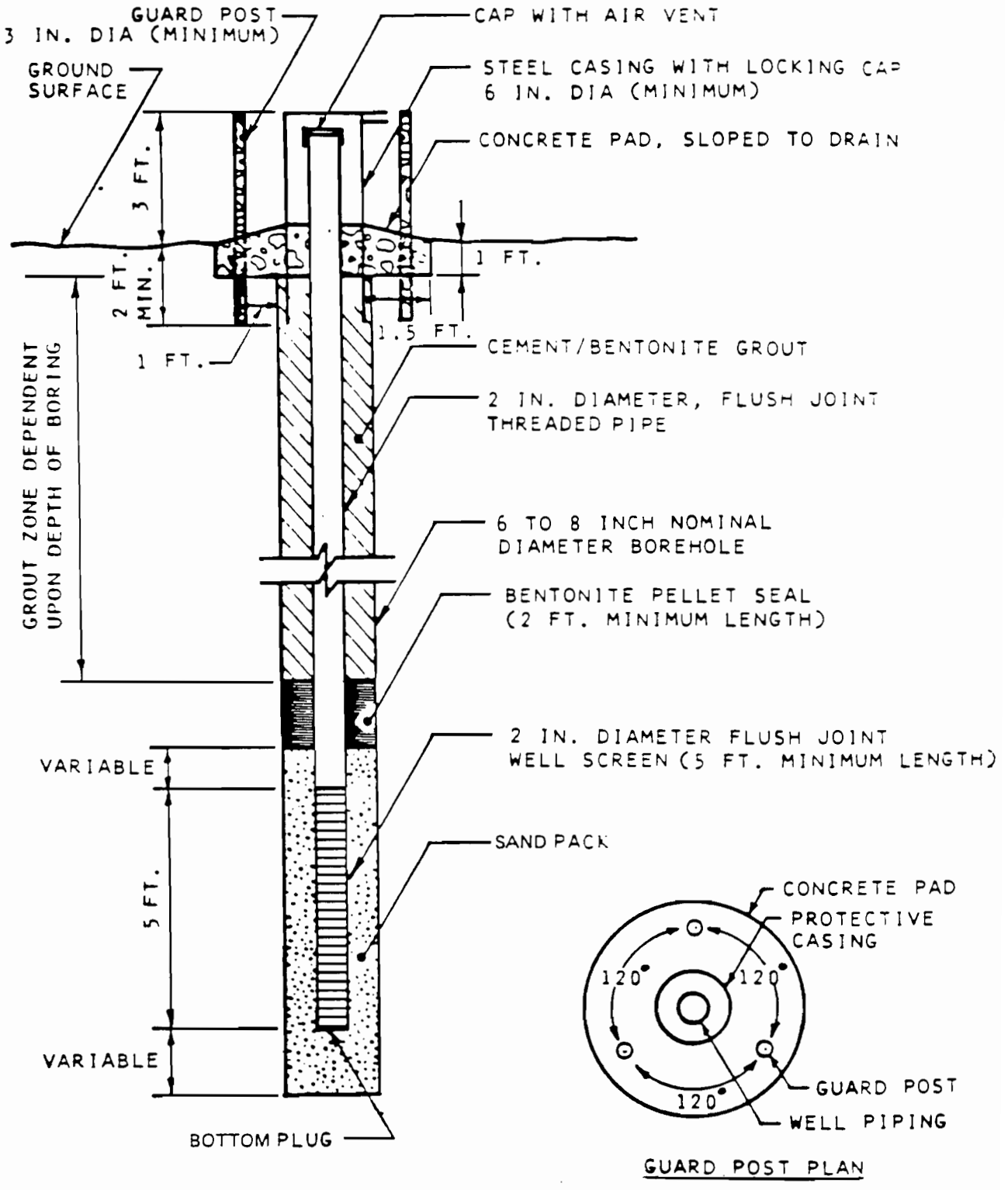
    Expansive clays and coarse sands can "grab" and collapse liners as the sample tube is filled with soil. A 1/8-inch Undersized MC Cutting Shoe (AT8537) will help alleviate this problem. The smaller diameter core (1.375 inches) allows expanding clays and coarse sands to travel up the sample liner without binding. The piston assembly can not be used with this cutting shoe.

11. Maximize the thread life of the sample tube by varying the ends in which the drive head and cutting shoe are installed. The dynamic forces developed while driving the sampler are such that the threads at the drive head wear more quickly than at the cutting shoe. Regularly switching ends will maintain relatively even wear on the sample tube.

APPENDIX C

WELL CONSTRUCTION DIAGRAMS

TYPICAL MONITORING WELL INSTALLATION



Taken from USEPA "A Compendium of Superfund Field Operation Methods", 1987

APPENDIX D

WELL LOG SHEET

Blank Well Log Sheet

WELL LOG SHEET

WELL NO.	PROJECT NO.	PROJECT NAME:
LOCATION:	GEOLOGIST:	
DRILLING DATE:	DRILLING CONTRACTOR:	
DRILLING METHOD:	DRILLER:	INSTALLATION DATE:
WATER LEVEL BEFORE INSTALLATION:	WATER LEVEL AFTER INSTALLATION:	
DEVELOPMENT METHOD:	GROUND ELEVATION:	

LITHOLOGY DESCRIPTION	SYMBOL	CONSTRUCTION DETAILS DESCRIPTION	DEPTH

APPENDIX E

ICM LABS STATEMENT OF QUALIFICATIONS

Statement of Qualifications

Table of Contents

Table of Contents

Industrial Corrosion Management
ICM Laboratories

General Information

ICM Laboratories has developed this manual to allow the reader to assess our technical and operational capabilities. We will describe our facilities and instrumentation, organizational structure which includes key staff, certifications, quality assurance program and methodologies we employ.

Company History

Industrial Corrosion Management, Inc. (ICM Laboratories) is an independent laboratory providing high quality analytical services to companies across the United States. Our primary business focuses on analyses for compliance with any regulatory issues regarding soil, water, oil, or hazardous waste.

Initially, ICM Laboratories was created to offer very rapid analysis and interpretation of air conditioning fluids such as Lithium Bromide, oils and refrigerants. Large central heating and air conditioning units are very sensitive to the chemical condition of these operating fluids. If they are not properly balanced or treated, numerous corrosion problems arise.

However, until ICM was created in 1974, normal turn around times for these analyses approached several weeks, and all the while the equipment performed inefficiently.

ICM changed this concept. We provided rapid analysis of air conditioning solutions in a time frame which permitted servicemen to solve critical problems in the field. The business grew and gradually served hundreds of organizations across the United States.

ICM entered the field of environmental testing in 1978. At that time, the certification of laboratories for environmental testing was just beginning. We were initially certified for the bacteriological, limited chemical and inorganic sections. In 1980, we were certified for the organic analyses. ICM now has approximately 16 years experience in the environmental analytical testing industry.

Corporate Philosophy

With environmental pressures mounting in the United States, it is important to be able to find a laboratory that is not only quality driven, but also timely and cooperative. ICM's philosophy mandates that we generate high quality data in a timely fashion that is complemented with a high level of service. Many laboratories have the certifications necessary to conduct analytical testing. ICM believes it is the quality and the service which a laboratory offers that distinguish it from another.

Geographical Area Serviced

ICM services clients throughout the United States. The majority of our clients are located in the Middle Atlantic states. ICM utilizes overnight carrier services such as Federal Express, for projects that are located outside our local area. This practice enables us to service clients with sample containers throughout the United States.

US EPA and NJ DEPE Contract Laboratory Program

Experience with analytical protocol is critical to ensure that a project is completed properly and will withstand strict government scrutiny.

ICM Laboratories has had a great deal of experience in the US EPA Contract Laboratory Program. We were awarded our first contract in 1986. We have also been awarded a contract for the US EPA Contract Laboratory Program Special Analytical Services (SAS) Division work. These contracts are only available to laboratories who are in good standing in the US EPA CLP program.

The US EPA SAS contracts can also be far more demanding than the routine contract work. For example, the SAS division may require that you submit a CLP hardcopy report for 165 semivolatile soils within a 15 day period. ICM accomplished this task successfully. This request compels a lab to pull resources together and react quickly.

As you may know, the New Jersey Department of Environmental Protection and Energy also has a contract laboratory program. NJ DEPE awarded ICM a contract in 1993. Approximately 40

laboratories completed for these contracts and only a small number of laboratories were given awards.

ICM's contract includes Task IV, New Jersey's State Superfund Program as well as Task III, analysis of non-aqueous/alternative wastewater sample analysis.

Section 2

Facilities and Instrumentation

Facilities and Instrumentation

ICM Laboratories is located at 1152 Route 10 in Randolph, New Jersey. We are approximately four miles from Route 80 and Route 46.

ICM currently occupies 21,500 square feet of industrial building space including laboratories, offices, conference rooms, refrigerated storage, and field equipment storage. This area is divided into the following:

A. Laboratory Space	9,000 square feet
B. Office Space	8,500 square feet
C. Storage Space	4,000 square feet

Each individual laboratory has its own ventilation system. Separate systems are advantageous because the laboratory minimizes contamination from various chemicals utilized in each laboratory.

A central station burglar system with a 24 hour per day, 7 day per week, surveillance system secures all laboratory, office, and storage space. The security system utilizes a combination of keys and passwords. Passwords are only given to those with security clearance and are periodically modified.

All visitors are required to sign the visitors log, located at the main entrance. Sign in is required for security and health and safety purposes in case of an emergency.

ICM Laboratories

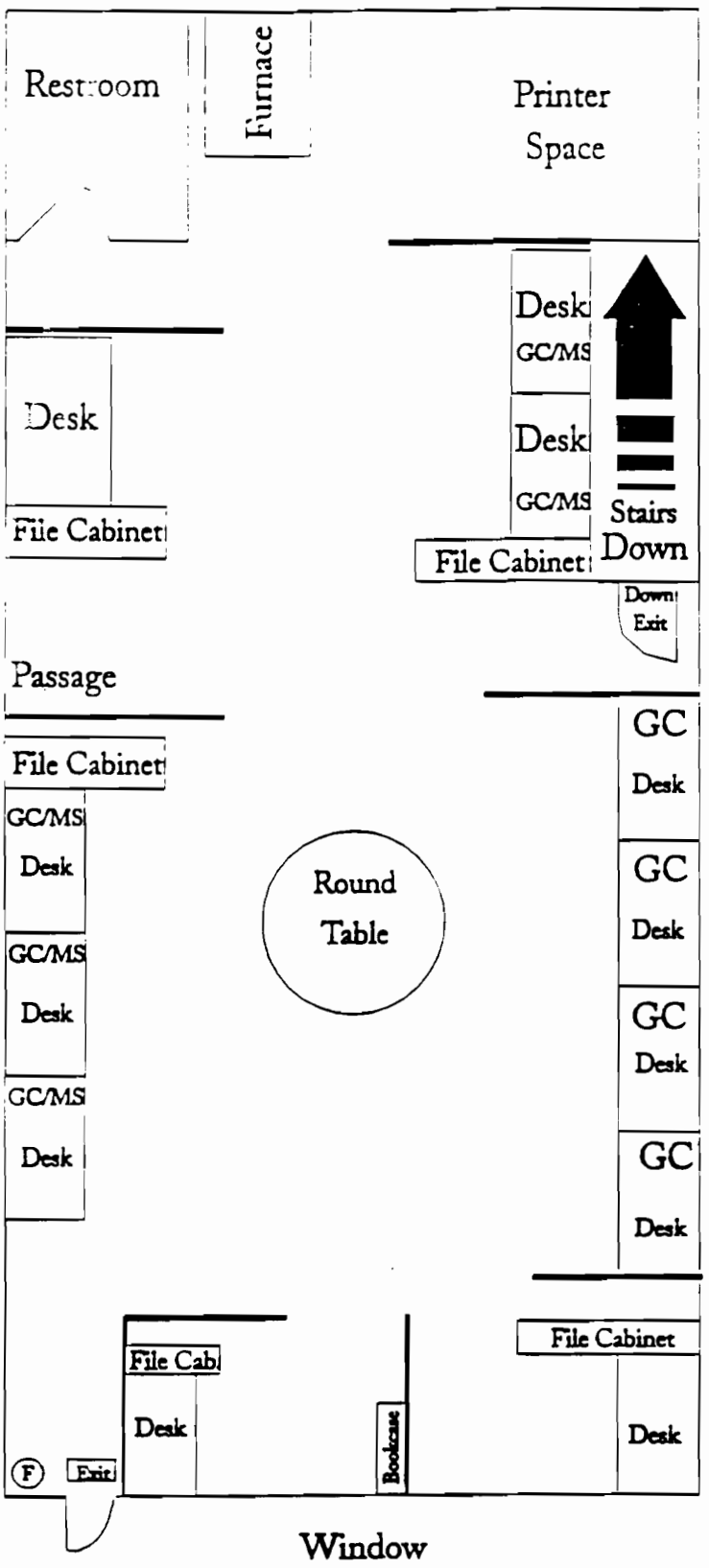
West Bay	P		16
Stock Room/ Shipping & Receiving	O	Support Services Office Field Sampling Office Sampler preparation	15
	N	File Box Storage	14
	M		13
	L		12
General Chemistry Office	K		11
General Chemistry Lab	J		10
General Chemistry Lab	I	Accounting/Personnel Computer/Operations	9

BREEZEWAY

(Metals) Inorganics Lab	H	Executive Office Area	8
(Metals) Inorganics Lab	G	Sample Log-in	7
Extractions Lab	F	Customer Service Break Room	6
Extractions/Gas Cylinder Storage	E	Sales Manager's Office QA Manager's Office Lab Coordinator's Office	5
	D		4
Organics Lab	C	Secretarial Department	3
Organics Lab	B	Quality Assurance Department / File Box Storage	2
Microbiology Lab	A	GC - GC/MS Office	1

Lower Level

Upper Level



Bay 1

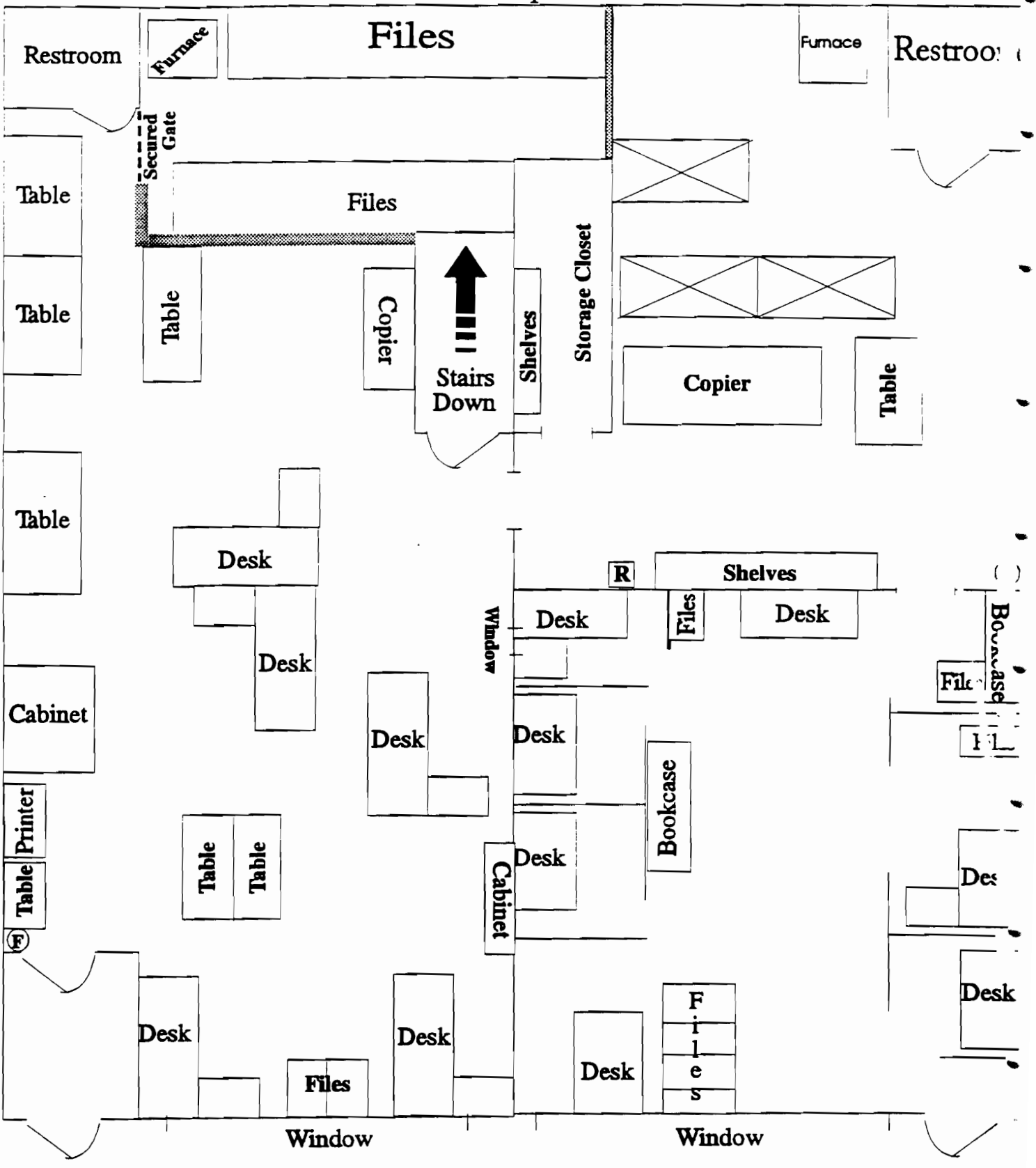
GC/MS Office

1,000 sq. ft.

F = Fire Extinguisher

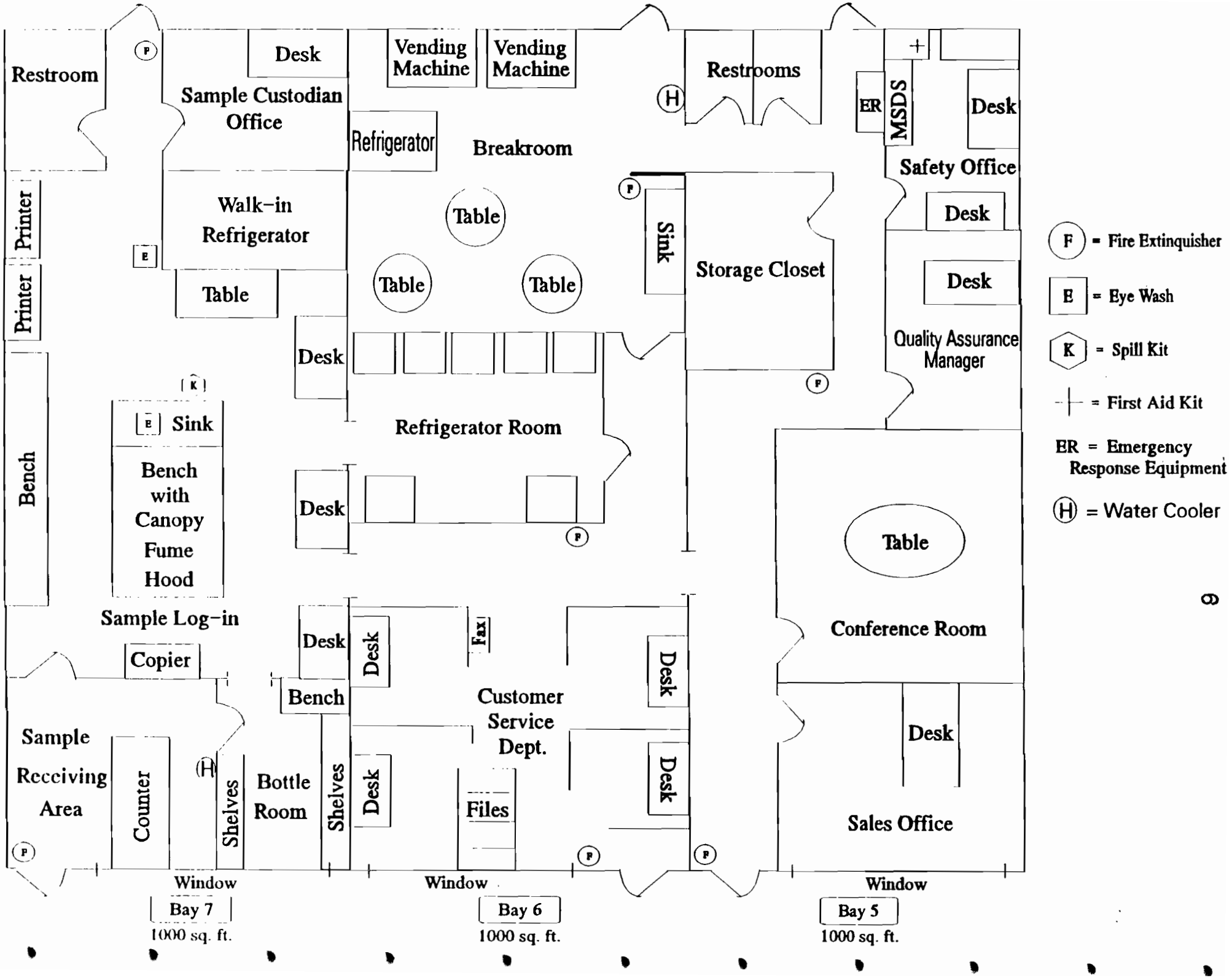
Secretarial & QA Departments

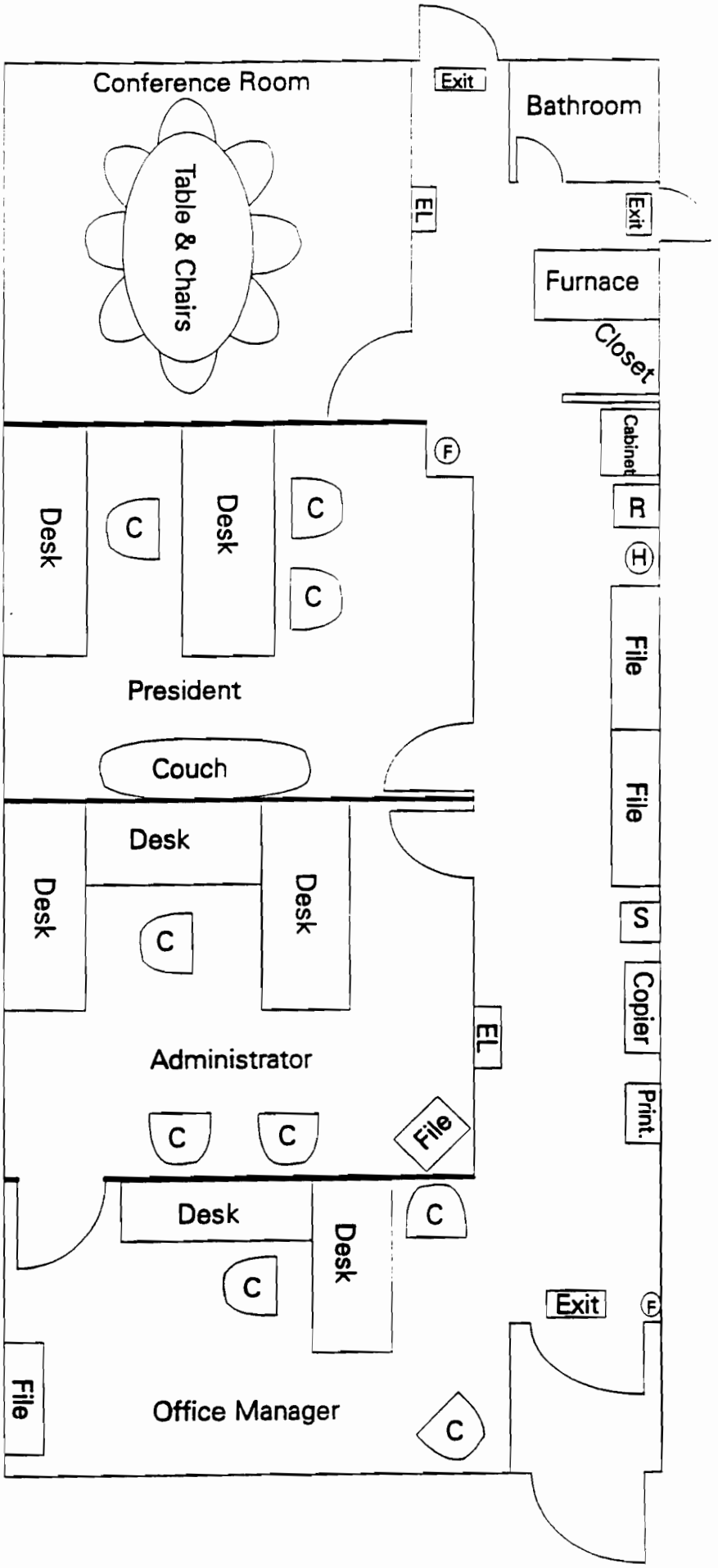
2000 sq. ft.



F = Fire Extinguisher

R = Refrigerator


Restroom
Desk
Sample Custodian Office
Vending Machine
Vending Machine
Restrooms
ER
MSDS
Desk
Safety Office
Refrigerator
Breakroom
Printer
Printer
Walk-in Refrigerator
Table
Table
Table
Table
Sink
Storage Closet
Desk
Desk
Quality Assurance Manager
Bench
Sink
Bench with Canopy Fume Hood
Refrigerator Room
Desk
Desk
Table
Sample Log-in
Conference Room
Copier
Desk
Desk
Fax
Desk
Bench
Customer Service Dept.
Sample Receiving Area
Counter
Shelves
Bottle Room
Shelves
Desk
Files
Desk
Desk
Desk
Sales Office
Window
Window
Window
Bay 7
1000 sq. ft.
Bay 6
1000 sq. ft.
Bay 5
1000 sq. ft.
F = Fire Extinquisher
E = Eye Wash
K = Spill Kit
= First Aid Kit
ER = Emergency Response Equipment
H = Water Cooler



Bay 8

Executive Office Area

(F) = Fire Extinquishe

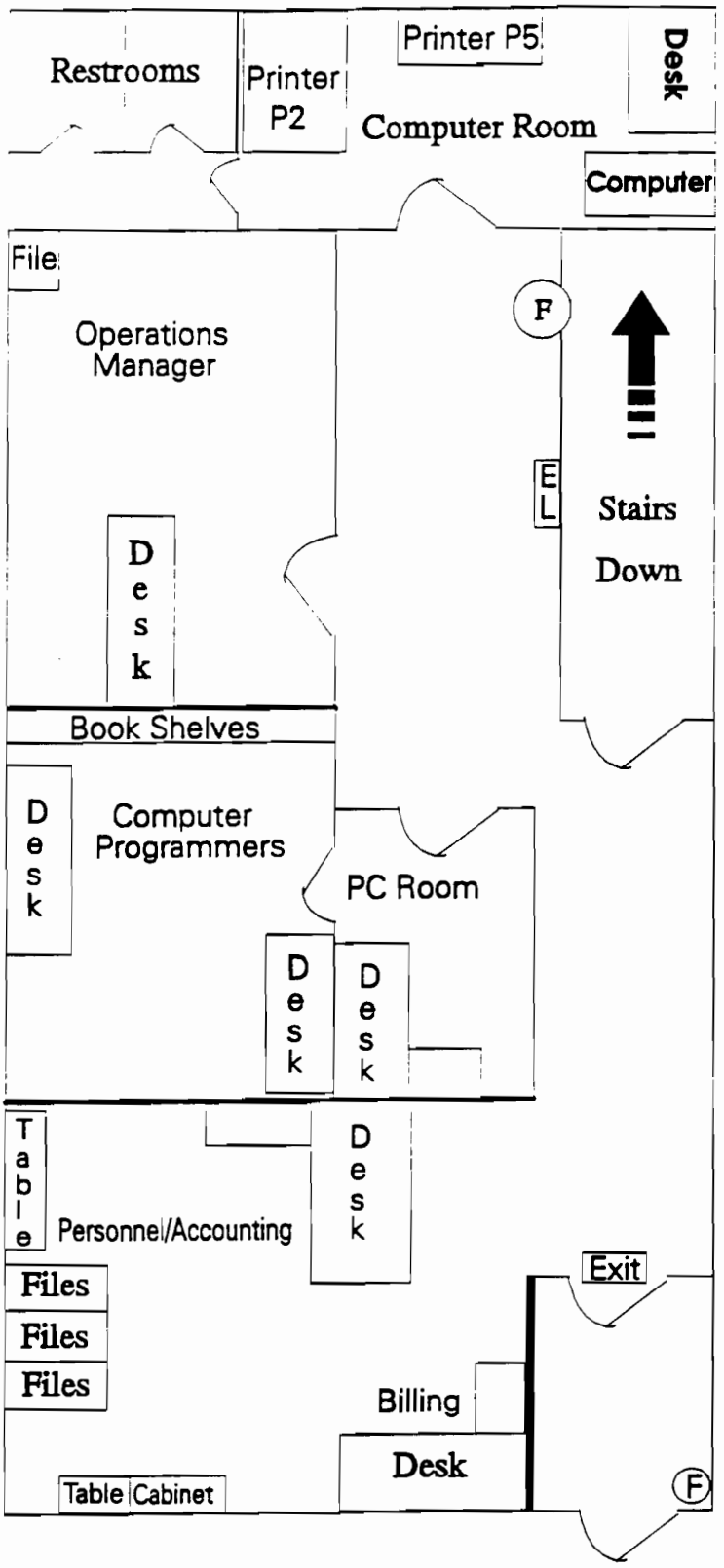
(H) = Water Cooler

EL = Emergency Ligh.

S = Shredder

C = Chair

R = Refrigerator



Bay 9

Accounting/Personnel Computer/Operations

1000 sq. feet

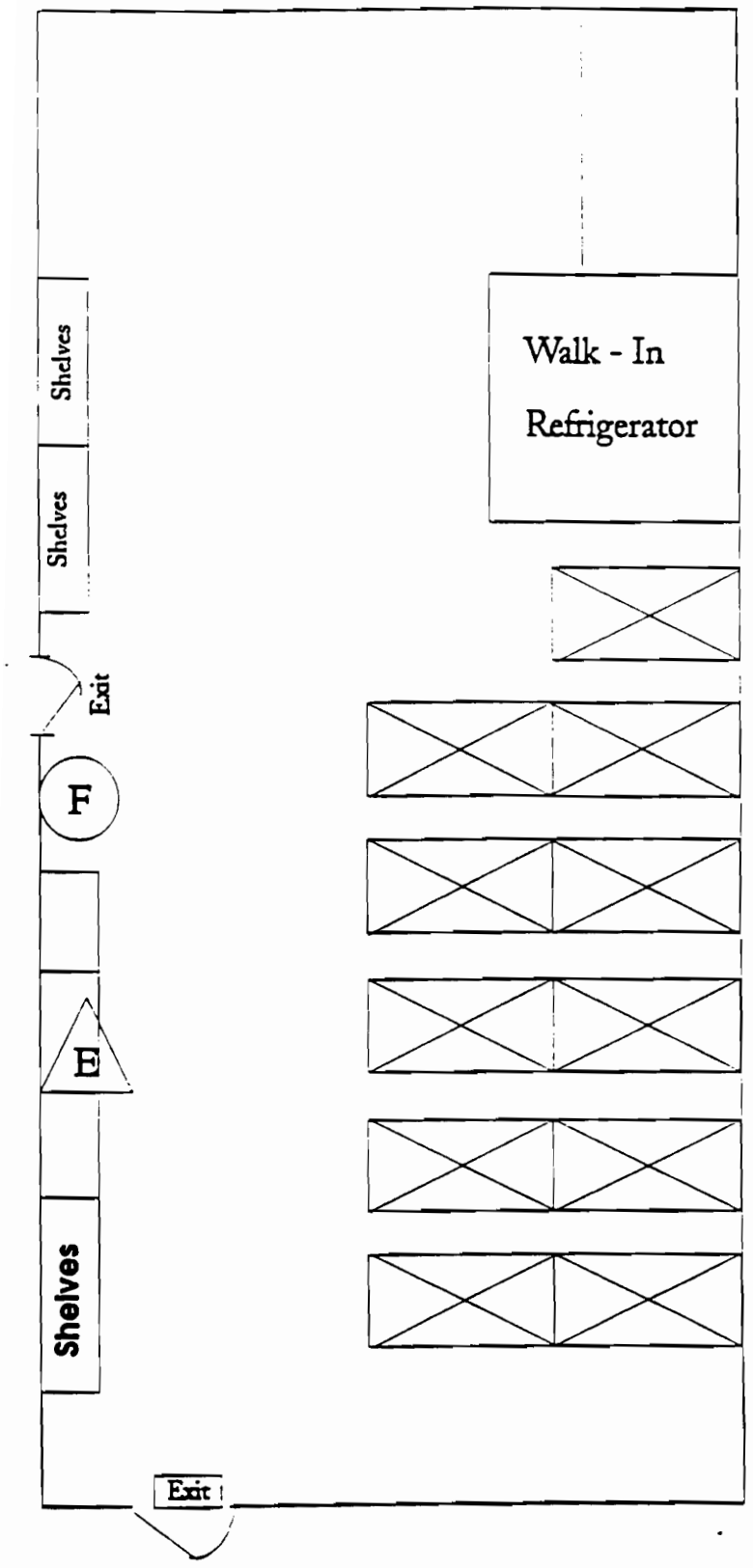
F = Fire Extinguisher

EL = Emergency Light

Bay 14

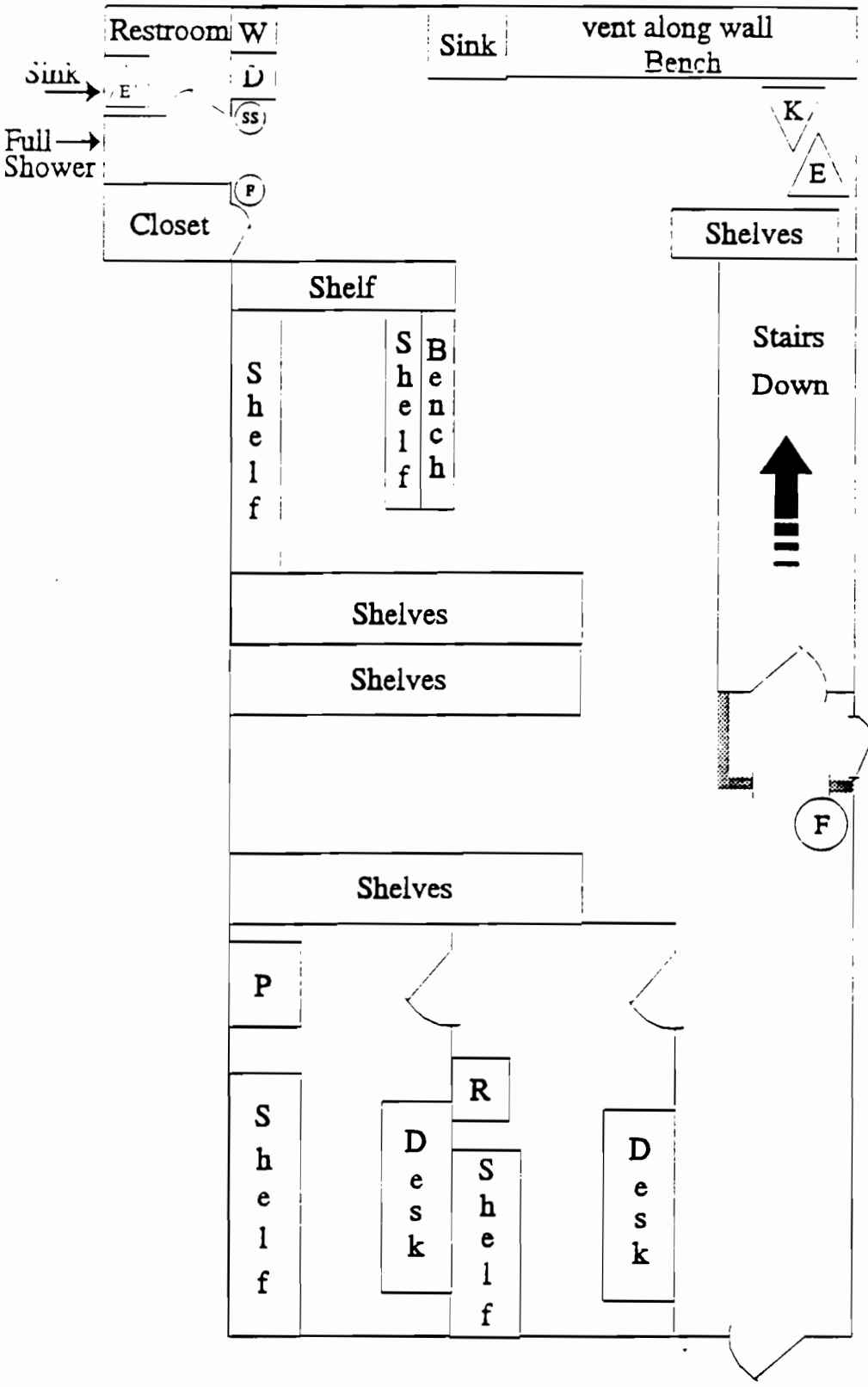
File Box Racks &
Storage Bay

1,000 sq. ft.



F = Fire Extinguisher

E = Emergency Light



Bay 15

Sampling Department
and
Bottle Preparation Area

1,000 sq. ft.

F = Fire Extinguisher

E = Eye Wash

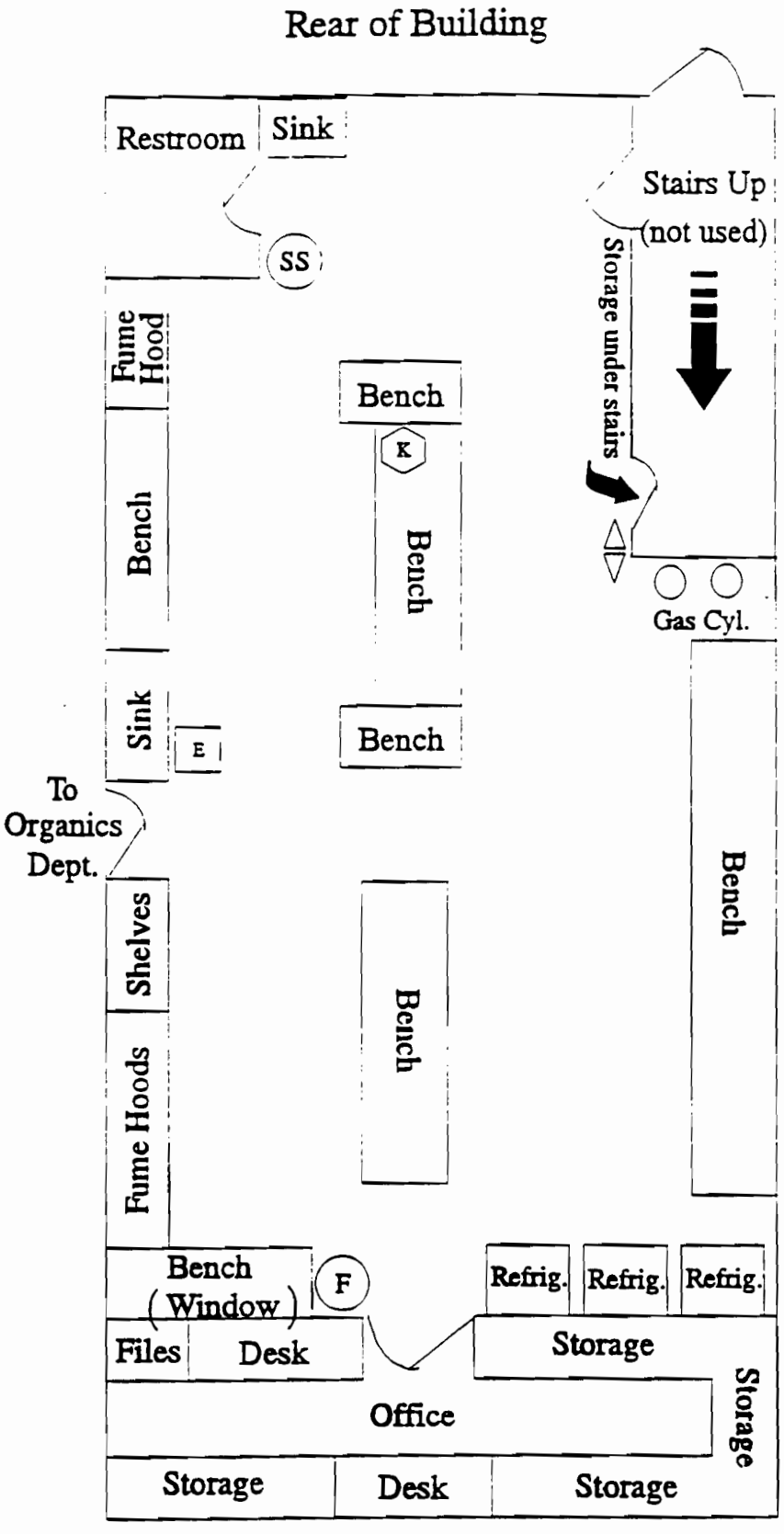
K = Spill Kit

R = Refrigerator

P = Printer

W = Washing Machine

D = Dryer



Bay A

Microbiology

1,000 sq. ft.

F = Fire Extinguisher

E = Eye Wash

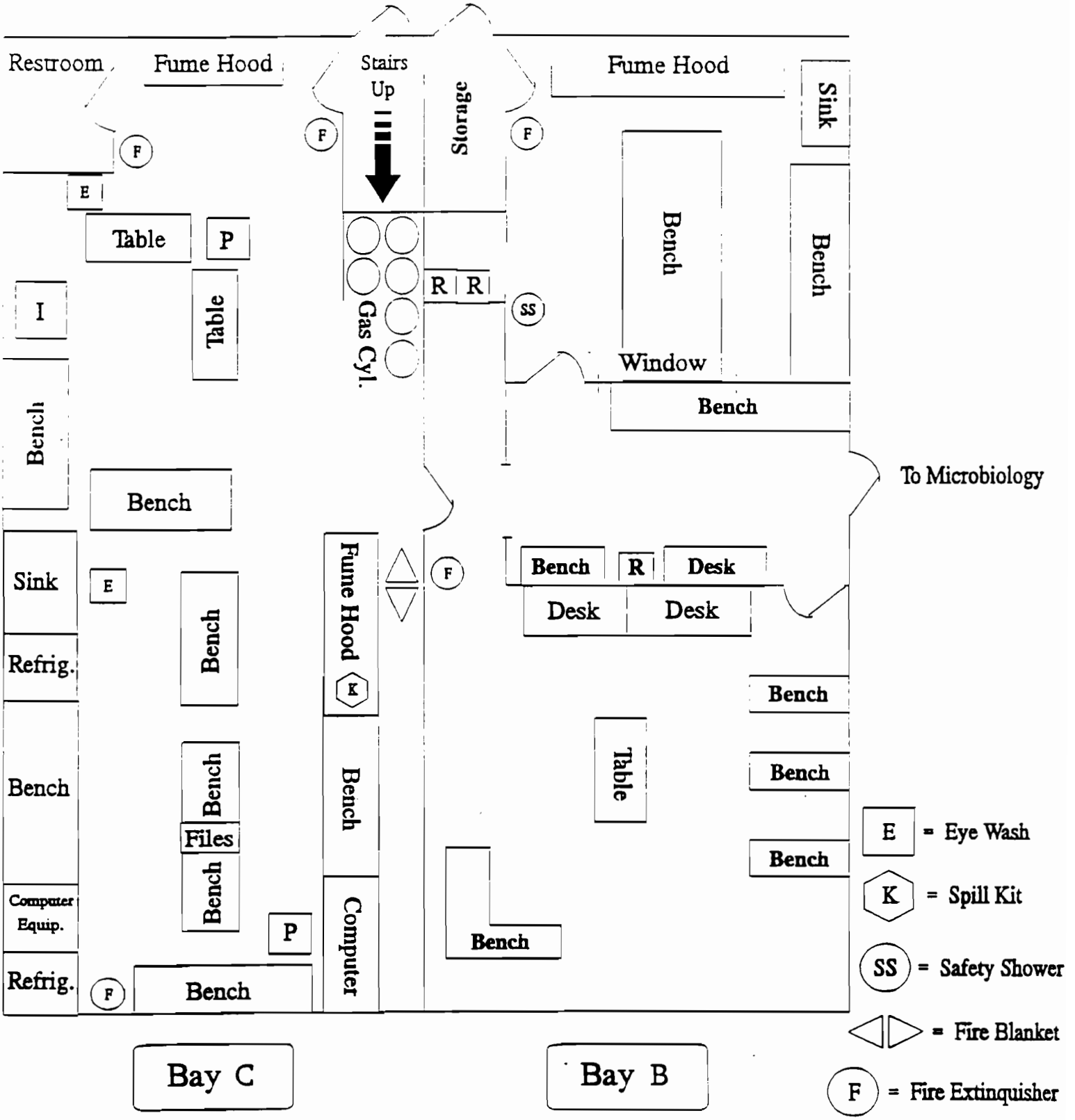
K = Spill Kit

= Fire Blanket

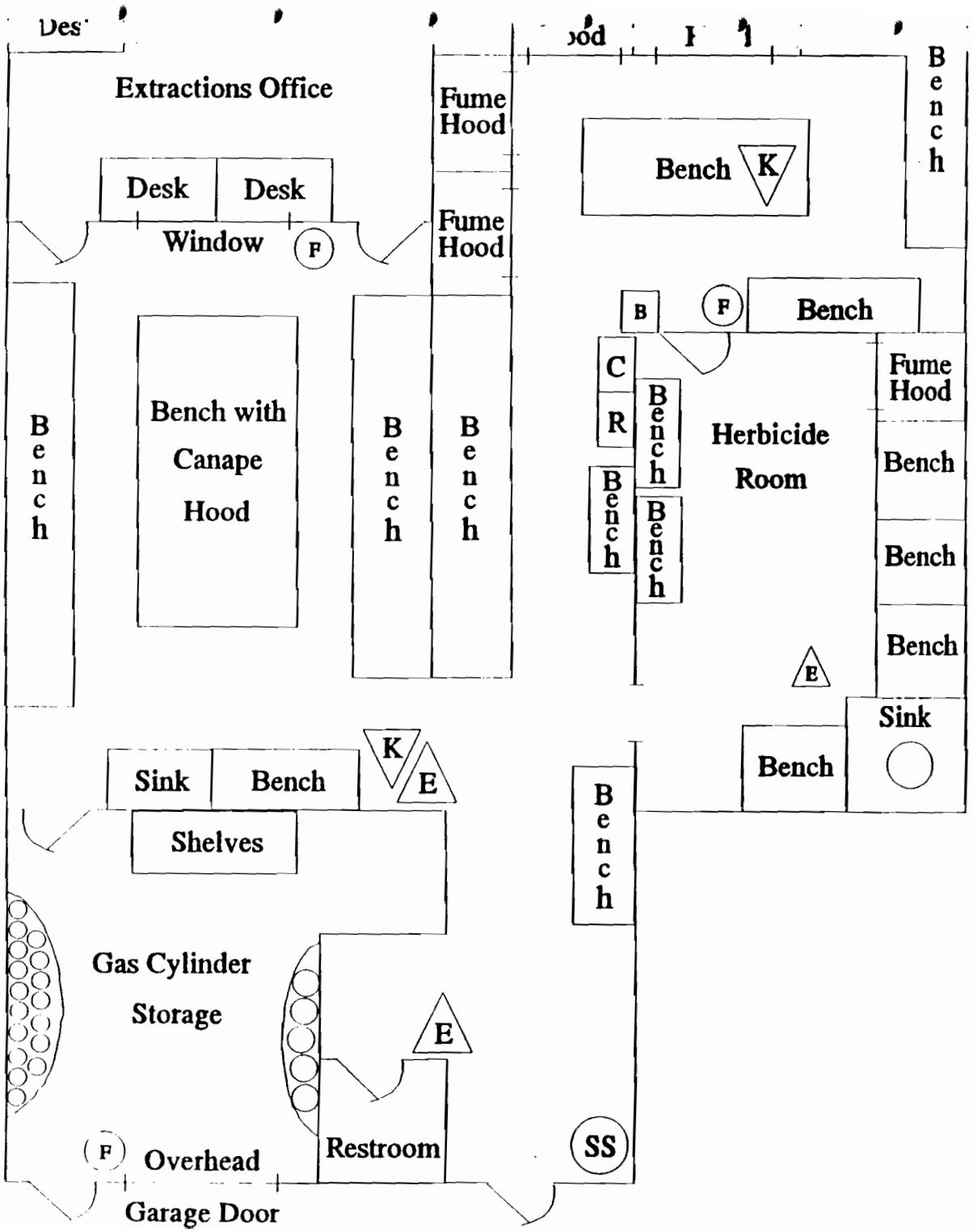
SS = Safety Shower

Organics Department
2000 sq. ft.

Rear of Building



Front of Building



Bay E & F

Extractions Laboratory
1650 sq. ft.

E = Eye Wash

F = Fire Extinguisher

K = Spill Kit

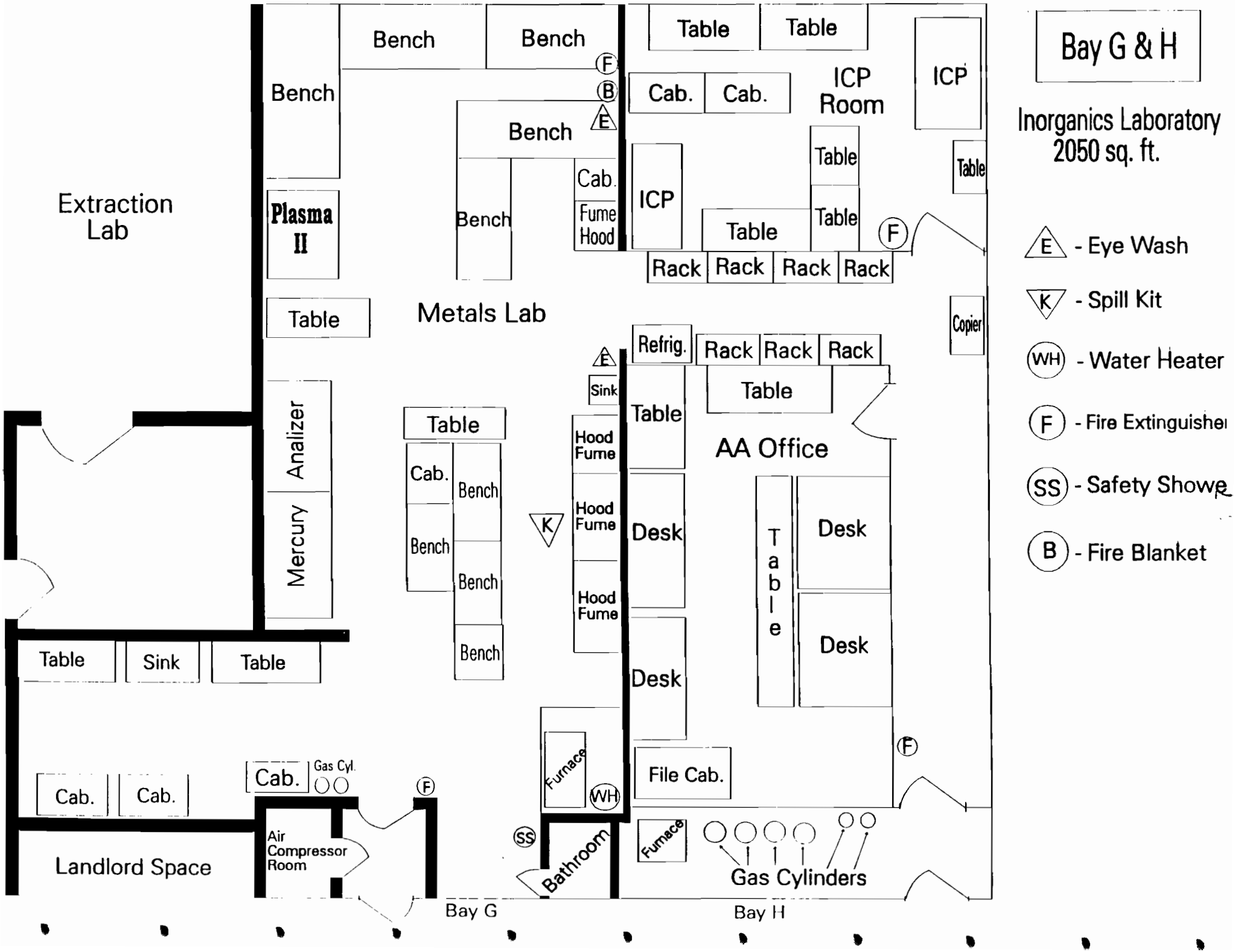
B = Fire Blanket

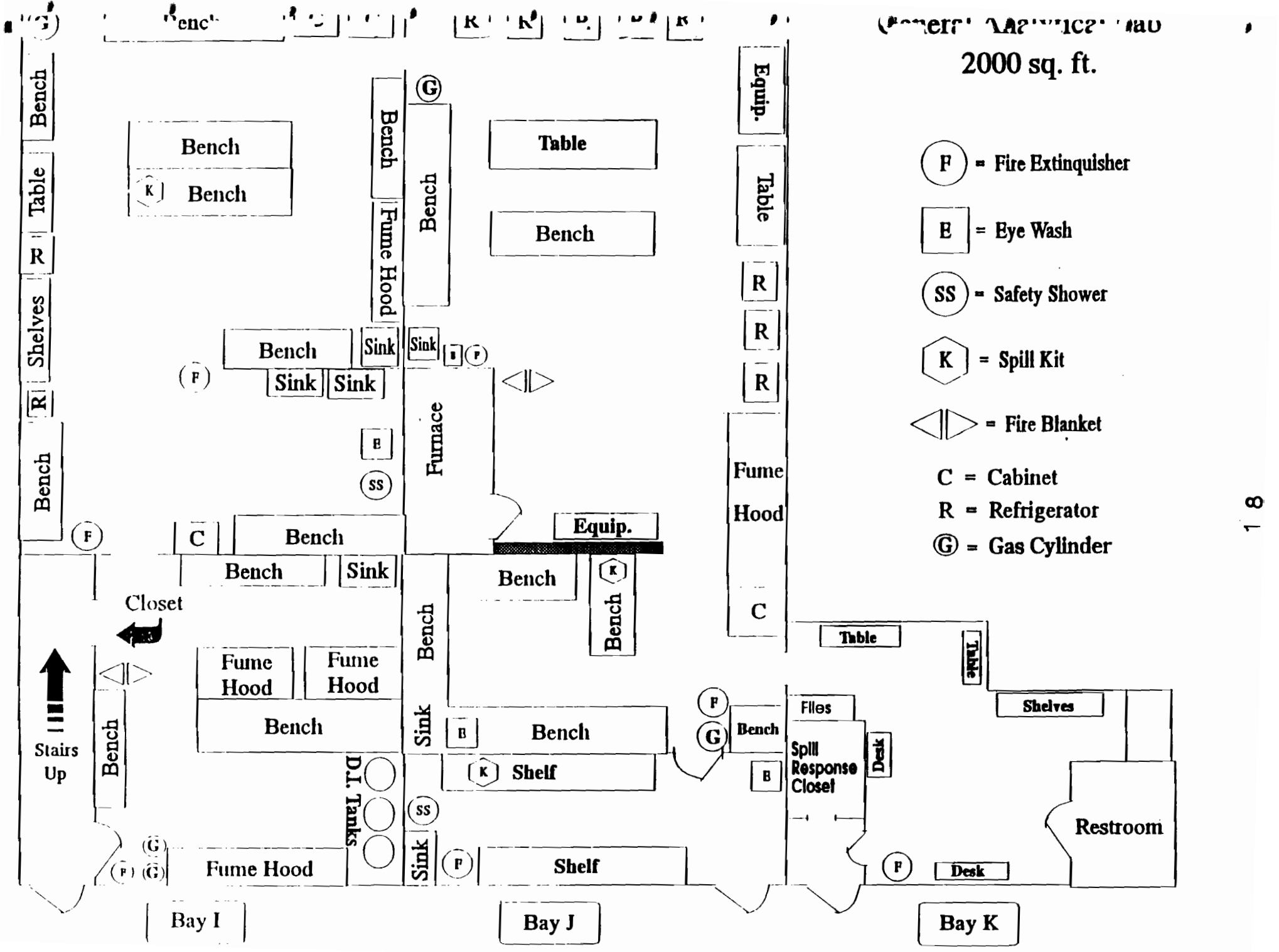
SS = Safety Shower

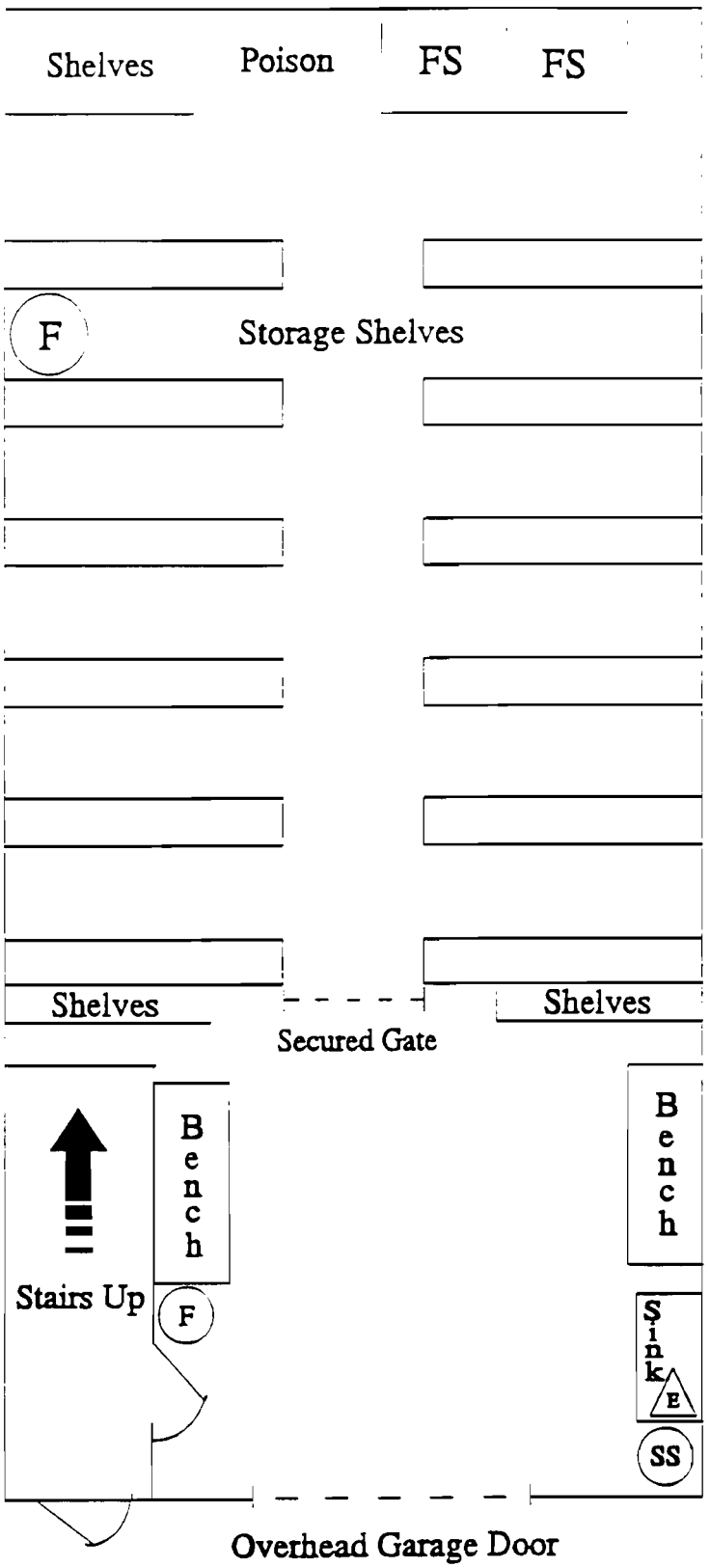
R = Refrigerator

C = Cabinet

16


Bay G & H
Inorganics Laboratory
2050 sq. ft.
E - Eye Wash
K - Spill Kit
WH - Water Heater
F - Fire Extinguisher
SS - Safety Shower
B - Fire Blanket
Extraction Lab
Plasma II
Bench
Bench
Bench
Bench
Cab.
Fume Hood
ICP
Table
Table
Table
Table
Table
Cab.
Cab.
ICP Room
ICP
Table
Rack
Rack
Rack
Rack
Metals Lab
Copier
Refrig.
Rack
Rack
Rack
Table
Sink
Table
Hood Fume
Hood Fume
Hood Fume
Desk
Desk
AA Office
Table
Desk
Desk
Analizer
Mercury
Table
Cab.
Bench
Bench
Bench
Bench
Table
Sink
Table
Cab.
Cab.
Cab.
Gas Cyl.
Air Compressor Room
Landlord Space
Furnace
WH
File Cab.
Furnace
Bathroom
Gas Cylinders
Bay G
Bay H


2000 sq. ft.
F = Fire Extinquisher
E = Eye Wash
SS = Safety Shower
K = Spill Kit
= Fire Blanket
C = Cabinet
R = Refrigerator
G = Gas Cylinder
Bench
Table
Shelves
Furnace
Fume Hood
Sink
Equip.
Closet
Stairs Up
D.I. Tanks
Files
Spill Response Closet
Desk
Restroom
Shelf
Bay I
Bay J
Bay K



Bay O

Shipping and Receiving

1,000 sq. ft.

F = Fire Extinguisher

E = Eye Wash

K = Spill Kit

SS = Safety Shower

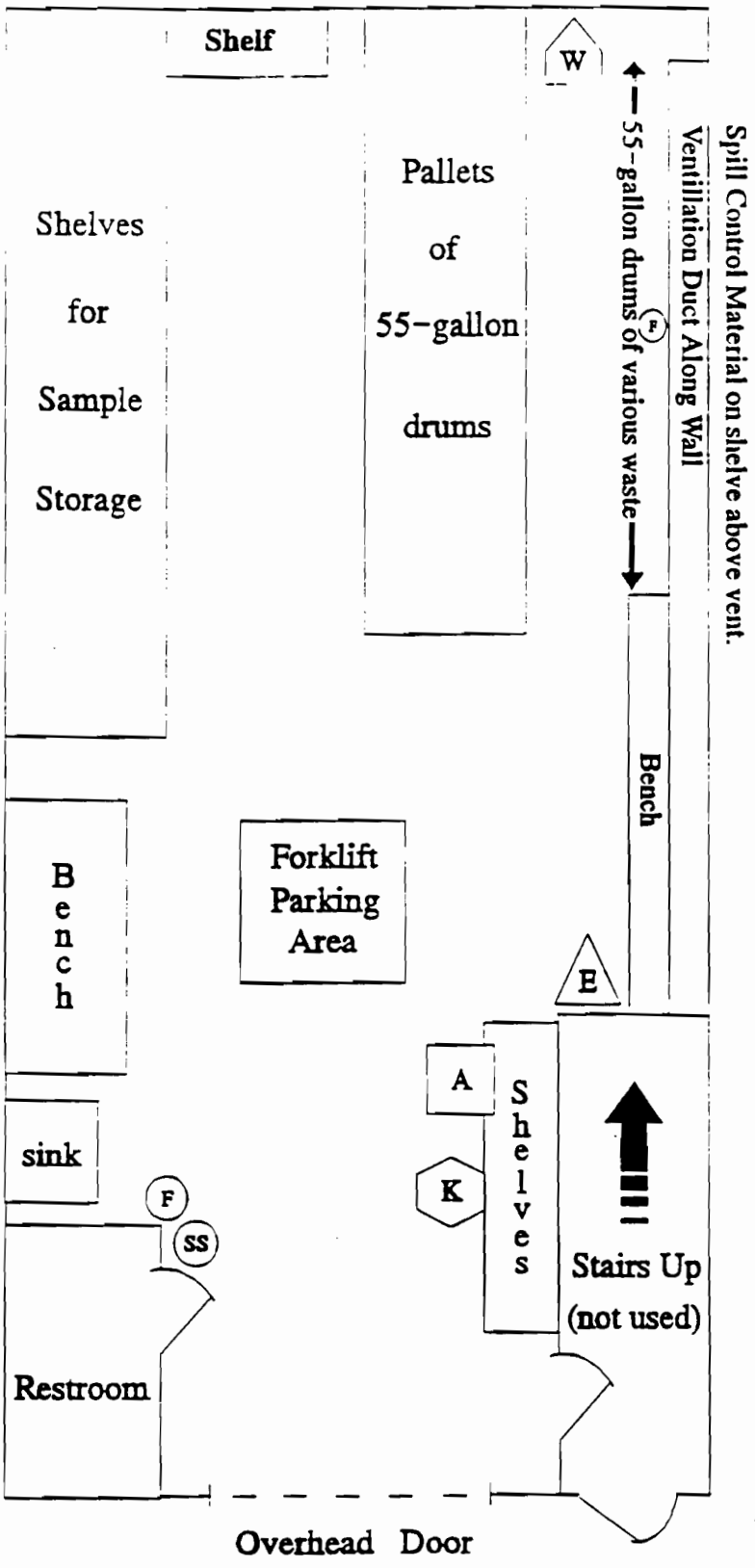
FS = Flammable Storage Cabinets

Bay P

West Bay

Waste accumulation
and
Sample Storage

1,000 sq. ft.



F = Fire Extinguisher

E = Eye Wash

K = Spill Kit

SS = Safety Shower

A = Air Line Respirator

W = Water Valve and Ho:

Instrumentation

Facility Description

1. Computer Systems

Manufacturer	Number of Units
IBM System AS400 E20 with 23 megabytes RAM and 3 gigabytes storage. Supports 250 devices (terminals, printers). Presently, eleven printers are supported along with 50 workstation terminals.	1

2. Gas Chromatography/Mass Spectroscopy:

Manufacturer	Number of Units
A. Hewlett Packard GC/MS Model 5995C with an RTE-6 data system.	1
1. Auxiliary Equipment: Tekmar Auto Model 7000	1
B. Two Hewlett Packard GC/MS Model 5970B MSD with an RTE-6 data system and five 5970B's with a third HP1000 computer using RTE-A.	7
1. Auxiliary Equipment:	
Hewlett Packard Sampler Model 7673	3
Tekmar 2000/2016 automatic purge and trap configured for both packed and capillary columns.	2
Tekmar 3000/2016 Combination	2
Gateway 2000 personal computers interfaced with the RTE data systems	3

3. **Gas Chromatography:**

Manufacturer	Number of Units
A. Tracor GC Model 565 with a Hall detector and PID detector.	1
1. Auxiliary Equipment:	
Hewlett Packard Integrators Model 3392A and 3396A	2
Tekmar Purge and Trap LSC-2 and Model ALS Samplers	1
B. Tremetrics GC Model 9000 with Hall and PID detector. Capability for packed and capillary columns.	1
1. Auxiliary Equipment:	
Tekmar Purge and Trap LSC-2 and ALS sampler, Model 2000/2016	1
C. Tremetrics Model 9001 with a Hall and FID detector, having packed and capillary column capabilities.	1
1. Auxiliary Equipment:	
Hewlett Packard Automatic Sampler Model 7673 auto sampler	1
D. Hewlett Packard GC Model 5840 with a FID and EC detector.	1
1. Auxiliary Equipment:	
Hewlett Packard Integrator	1
Hewlett Packard Automatic Sampler Model 7672A	1
E. Hewlett Packard GC Model 5890 with dual EC detectors and capillary column capability	3

1. Auxiliary Equipment:

Hewlett Packard Automatic Sampler Model 7673A	1
One GC is interfaced to a RTEA 900 Computer for data reduction using the Aquarius software.	1
Two GCs are interfaced to a 386DX PC for data reduction and storage using Lab Quest Software.	1

All Tracor and Tremetric GCs are interfaced with a 386DX computer for data reduction using Lab Quest Software.

4. Atomic Absorption/Emission Spectrophotometry

Manufacturer	**Number of Units**
A. Perkin-Elmer Plasma II Inductively Coupled Argon Plasma Spectrophotometer, dual channel sequential instrument	1
1. Auxiliary Equipment:	
Autosampling device	1
Model 7700 computer	1
B. Perkin-Elmer Atomic Absorption Spectrophotometer Model 5100 with a Zeeman graphite furnace	3
2. Auxiliary Equipment:	
Automatic sampler Model AS60	3
Gateway 2000 Personal Computer	3
C. Perkin-Elmer Atomic Absorption Spectrophotometer Model 2380	1
D. Thermal Jarrel Ash Simultaneous Inductively Coupled Plasma Spectrometer Model 61E	1
1. Auxiliary Equipment:	
IBM PC	1

5. Organic Sample Preparation Apparatus

Manufacturer	Number of Units
A. Heat Systems-Ultrasonics, Inc. Sonicator Model W-380 475 Watts with pulsing capability	3
B. ABC Laboratory GPC Autoprep, Model 1002B and Model 1000 from Analytical Bio-Chemistry Laboratories, Inc.	2
1. Auxiliary Equipment:	
UVD-1 UV Detector	1
SCR-1 Strip Chart Recorder	1
C. Organomation N-Evap Analytical Evaporator, Model 112	1
D. Boekel Steam Baths	3
E. Analytical Testing & Consulting Services Inc. Zero Head Space Extraction Vessel, Model C102	8
F. Labline Orbital Shakers	3
G. IEC Centrifuge	1
H. Labline Multiunit Extraction Heater	3
I. Lindberg Muffle Furnace	4

6. Miscellaneous Instrumentation

Manufacturer	Number of Units
A. Lachat Quik Chem Automated 4 Channel Ion Analyzer	1
B. O.I. Corporation TOC Analyzer Model 524C	1
C. Dohrmann TOX Analyzer Model DX20	1
D. Mitsubishi TOX Analyzer 10 Sigma	1
E. Perkin-Elmer Infrared Spectrophotometer Model 710B	1

F. Perkin-Elmer Infrared Spectrophotometer Model 1600 Series FTIR — 1

G. Milton Roy Spectrophotometer Model 20D — 1

H. Milton Roy Spectrophotometer Model 21D — 1

7. Vehicle Fleet

Our vehicle fleet allows ICM to service clients in New Jersey, New York, and Pennsylvania. In addition to sample pick-up, we offer field sampling services for ground water. All our field samplers have 40 Hour OSHA training and are fully versed in proper sampling and custody procedures.

In addition to the above listed instrumentation and apparatus, ICM Laboratories maintains a full array of standard laboratory equipment such as pH meters, analytical balances, and glassware. We also have ampul refrigeration for maintaining samples at proper temperature.

To ensure continuation of operations, ICM has strategically placed back-up power sources in case of a power outage.

Instrument Preventative Maintenance

A maintenance and repair log book is kept for each instrument. Regularly scheduled maintenance, instrument repairs, and/or any instrument problems are recorded, dated, and initialed. The following are the maintenance schedules for the major instrumentation:

1. Hewlett Packard Gas Chromatography/Mass Spectroscopy:

   Monthly:

   A. Dust around instrument and instrument surfaces to reduce airborne particles.
   B. Check all fans and clean to remove dust from filter.
   C. Remove Syringe, clean, reinstall or replace (SVs).
   D. Remove all glassware and acid wash (VOAs).

   Semi-Annually:

   A. Replace roughing pump oil.
   B. Replace aux pump oil (VOAs).
   C. Replace forline trap absorbent.
   D. Lubricate turbo pump.
   E. Methanol rinse Tekmar (VOAs).

   Annually:

   A. Renew chemical filter.
   B. Clean injection port.
   C. Clean jet separator.

   As Needed:

   A. Clean source.
   B. Change column.
   C. Change trap.

2. **Tracor/Tremetric Gas Chromatographs:**

   Monthly:

   A. Replace hydrocarbon trap.

Semi-Annually:

A. Replace resin and n-propanol (Hall).

As Needed:

A. Maintain n-propanol reservoir (Hall).
B. Clean PID lamp window or replace lamp (when sensitivity is lost).
C. Detach and thoroughly clean purging vessels and inspect Teflon ferrules (replace if necessary).
D. Replace trap and condition new trap at 180°C overnight (when trap produces poor bromoform sensitivities or a pressure drop in excess of 3 psi).
E. Replace column and condition new column overnight (when peak tailing, poor resolution, or a pressure in excess of 60 psi is required to obtain 40 ml/min carrier flow occur).

3. **Hewlett Packard Gas Chromatographs:**

Daily:

A. Change septums.

Monthly:

A. Dust around instrument and instrument surfaces to reduce airborne particles.
B. Check all fans and clean to remove dust from the filter.
C. Remove all rinse bottles, clean and/or replace.
D. Remove syringe, clean and/or replace.

Semi-Annually:

A. Renew chemical filter
B. Clean injection ports
C. Perform wipe test for radiation at detector entrance fitting, detector housing, and detector exit.

As Needed:

A. Clean inlet inserts or liners.
B. Replace glasswool at head of column and clean with methanol.
C. Replace a small portion of column packing.
D. Condition columns.
E. Replace column and condition new column overnight when peak tailing, poor resolution, column bleed, or retention time shifts occur.

4. **Mettler Balances:**

With Each Use:

A. Check level indicator bubble.

Daily:

A. Check 2 S-weights
B. Clean pan, pan brake, and floor of chamber.

Monthly:

A. Clean housing, weighing chamber, and mirrors.
B. Check 5 S-weights.

Annually:

A. Serviced by Mettler.

5. **pH Meters:**

Daily:

A. Calibrated daily or prior to use with 3 buffer solutions, pH 4, 7, and 10.
B. At the end of each day the pH bulbs are capped with filling solution.
C. Airhole is closed to prevent evaporation and crystallization of filling solution.

Weekly:

A. Filling solution replaced.

6. **Spectrophotometers:**

Daily:

A. Clean instrument thoroughly.

Monthly:

A. Performance tested with standard (to insure photometric accuracy, linearity, and precision). This is done every month.
B. Lamps and mirrors checked and cleaned (more frequently if drifting or difficulty zeroing).

Semi-Annually:

A. Serviced by Bausch & Lomb (or more frequently if needed).

7. **Infrared Spectrophotometer:**

Daily:

A. Clean cells.
B. Polystyrene Test Spectrum checked.
C. Balance adjustment.

As Needed:

A. Oil pen carriage.

8. **TOC Analyzer:**

Daily:

A. Replace all drying tubes.
B. Clean and grease the cutter plunger.
C. Clean glass barrel.

Monthly:

A. Clean flow measuring meters.

As Needed:

A. Replace ascarite (when it turns whitish-gray).
B. Adjustment of infrared optical balance.

9. **Perkin-Elmer Plasma II ICP:**

Weekly:

A. Check water cooling system and replace filter cartridge if plugged.
B. Inspect torch, glassware and aerosol injection tube for traces of deposits or signs of melting.
C. Check pump tubing and replace as flat spots develop; check pump roller to insure that there are no binding spots which might affect precision.
D. Keep autosampler carousel clean and spill-free.
E. Clean and check nebulizer and spray chambers.

Periodically:

A. Clean plasma torch assembly.
B. Check purge window and clean if necessary.

10. Perkin-Elmer Graphite Furnace AA Model 5100:

Daily:

A. Wipe contact rings before each new tube.
B. Check contact rings for wear.
C. Condition new tube.
D. Clean quartz window with methanol.
E. Clean workhead surface.
F. Keep autosampler carousel clean and spill-free.

Periodically:

A. Clean graphite contact cylinder.
B. Check sampling capillary regularly and replace if damaged or deteriorating.
C. Inspect pump assembly and tighten any loosening parts.
D. Check optics and carefully remove any dust.

11. Perkin-Elmer AA Model 2380:

Daily:

A. Clean burner head and mixing chamber.
B. Empty drain bottle and check water trap in tubing.
C. Keep instrument and recorder clean and spill-free.

Periodically:

A. Check optics and carefully remove any dust.
B. Clean absorption cell (cold vapor).
C. Acid-clean dispersion frit (cold vapor).

12. Thermo-Jarrell Ash ICAP 61E:

Daily:

A. Inspect torch glassware and aerosol injection tube for traces of deposits or signs of melting.
B. Check pump tubing and replace as flat spots develop. Check all pump tubing connections for leaks or clogs.
C. Visually check spray chamber for proper nebulizer operation.

Periodically:

A. Clean and check nebulizer and spray chamber.
B. Lubricate slider rods of autosampler with a light machine oil.
C. Remove cooling fan filters on back of instrument and vacuum clean.
D. Perform white light and dark current test.

13. Instrument Service Contractors:

In addition to the preventative maintenance performed by ICM, the following contractors perform essential maintenance and repairs:

A. Milton Roy for the Spectrophotometers
B. Perkin-Elmer for the Atomic Absorption, Plasma II ICP, and Infrared Spectrophotometer
C. Thermo-Jarrell Ash for the ICAP 61E
D. Compco Analytical & Hewlett Packard for GC and GC/MS
E. IBM for the computers
F. Tekmar for the purge and trap samplers
G. Tracor for the Tracor GC
H. O.I. Corporation for the TOC Analyzer
I. Mettler for the analytical balances
J. Lachat for the autoanalyzer

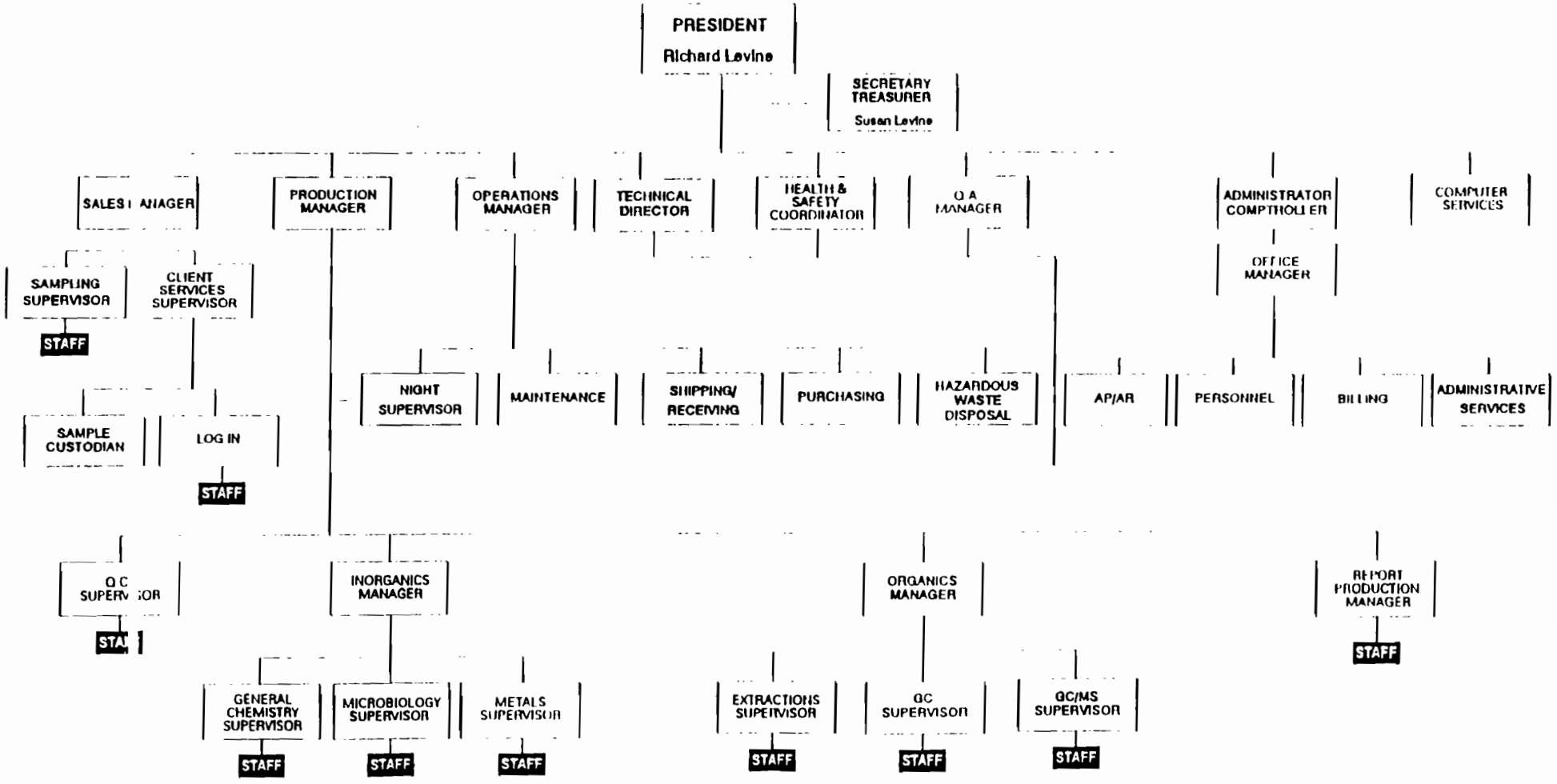
14. Laboratory Reagents and Supplies:

All reagents and supplies are purchased from reputable suppliers such as Fisher Scientific, VWR Scientific, and Supelco. All chemicals and glassware are of the highest possible quality for proper application. The Production Support area maintains a stockroom of appropriate supplies. All chemicals are dated upon receipt and opening. The oldest chemicals are used first and any chemical which reach their expiration date are properly discarded.

Section 3

Organizational Structure

ICM LABORATORIES ORGANIZATIONAL CHART



Training

ICM ensures that all new employees go through a training period. Training includes an introduction to ICM company policies and philosophy, QA/QC practices, safety, and waste disposal. In addition to general policies, each employee is trained in the tasks they are hired to perform.

A variety of individuals are involved in a new employee's training. Individuals include the Safety Coordinator, Quality Assurance Officer, and the department supervisor.

The training period varies depending upon the experience and technical position of the new employee. The typical span of time is one to six months.

When the initial training is completed regarding company policies and safety practices, the department supervisor assumes the training responsibility. During this time, the trainee is introduced to the reference tools needed to perform his duties, tools such as our Standard Operating Procedures. The supervisor works with the new analyst as he/she is performing the analysis. The trainee is encouraged to ask questions and to take notes concerning the analysis.

Gradually, the trainee becomes more experienced with the methodologies and is able to work independently from the supervisor. It is the supervisor's responsibility to determine the time in which the employee can work independently.

All ICM supervisors and managers periodically monitor their employees to ensure that the analysts are performing the methodologies in accordance with ICM Standard Operating Procedures and QA/QC policies. In addition, blind samples are sent through the laboratory to further ensure all methods are working properly.

RICHARD LEVINE

EDUCATION:

1973	University of Illinois Urbana, IL PhD Candidate
1971	University of Illinois Urbana, IL MS Physical Chemistry
1968	Carnegie Mellon University Pittsburgh, PA BS Chemistry

PROFESSIONAL EXPERIENCE:

2/74 - Present

Lab Director
ICM Laboratories - Division of Industrial Corrosion Management, Inc.

Supervising overall operation of ICM Laboratories - work flow, personnel, and finances. Performing long range planning. Since 1982, duties include Computer Systems Software Manager and Programmer. Migrated IBM System 23 to IBM 36, and now to AS400. Developed highly sophisticated environmental LIMS software utilized for data management, generation of deliverables, computerized accounting and purchasing, etc. Supervises programmers working throughout the company.

8/73 - 2/74

Senior Research Chemist
Drew Chemical
Boonton, NJ

Formulation of products, chemical analyses, and reports for water treatment.

6/71 - 8/73

Chemist
University of Illinois - Physical Plant
Urbana, IL

Responsible for all chemically related aspects of corrosion control in water treatment and performing related chemical analyses. Developed rapid analytical techniques for Lithium Bromide analysis in steam absorption refrigeration systems.

9/68 - 6/71	Lecturer, Teacher Graduate Fellow University of Illinois - Dept. of Chemistry Urbana, IL Taught course in undergraduate chemistry and graduate courses in Quantum Mechanics.
1/66 - 9/68	Assistant Research Chemist Gulf Oil Company Pittsburgh, PA Heterogeneous catalysis for petroleum products. Performing analyses using Gas Chromatograph and Gas Chromatograph/Mass Spectrometer. Also construction and maintenance of GC/MS units.

PUBLICATIONS:

Various in the fields of Corrosion Analysis and Control, Water Treatment, Chemical Systems, and Environmental Problems

AWARDS:

Who's Who - 1979 thru Present
Finalist - Inc. Magazine
Entrepreneur of The Year 1991

SUSAN LEVINE

EDUCATION:

1969	University of Pittsburgh Pittsburgh, PA B.S. Psychology

PROFESSIONAL EXPERIENCE:

1974 - Present	Secretary/Treasurer ICM Laboratories-Division of Industrial Corrosion Mangaement, Inc. Duties include comptroller, administrator, managing financial and administrative aspects of company.

ELIZABETH PRICE

EDUCATION:

1978	New Jersey Institute of Technology Newark, NJ Doctoral Candidate, Graduate courses in Environmental Engineering and Chemistry
1975	New Jersey Institute of Technology Newark, NJ M.S. Environmental Engineering
1961	Seton Hall University South Orange, NJ 20 Graduate Credits in Chemistry
1956	Duke University Durham, NC B.S. Chemistry

PROFESSIONAL EXPERIENCE:

1984 - Present	Technical Director ICM Laboratories - Division of Industrial Corrosion Management, Inc. Technical Supervision for Organic, Inorganic, and General Chemical analyses of water, wastewater, soils, hazardous waste, etc. Data review of all GC results. Review and interpretation of chromatograms for Pesticide/PCB and Volatile Organics GC analyses. Method research and development. Supervision and/or analysis of Pesticide/PCB fraction of EPA-CLP samples.
1979 - Present	Adjunct Professor New Jersey Institute of Technology Adjunct Professor for "Environmental Chemistry", "Environmental Microbiology", and "Water and Wastewater Analysis".
1978 - 1984	Director-Environmental Laboratory Civil and Environmental Eng. Dept-NJ Institute of Technology. Conducted and supervised funded research and studies and developed and maintained the laboratory's competence in current test procedures

including A.A. - Graphite furnace and GC/MS (Gas Chromatograph/Mass Spectrometer) methods.

1976 - 1984 — Consultant for various water quality studies and surveys including those for Lake Hopatcong Regional Planning Board, Johns-Manville Development Corp., Lake Shawnee Club, S.B. Thomas, Inc., and Lakeland Laboratories.

1971 - 1978 — Director
Lakeland Laboratories
Supervised all technical aspects of the environmental laboratory operation, including compliance with EPA and State quality assurance guidelines for laboratory certification.

1976 — Adjunct Professor
Middlesex County College
Adjunct Professor in "Environmental Science".

1956 - 1961 — Chemist
Pacquin-Leeming Division of Chas. Pfizer
Worked on the development of analytical methods for combinations of ingredients in pharmaceutical preparations in accordance with N.F. and U.S.P. guidelines.

PUBLICATIONS:

"Sewage Treatment Plants Combat Odor Problems" Water & Sewage Works, October 1978. This article was a winner of the Annual O & M Award.

"Trace Organics by GC/MS," chapter in Pollution Control Handbook, P. Cheremisinoff, Ed., Ann Arbor Science, 1981.

"Airless Digestion Aired" Water & Sewage Works, April 1980

Biogas Production and Utilization, Ann Arbor Science, 1981

"Methods of Biogas Generation and Comparisons" Lecture Books, International Symposium-Workshop on Renewable Sources, Mar. 18-22, 1983, Lahore, Pakistan. E. Price was invited lecturer, session, & workshop chairman.

"The Microbiology of Anaerobic Digestion" and "Biogas Generation", two chapters in Biotechnology Handbook, Cheremisinoff and Ouellette, Ed., Butterworth/Ann Arbor Sci., 1984.

ICMMC

EDUCATION:

1991	Emilcott Associates, Inc. - Certificate for completing RCRA Hazardous Waste Training Program.
1991	Emilcott Associates, Inc. - Certificate for completing Hazardous Materials Training Program
1990	St. Clares - Riverside Medical Center - Certificate for completing CPR Training
1986	Spectra - Certificate for completing Atomic Absorption Course
1984	Nassua Community College Garden City, NJ Non-matriculated, Computer Science
1982	Perkin-Elmer - Certificate for completing Atomic Spectroscopy and Plasma Emission Course
1980	Southeastern Massachusetts University North Dartmouth, MA B.S. Marine Biology

PROFESSIONAL EXPERIENCE:

11/91 - Present	Lab Production Manager ICM Laboratories-Division of Industrial Corrosion Management, Inc. Responsible for overseeing production process. Manages Quality Control, Inorganics, Organics and Report Production departments. Coordinates with Sales, Operations and Quality Assurance Managers to accomplish company goals of rapid turnaround times with highest quality.
7/89 - 11/91	Inorganics Manager ICM Laboratories Responsible for managing the operations of the General Chemistry, Trace Metals, and Microbiology laboratories. Supervised Trace Metals department. Coordination of workflow. Troubleshooting of instruments and other technical problems. Preparation of Inorganic CLP diskette

deliverables.

3/88 - 7/89 — Laboratory Operations Manager
International Technologies Corporation

Supervision and management of sample receiving/ sample management, customer service, data review, health and safety, troubleshooting technical problems in the lab.

10/87 - 2/88 — Quality Assurance Manager
International Technologies Corporation

Supervised Quality Control program, including reports to meet ECRA, CLP and NJDEP Tier requirements. Performed audits, wrote and reviewed SOPs.

1/87 - 10/87 — Inorganics Laboratory Manager
International Technologies Corporation

Managed operation of Trace Metals and Wet Chemistry laboratories. Also responsible for upgrading of equipment, writing and implementing SOPs.

5/85 - 1/87 — Trace Metals Laboratory Team Leader
Environmental Testing and Certification Corporation

Coordinated and supervised laboratory personnel and operations. Performed analyses utilizing ICP, flame and graphite furnace atomic absorption. Handled technical problems, methods development, instrument troubleshooting, etc.

3/84 - 5/85 — Trace Metals Laboratory Supervisor
NYTEST Environmental, Inc.

Supervised technicians, developed methods, scheduled analyses and reviewed data. Department performed analyses by atomic absorption utilizing flame, graphite furnace and hydride generation techniques.

3/81 - 3/84 — Trace Metals Analyst
NYTEST Environmental, Inc.

Performed environmental analyses by atomic absorption utilizing flame, graphite furnace and hydride generation techniques.

BIANCA R. BUCKWALTER

EDUCATION:

1986	Boston College, Graduate School of Management Chestnut Hill, MA M.B.A., Concentration in Marketing
1982	St. John's University Queens, NY B.S. Toxicology (Cum Laude)

PROFESSIONAL EXPERIENCE:

1989 - Present	Industrial Corrosion Management, Inc. Sales Manager Responsible for new business development, marketing and systems development of the sales department.
1986 - 1989	Intech BioLabs Territory Manager Responsible for new business development and market penetration. Maintain a high level of customer service.
1984 - 1986	Boston College Marketing Department Marketing Graduate Assistant Managed professors' marketing research projects. Delivered lecture series to students for instruction of computer-based statistics.
1985 - 1986	Small Business Institute, Boston College Business Consultant Worked with entrepreneurs for the detection of business problems. Developed and implemented solutions.
1983 - 1984	Energy Resources Analytical Environmental Chemist Responsible for Contract Laboratory Program samples and paperwork in the Mass Spectroscopy Department.
1980 - 1983	New York Testing Laboratories Analytical Environmental Chemist Conducted many different analyses including volatiles, base neutrals, acids, pesticides and PCB's

ICMQPK

EDUCATION:

1992	Rutgers University New Brunswick, NJ M.S. Environmental Science.
1984	Stockton State College Pomona, NJ B.S. Environmental Science

PROFESSIONAL EXPERIENCE:

8/89 - Present	Quality Assurance Manager ICM Laboratories - Division of Industrial Corrosion Management, Inc. Responsible for the communication of all QA/QC policies and procedures to the laboratory managers. Ensures laboratory compliance with current NJDEPE and USEPA regulations. Coordinates performance evaluation analysis and state certification.
10/88 - 8/89	Quality Control Specialist ICM Laboratories - Division of Industrial Corrosion Management, Inc. Responsible for review of data and laboratory reports for completeness and compliance to all NJDEPE and EPA regulations. Performance of contract compliance screening. Preparation of data deliverables. Oversaw all method and and quality assurance requirements pertaining to gas chromatography. Responsible for CLP Pesticide/PCB data review.
10/87 - 9/88	GC Analyst Intech Biolabs Performed gas and liquid chromatography analyses of pesticides and herbicides on environmental samples utilizing CFR 601, 602, 608 and SW846, 8080 and 8150 methodologies. Review and interpretation of chromatograms and results.
11/85 - 8/87	GC Analyst Environmental Testing and Certification Corp. Performed gas chromatography analyses of pesticides and herbicides on environmental

samples including wastewater, drinking water, and CLP analyses. Responsible for data review of the above analyses.

5/84 - 11/85 General Chemical Analytical Shift Supervisor
Environmental Testing and Certification Corp.

Responsible for the QC review of laboratory data, training new personnel, and production scheduling in the General Chemical Analytical department.

ICMMY

EDUCATION:

1965	River Dell Regional High School Oradell, NJ Diploma
	County College of Morris Randolph, NJ Accounting Courses

PROFESSIONAL EXPERIENCE:

2/93 - Present	Office Manager ICM Laboratories-Division of Industrial Corrosion Management, Inc. Responsible for the management of billing accounts receivable, accounts payable and Human Resource Departments
7/89 - 2/93	Secretarial Manager ICM Laboratories-Division of Industrial Corrosion Management, Inc. Managed secretarial, report production, and billing departments. Coordinated with Lab Production Manager, Quality Assurance and operations to ensure company goals of rapid turnaround times with highest quality.

ICMGTM

EDUCATION:

1991	Emilcott Associates, Inc. - Certificate for completing RCRA Hazardous Waste Training Program
1991	Emilcott Associates, Inc. - Certificate for completing Hazardous Materials Training Program
1990	St. Clares - Riverside Medical Center - Certificate for completing CPR Training
1985	Hewlett Packard - Certificate for completing the Mass Spectrometry Techniques and Interpretation Course
1983	IT Corporation - Certificate for completing the Hazardous Material Incident Response Operations Course
1983	William Paterson College Wayne, NJ B.S. Chemistry

PROFESSIONAL EXPERIENCE:

4/89 - Present	Organics Manager ICM Laboratories - Division of Industrial Corrosion Management, Inc. Responsible for management of Organics department and supervision of Extractions and GC departments. Supervision of GC analysts and Extractions technicians. Coordination of work flow. Trouble-shooting of instruments and other technical problems. Preparation of organic CLP diskette deliverables.
4/86 - 4/89	GC - GC/MS Supervisor ICM Laboratories - Division of Industrial Corrosion Management, Inc. Responsible for supervision of GC & GC/MS analysts. Coordination of work flow. Troubleshooting of instruments and other technical problems. Technical data review for all GC/MS data. Preparation of Organic CLP diskette deliverables. Performed GC/MS analyses and interpretation of Mass Spectra utilizing SW846, EPA Series 500 and 600, and CLP Methodologies.

6/83 - 4/86	Organics Analyst Environmental Testing and Certification Corporation Performed and reviewed volatile and semivolatile environmental analyses by GC/MS and interpreted resulting Mass Spectra. Performed Pesticide/PCB Pesticide/PCB analyses by GC/ED. Performed volatileorganic analyses by GC/FID.
1/82 - 6/83	Organics Analyst International Technologies Corporation Performed and reviewed volatile and semivolatile environmental analyses by GC/MS and interpreted resulting Mass Spectra. Performed Pesticide/PCB analyses by GC/ED. Performed volatile organic analyses by GC/FID.
1/81 - 12/81	Physical Scientist Aid USEPA Performed and reviewed volatile, base neutral and acid fraction environmental analyses by GC/MS and interpreted resulting Mass Spectra. Performed Pesticide/PCB analyses by GC/ED. Performed volatile organic analyses by GC/FID.

ICMGMB

EDUCATION:

1991	Emilcott Associates, Inc. - Certificate for completing RCRA Hazardous Waste Training Program
1991	Emilcott Associates, Inc. - Certificate for completing Hazardous Materials Training Program
1990	St. Clares - Riverside Medical Center - Certificate for completing CPR Training
1989	County College of Morris - Certificate for completing Supervisory Skills Seminar
1986	Stonehill College North Easton, MA B.S. Biology

PROFESSIONAL EXPERIENCE

1/89 - Present	GC/MS Supervisor ICM laboratories - Division of Industrial Corrosion Management, Inc. Supervision of GC/MS analysts. Coordination of work flow. Technical data review for all GC/MS data. Troubleshooting of instruments and other technical problems. Preparation of organic CLP diskette deliverables.
2/87 - 1/89	GC/MS Analyst ICM Laboratories- Division of Industrial Corrosion Management, Inc. Performed and reviewed volatile and semivolatile organic analyses by GC/MS with RTE Data System on environmental samples utilizing SW846, EPA Series 500 and 600, and CLP methodologies. Interpretation of resulting mass spectra. Preparation of standards. Routine instrument maintenance.
8/87 - 2/88	GC Analyst ICM Laboratories - Division of Industrial Corrosion Management, Inc. Performed volatile organic analysis by GC on environmental samples using 500 and 600 series methods. Interpretation of data. Preparation of

standards.

1/87 - 8/87

General Chemistry Analyst
ICM Laboratories - Division of Industrial Corrosion Management, Inc.

Performed general chemistry analyses on environmental samples following Standard Methods, SW846, and EPA procedures. Preparation of standards.

ICMGBB

EDUCATION:

1982	Cook College, Rutgers University New Brunswick, NJ B.S. Biology

PROFESSIONAL EXPERIENCE

9/90- Present	GC/MS Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performs and reviews volatile and semi-volatile organic analyses by GC/MS with RTE Data System on environmental samples utilizing SW846, EPA Series 500 and 600, and CLP Methodologies. Interpretation of resulting Mass Spectra. Preparation of standards. Routine instrument maintenance.
9/87 - 9/90	Inorganics Analyst ICM Laboratories - Division of Industrial Corrosion Management, Inc. Performed and reviewed trace metal analyses by ICP, Graphite Furnace, Flame AA and Cold Vapor AA utilizing SW846, EPA and CLP Methodologies. Interpretation of resulting data. Preparation of standards. Routine instrument maintenance.
12/86 - 9/87	General Chemistry Supervisor ICM Laboratories-Division of Industrial Corrosion Management, Inc. Supervision of general chemistry analysts. Coordination of work flow. Technical data review of general chemistry data. Trouble shooting of instruments and other technical problems.
5/86 - 12/86	General Chemistry Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performed and reviewed General Chemistry analyses utilizing ASTM, Standard Methods, SW846, EPA and CLP procedures. Preparation of standards. Routine instrument maintenance.

ICMGGT

EDUCATION:

1993	ICM Laboratories-Certificate for completing GC/MS Interpretation of Electron Ionization Spectra Training Course
1993	ICM Laboratories-Certificate for completing GC/MS Operation-Volatile Training Course
1993	ICM Laboratories-Certificate for completing GC/MS Operation-Semivolatile Training Course
1982	Rutgers University New Brunswick, N.J. BA Chemistry

PROFESSIONAL EXPERIENCE:

6/93 - Present	GC-GC/MS Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performs and reviews volatile and semivolatile organic analyses by GC/MS with RTE Data System on environmental samples utilizing SW846, EPA Series 500 and 600, and CLP methodologies. Performs and reviews analyses on environmental samples for Pesticide, PCB's and Herbicides. Interpretation of resulting mass spectra. Preparation of standards. Routine instrument maintenance.
4/90 - 4/93	GC/MS Chemist Laboratory Resources Performed and reviewed base neutral and acid extractable analyses. Interpretation of resulting mass spectra.
11/88 - 3/90	GC Chemist Laboratory Resources Performed and reviewed analyses on environmental samples for Pesticide, PCB's and Herbicides.

Interpretation of resulting mass spectra. Analyzed for volatile organics using the Trecor 585 and Tekmar purge and trap instrument.

9/87 - 10/88 Extractions Chemist
Laboratory Resources

Responsible for the preparation of waters, soils, and wastes for analysis by GC and GC/MS. Performed various wet chemistry analyses.

ICMRB

EDUCATION:

1984	State University of New York Oneonta, NY B.S. Biology

PROFESSIONAL EXPERIENCE:

06/95 - Present	Inorganic Lab Manager ICM Laboratories-Division of Industrial Corrosion Management, Inc. Supervision of General Chemistry, Metals, and Microbiology departments. Coordination of work flow. Technical data review of analyses. Troubleshooting of instruments and other technical problems.
10/89 - 06/95	General Chemistry Supervisor ICM Laboratories-Division of Industrial Corrosion Management, Inc. Supervision of General Chemistry analysts. Coordination of work flow. Technical data review for General Chemistry analyses. Troubleshooting of instruments and other technical problems. Department performs full range of General Chemistry analyses including cyanide, phenol, petroleum hydrocarbon, etc. utilizing ASTM, Standard Methods, SW846, EPA and CLP procedures. In addition to classical Wet Chemistry techniques, the department also performs TCLP extractions and utilizes TOC analyzer and autoanalyzer.
8/88 - 10/89	General Chemistry Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performed and reviewed General Chemistry analyses utilizing ASTM, Standard Methods, SW846, EPA and CLP procedures. Preparation of standards. Routine instrument maintenance.
6/86 - 6/88	Laboratory Supervisor Pompton Lakes Municipal Utilities Authority Performed the analyses necessary to keep a small water and wastewater laboratory certified by the state. Also performed analyses necessary to control wastewater treatment.

ICMMLM

EDUCATION:

1992	Emilcott Associates, Inc.-Certificate for completing Health and Safety Program
1991	Emilcott Associates, Inc.-Certificate for completing RCRA Hazardous Waste Training Program
1991	Emilcott Associates, Inc.-Certificate for completing Hazardous Materials Training Program
1990	St. Clares-Riverside Medical Center-Certificate for completing CPR Training
1989	ICM Laboratories-Certificate for completing Mercury Atomic Absorption Training Course
1989	ICM Laboratories-Certificate for completing Graphite Furnace Atomic Absorption Training Course
1989	ICM Laboratories-Certificate for completing ICP Training Course
1989	Perkin-Elmer-Certificate for completing Atomic Spectroscopy and Graphite Furnace Atomic Absorption Course
1982	Adelphi University Garden City, NY B.A. Biology

PROFESSIONAL EXPERIENCE:

11/89 - Present	AA/ICP Specialist ICM Laboratories-Division of Industrial Corrosion Management, Inc. Supervision of Trace Metals analysts. Coordination of work flow. Performs and reviews Trace Metals analyses by ICP, Graphite Furnace, Flame AA and Cold Vapor AA utilizing SW846, EPA and CLP Methodologies. Preparation of Inorganic CLP

diskette deliverables. Responsible for the operation and maintenance of instruments. Performs sample preparation. (Microwave digestion procedure is not employed).

1/89 - 11/91

Evening Shift Supervisor
ICM Laboratories-Division of Industrial Corrosion Management, Inc.

Responsible for general supervision of laboratory during the evening shift (4pm-midnight). Coordinated work flow, handled problems, shut down facilities at end of work day.

8/83 - 6/88

Teacher
Pope John XXIII High School
Sparta, NJ

Responsiblities included the teaching of biology, chemistry and earth sciences.

ICMMPC

EDUCATION:

1992 - Present	East Stroudsburg University
1987 - 1989	East Stroudsburg, Pennsylvania
	Major-Biochemistry

PROFESSIONAL EXPERIENCE:

08/95 - Present	Inorganic Analyst
	ICM Laboratories-Division of Industrial Corrosion
10/94 - 12/94	Management, Inc.
08/92 - 04/93	Performs and reviews Trace Metal analyses by ICP, Graphite Furance, Flame AA and Cold Vapor AA utilizing SW846, EPA 200.7 and 200 series, and CLP methodologies. Interpretation of resulting data. Preparation of standards. Routine instrument maintenance. Responsible for the operation, maintenance of graphite furnace, flame and cold vapor atomic absorption instruments. Performs sample preparation. (Microwave digestion procedure is not employed).
01/95 - 07/95	General Chemistry Analyst
	Diversey Corp.
	Performed and reviewed General Chemistry analyses. Preparation of standards. Routine instrument maintenance.
01/90 - 10/91	General Chemistry Analyst
	ICM Laboratories-Division of Industrial Corrosion
	Management, Inc.
	Performed and reviewed General Chemistry analyses utilizing ASTM, Standard Methods, SW846, EPA and CLP procedures. Preparation of standards. Routine instrument maintenance.

ICMMRJ

EDUCATION:

1988	Montclair State College Upper Montclair, NJ B.S. Biology, minor in Chemistry

PROFESSIONAL EXPERIENCE:

4/96 - Present	Metals analyst
8/93 - 2/96	Quality Control Specialist ICM Laboratories-Division of Industrial Corrosion Management, Inc. Responsible for review of data and laboratory reports for completeness and compliance to all NJDEPE and EPA regulations. Performance of contract compliance screening. Preparation of data deliverables.
10/91 - 8/93	Inorganic Leader EI Du Pont Responsible for set up of the metals laboratory, the training of personnel and the operation and maintenance of Graphite Furnace, ICP and Cold Vapor Mercury Analyzer utilizing SW846 methods. Performed quality assurance review on all results obtained by metals lab.
5/91 - 9/91	Metals Team Leader York/IEA Laboratories Responsible for supervision of metals lab. Coordinated production, trained personnel and performed data quality review. Performed anlayses on Graphite Furnace and ICP following SW846 and EPA CLP protocol.
4/89 - 5/91	Inorganic Chemist York/IEA Laboratories Performed environmental metals analyses utilizing SW846 and EPA CLP protocol. Operated Graphite Furnace and ICP instruments. Performed Mercury extraction and analysis, Hexavalent Chromium extraction and analysis, and metals digestion. Reviewed and interpreted resulting data.

ICMGK

EDUCATION:

1974	Bombay University Bombay, India B.S. in Chemistry

PROFESSIONAL EXPERIENCE:

8/95 - Present	General Chemistry Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performs and reviews General Chemistry analyses utilizing ASTM, Standard Methods, SW846, EPA and CLP procedures. Preparation of standards. Routine instrument maintenance.
6/91 - 8/95	Inorganics Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performs and reviews trace metal analyses by ICP, Graphite Furance, Flame AA and Cold Vapor AA utilizing SW846, EPA 200.7 and 200 series, and CLP methodologies. Interpretation of resulting data Preparation of standards. Routine instrument maintenance
9/88 - 6/91	General Chemistry Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performed and reviewed General Chemistry analyses utilizing ASTM, Standard Methods, SW846, EPA and CLP procedures. Preparation of standards. Routine instrument maintenance.
10/87 - 4/88	Inorganics Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performed and reviewed Trace Metals analyses by Graphite Furnace, Flame AA and Cold Vapor AA utilizing SW846 and EPA Methodologies. Interpretation of resulting data. Preparation of standards. Routine instrument maintenance.
3/87 - 10/87	Extractions Chemist ICM Laboratories-Division of Industrial Corrosion

Management, Inc.

Performed Extractions of environmental samples for the Organic analyses of pesticides, PCB's semi-volatiles and herbicides. Extracted and analyzed for petroleum hydrocarbons on the infrared spectrophotometer.

10/86 - 3/87

Microbiology Analyst
ICM Laboratories-Division of Industrial Corrosion Management, Inc.

Performed Microbiological analyses on environmental samples, testing for total coliform, fecal coliform fecal strep, standard plate count, pseudomonas and enterococci using Standard Methods and EPA

ICMVN

EDUCATION:

1968	Bucharest Polytechnical Institute Bucharest, Romania M.S. - Geology: Concentration in Petroleum and Gas.

PROFESSIONAL EXPERIENCE:

5/89 - Present	General Chemistry Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performs and reviews General Chemistry analyses utilizing ASTM, Standard Methods, SW846, EPA and CLP procedures. Preparation of standards. Routine instrument maintenance.
1969 - 1988:	Environmental Engineer/Research Department Institute for Land Reclamation, Studies and Design Bucharest, Romania

ICMJM

EDUCATION:

1962	Eastern School For Physicians Aides Certified Medical Technologist

PROFESSIONAL EXPERIENCE:

3/90-Present	Laboratory Technician ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performs microbiological and general analyses on water and waste water.
9/89-3/90	Sample Preparation Technician/ICM Laboratories Responsibilties include the preparation of soil and water samples for analysis in the Metals Laboratory.
1968-1989	Full-time domestic work including geriatric and Child care.

ICMEPB

EDUCATION:

1988	County College of Morris Randolph, NJ A.S. in Biology

PROFESSIONAL EXPERIENCE:

5/90 - Present	Extractions Supervisor ICM Laboratories-Division of Industrial Corrosion Management, Inc. Responsible for supervision of Extractions Chemists. Coordination of work flow. Trouble-shooting of instruments. Performs extractions and concentrations of environmental samples for the Organic analysis of herbicides, pesticides, PCB's, and semi-volitiles utilizing SW846 EPA and CLP methodologies. Extracts and analyzes for petroleum hydrocarbons on the infrared spectophotometer. Preparation of standards and reagents.

ICMQCT

EDUCATION:

1984	University of New Hampshire Durham, N.H. B.S. Animal Science

PROFESSIONAL EXPERIENCE:

11/91 - Present	Quality Control Supervisor ICM Laboratories-Division of Industrial Corrosion Management, Inc. Responsible for the management of Quality Control Specialists. Coordination of workflow and data validation. Performance of contract compliance screening. Preparation of data deliverables.
4/89 - 11/91	Quality Control Specialist ICM Laboratories-Division of Industrial Corrosion Management, Inc. Responsible for review of data and laboratory reports for completeness and compliance to all NJDEPE and EPA regulations. Performance of contract compliance screening. Preparation of data deliverables.
11/87 - 4/89	Client Services/Sample Management Technician ICM Laboratories-Division of Industrial Corrosion Management, Inc. Duties included sample receipt, log-in, preparing and proofing chains of custody. Preparing bottle orders and arranging shipment. Acted as liason between customers and laboratory by providing price quotes, status of projects, regulatory requirements etc.
1/86 - 11/87	Inorganics Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performed and reviewed trace metals analyses by Graphite Furnace, Flame AA, and Cold Vapor AA utilizing SW846 and EPA Methodologies. Interpretation of resulting data. Preparation of Standards. Routine instrument maintenance.

ICMQDB

EDUCATION:

Cook College - Rutgers University
New Brunswick, NJ
B.S. Environmental Science

PROFESSIONAL EXPERIENCE:

8/91 - Present

Quality Control Specialist/Special Analytical Services (SAS) Project Manager
ICM Laboratories - Division of Industrial Corrosion Management, Inc.

Quality Control Specialist
Responsible for review of data and laboratory reports for completeness and compliance to all NJDEPE and EPA regulations. Performance of contract compliance screening. Preparation of data deliverables.

Special Analytical Services Project Manager
Responsible for the review of data reports for completeness and compliance to Special Analytical Services Contract requirements. Also serve as the primary contact and coordinator for SAS work.

6/90 -8/91

Environmental Specialist
Suburban Regional Health Commission

Investigated and evaluated known or potential environmental problems associated with air and noise pollution. Interpret and apply laws and regulations relating to the environment.

ICMKN

EDUCATION:

1980	County College of Morris Randolph, NJ A.S. Biology

PROFESSIONAL EXPERIENCE:

1/90 - Present	Client Services/Sample Management Supervisor ICM Laboratories-Division of Industrial Corrosion Management, Inc. Supervision of Client Services Representatives and Sample Management Technicians. Coordination of work flow. Responsible for all aspects of sample receipt, log-in, full chain of custody documentation and distribution of samples and/or extracts. Oversees sample container preparation, preservation and shipments. Client Services department acts as liason between customers and laboratory.
3/89 - 1/90	Client Services/Sample Management Technician ICM Laboratories-Division of Industrial Corrosion Management, Inc. Duties included sample receipt, log-in, preparing and proofing chains of custody. Preparing bottle orders and arranging shipment. Acted as liason between customers and laboratory by providing price quotes, status of projects, regulatory requirements, etc.
8/88 - 3/89	Microbiology Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Performed Microbiological analyses on environmental samples, testing for total coliform, fecal coliform fecal strep, standard plate count, psuedomonas and enterococci using Standard Methods and EPA procedures.
3/87 - 3/88	Microbiology Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc.

Performed Microbiological analyses on environmental samples, testing for total coliform, fecal coliform fecal strep, standard plate count, psuedomonas and enterococci using Standard Methods and EPA procedures.

ICMPS

EDUCATION:

1993	East Stroudsburg University East Stroudsburg, PA B.S. Environmental Science
1989	County College of Morris Randolph, NJ Liberal Arts Major

PROFESSIONAL EXPERIENCE:

10/94 - Present	Client Services Representative/Sample Management Technician ICM Laboratories-Division of Industrial Corrosion Management, Inc. Duties included sample receipt, log-in, preparing and proofing chains of custody, and internal sample transfer. Prepared bottle orders and arranged shipment. Acted as liason between customers and laboratory by providing price quotes, status of projects, regulatory requirements, etc.

ICMSJB

EDUCATION:

1990	Completed 40 Hour OSHA Safety Training Course
1963	Morristown High School Morristown, NJ High School Graduate

PROFFESIONAL EXPERIENCE:

1989 - Present	Assistant Sampling Supervisor ICM Laboratories, Division of Industrial Corrosion Management, Inc. Responsibilities include the coordination of sample pick-up and drop-off. Supervises field sampling of monitoring wells, industrial discharges, surface waters, grab samples and potable water samples. Familiar with regulations regarding environmental sampling. Responsible for the Health and Safety training of staff.
1988 - 1989	Sampling Technician Responsible for sampling of water and wastewater samples from various sources for environmental clients.
1985 - 1988	Maintenence Department Support Services Assistant

ICMAC

EDUCATION:

1995	New York University New York, New York Courses toward M.S. degree in Computer Graphic Communication and Technology
1994	Montclair State University Upper Montclair, NJ B.S. Computer Science & Mathematics

PROFESSIONAL EXPERIENCE:

11/95 - Present	Programmer Analyst ICM Laboratories-Division of Industrial Corrosion Management, Inc. Responsible for installing, operation, and maintenance of software and programs generating, updating, and quality controlling analytical databases and automated deliverables. Also responsible for upkeep of terminals and printers throughout the company.
1/95 - 11/95	Administrative Directory, Group Sales Dept. NJ Nets NBA Basketball Team End-user system analyst, database programming & management.
9/93 -1/95	Computer Lab Assistant Montclair State University Assisted with batch compilers, terminal operations and system processes. Installed new network hardware and software.

Section 4

Methodology

Methodology

The following is a listing of the primary approved methods typically used by ICM Laboratories. Please note that an alternate approved method may substituted.

Parameter	Reference Aqueous	Reference Soils/Solids/ Liquid Wastes
Microbiology:		
Total Coliform - Membrane Filter	USEPA Part III Section B	---
Total Coliform - Most Probable Number (MPN)	USEPA Part III Section B	---
Fecal Coliform - Membrane Filter	USEPA Part III Section C.2	---
Fecal Coliform - Most Probable Number (MPN)	USEPA Part III Section C	---
Fecal Streptococci - Membrane Filter	SM17 Method 9230 2C and USEPA Part III Section D	---
Fecal Streptococci - Most Probable Number (MPN)	SM17 Method 9230 2B USEPA Part III Section D	---
General Chemistry:		
Acidity	EPA 305.1	---
Alkalinity	EPA 310.1	---
Ammonia (Distillation)	EPA 350.2	---
Ammonia (Automated)	EPA 350.1	---
BOD 5 Day, 20 Day, and Carbonaceous	SM17 Method 5210 EPA 405.1	---
Bromide	EPA 320.1	---

Parameter	Reference Aqueous	Reference Soils/Solids/ Liquid Wastes
Chloride (Automated)	EPA 325.1 EPA 325.2	---
Total Residual Chlorine	EPA 330.5	---
Chemical Oxygen Demand	EPA 410.1 EPA 410.2 EPA 410.3 Hach Method 8000 SM16 Method 508	---
Hexavalent Chromium	SM14 Method 307B	SW846 Method 3060 & 7196
Specific Conductance	EPA 120.1	SW 846 Method 9050
Color	EPA 110.2	---
Corrosivity	SW 846 Part II Characteristics 7.2	SW 846 Part II Characteristics 7.2
Corrosivity Toward Steel (For Liquid Waste Matrix)	---	SW 846 Method 1110
Total Cyanide	USEPA CLP SOW ILM03.0 SM16 Method 412C Method 335.2 SM17 Method 4500-CN	USEPA CLP SOW ILM03.0 SM16 Method 412C Method 335.2SM17 Method 4500-CN
Total Cyanide (Solid or Oil Matrix)	SW 846 Method 9010A	SW 846 Method 9010A
Total and Amenable Cyanide	SW 846 Method 9010A	SW 846 Method 9010A
Cyanide Amenable to Chlorination	EPA 335.1	---
Dissolved Oxygen	EPA 360.1 EPA 360.2	---

Parameter	Reference Aqueous	Reference Soils/Solids/ Liquid Wastes
Flashpoint/Ignitability	SW 846 Chapter 7 Section 7.1 SW 846 Method 1010 ASTM Method D93-85	SW 846 Chapter 7 Section 7.1 SW 846 Method 1010 ASTM Method D93-85
Fluoride	EPA 340.1 EPA 340.2	---
Total Hardness	EPA 130.2	---
Methylene Blue Active Substances (MBAS)	EPA 425.1 SM17 Method 5540C	---
Nitrate & Nitrite	EPA 353.2	---
Odor	SM16 Method 207	---
Oil & Grease Total Recoverable	EPA 413.1	EPA 413.1
Oil & Grease (For Sludge Matrix)	---	SW 846 Method 9071
Organic Nitrogen	EPA 351.3 EPA 350.1	---
Ortho Phosphate	EPA 365.2	---
Paint Filter Liquids Test	SW 846 Method 9095	SW 846 Method 9095
Petroleum Hydrocarbons Total Recoverable	EPA 418.1	EPA 418.1
pH	EPA 150.1	SW 846 Method 9045
Phenolics Total Recoverable	EPA 420.2 SM17 Method 5530C	EPA 420.2 SM17 Method 5530C
Phenolics	SW 846 Method 9066 and Method 9065	SW 846 Method 9066 and Method 9065
Phosphorus, Total	EPA Method 365.2	---

Parameter	Reference Aqueous	Reference Soils/Solids/ Liquid Wastes
Reactivity : Reactive Cyanide Reactive Sulfide	SW 846 Part II Section 7.3 SW 846 Method 9010 and Method 9030 SM17 4500-CN	SW 846 Part II Section 7.3 SW 846 Method 9010 and Method 9030 SM17 4500-CN
Percent Solids	USEPA ILM03.0	USEPA ILM03.0
Total Dissolved Solids	USEPA SOW Waters/Soils SM14 Method 208B EPA 160.1	---
Total Solids	EPA 160.3	---
Total Solids and Volatile Solids	---	SM17 Method 2540G
Total Suspended Solids	EPA 160.2	---
Sulfate	EPA 375.4	---
Sulfide	EPA 376.1 SM17 Method 4500-S SW 846 9030	SW 846 9030
Sulfite	SM16 Method 428A	---
Temperature	EPA 170.1 SM17 Method 2550	---
Total Kjeldahl Nitrogen	EPA 351.3 EPA 351.2 SM17 Method 4500-N	---
Total Organic Carbon (TOC)	EPA 415.1	EPA 415.1
Total Organic Halogen (TOX)	SW 846 Method 9020	SW 846 Method 9020 ASTM ST976 1988 Dohrmann TOX Manual Appendix A
Turbidity	EPA 180.1	---

Parameter	Reference Aqueous	Reference Soils/Solids/ Liquid Wastes
Elemental Analysis:		
All elements can also be analyzed and reported by USEPA SOW Multi-Media Multi-Concentration Latest Edition		
Aluminum	EPA 200.7	SW 846 Method 6010
Antimony	EPA 200.7	SW 846 Method 6010
Arsenic	EPA 206.2	SW 846 Method 7060
Barium	EPA 200.7	SW 846 Method 6010
Beryllium	EPA 200.7	SW 846 Method 6010
Cadmium	EPA 200.7	SW 846 Method 6010
Calcium	EPA 200.7	SW 846 Method 6010
Chromium	EPA 200.7	SW 846 Method 6010
Cobalt	EPA 200.7	SW 846 Method 6010
Copper	EPA 200.7	SW 846 Method 6010
Iron	EPA 200.7	SW 846 Method 6010
Lead	EPA 239.2	SW 846 Method 6010
Magnesium	EPA 200.7	SW 846 Method 6010
Manganese	EPA 200.7	SW 846 Method 6010
Mercury	EPA 245.1	SW 846 Method 7470

Parameter	Reference Aqueous	Reference Soils/Solids/ Liquid Wastes
Molybdenum	EPA 200.7	SW 846 Method 6010
Nickel	EPA 200.7	SW 846 Method 6010
Potassium	EPA 200.7	SW 846 Method 6010
Selenium	EPA 270.2	SW 846 Method 7740
Silver	EPA 200.7	SW 846 Method 6010
Sodium	EPA 200.7	SW 846 Method 6010
Tin	EPA 200.7	SW 846 Method 6010
Thallium	EPA 279.2	SW 846 Method 7841
Titanium	EPA 200.7	SW 846 Method 6010
Vanadium	EPA 200.7	SW 846 Method 6010
Zinc	EPA 200.7	SW 846 Method 6010
Organic Analysis:		
Gas Chromatographic Methods:		
Trihalomethanes	40 CFR Part 141 Method 501.1	---
Volatile Organic Compounds	Methods for the Determination of Organic Compounds in Finished Drinking Water Method 502.2	---
Purgeable Halocarbons	40 CFR Part 136 Method 601	SW 846 Method 8010

Parameter	Reference Aqueous	Reference Soils/Solids/ Liquid Wastes
Purgeable Aromatics	40 CFR Part 136 Method 602	SW 846 Method 8020
Non-Halogenated Volatile Organics By Direct Aqueous Injection Petroleum Hydrocarbons GCFID Gasoline and Diesel Range	SW 846 Method 8015	SW 846 Method 8015
Organochlorine Pesticides and PCBs	40 CFR Part 136 Method 608	SW 846 Method 8080
Drinking Water Determination of 1,2-Dibromoethane and 1,2-Dibromo-3-chloropropane	Methods for the Determination of Organic Compounds in Finished Drinking Water Method 504	---
Organochlorine Pesticides and PCBs in Drinking Water	Methods for the Determination of Organic Compounds in Finished Drinking Water Method 505	---
Screening for PCBs by Perchlorination	Methods for the Determination of Organic Compounds in Finished Drinking Water Method 508A	---
Chlorinated Herbicides	Methods for the Determination of Organic Compounds in Finished Drinking Water Method 515.1	SW 846 Method 8150
Pesticides/PCBs	USEPA CLP SOW for Organics Multi-Media Multi-Conc. OLM01.0-1.8	USEPA CLP SOW for Organics Multi-Media Multi-Conc. OLM01.0-1.8

Parameter	Reference Aqueous	Reference Soils/Solids/ Liquid Wastes
Gas Chromatography/Mass Spectroscopy:		
Purgeable Volatile Organics	USEPA Environmental Monitoring Systems Laboratory (4/88) Method 524.2	---
Purgeable Volatile Organics	40 CFR Part 136 Method 624	SW 846 Method 8240 and Method 8260
Volatile Organics	USEPA CLP SOW for Organics Multi-Media Multi-Conc. OLM01.0-1.8	USEPA CLP SOW for Organics Multi-Media Multi-Conc. OLM01.0-1.8
Extractable Semivolatile Organic Compounds	40 CFR Part 136 Method 625	SW 846 Method 8270
Extractable Semivolatile Organic Compounds	USEPA CLP SOW for Organics Multi-Media Multi-Conc. OLM01.0-1.8	USEPA CLP SOW for Organics Multi-Media Multi-Conc. OLM01.0-1.8
Toxic Characteristic Leaching Procedure	40 CFR Vol 55 No 126, 6/29/90 Appendix II Method 1311	SW 846 Method 1311

The above reference abbreviations represent the following:

1. USEPA = USEPA-600/8-78-017, Part III Appropriate Section

2. SM# = Standard Methods for the Examination of Water and Wastewater, The # indicates the particular Edition

3. EPA = EPA Methods for Chemical Analysis of Water and Waste, March 1983

4. SW 846 = Test Methods for Evaluating Solid Waste, SW-846, 3rd Edition, 1986

5. USEPA CLP:

   A. USEPA CLP SOW for Inorganic Analysis, Multi- Media Concentration, ILMO3.0 September 1991 or

   B. USEPA CLP SOW for Organic Analysis, Multi-Media concentration, OLMO1.0-1.8 or

   C. USEPA SOW for Water and Soil Characterization in Multi-Media Multi-Concentration Rev. 2.0 November 1990

6. ASTM = American Society for Testing and Materials, 1985

ORGANIC SAMPLE CONTAINER/PRESERVATION/HOLDING TIMES/VOLUME

Parameter	Sample Container	Preservation	Maximum Holding Time	Sample Volume(ml)
VOLATILE ORGANICS:				
Potable Water:				
Trihalo-methanes	G, teflon lined septum	Cool 4 deg C*	14 days	2-40
Halogenated organics	G, teflon lined septum	Cool 4 deg C* 1:1 HCl to pH<2	14 days	2-40
Aromatic Unsaturated Compounds	G, teflon lined septum	Cool 4 deg C** 1:1 HCl to pH<2	14 days	2-40
Organic Compounds	G, teflon lined septum	Cool 4 deg C* 1:1 HCl to pH<2	14 days	4-40
Wastewater:				
Purgeable Halocarbons	G, teflon lined septum	Cool 4 deg C*	14 days	2-40
Purgeable Aromatics	G, teflon lined septum	Cool 4 deg C* 1:1 HCl to pH<2	14 days	2-40
		Cool 4 deg C*	7 days	
Aqueous, Non-Aqueous, and Waste Samples:				
Volatile Organics (Aqueous)	G, teflon lined septum	Cool 4 deg C	14 days	2-40

Acrolein (Aqueous)	G, teflon lined septum	Cool 4 deg C pH adjustment to 4-5 Cool 4 deg C	14 days 3 days	2-40
Acrylonitrile (Aqueous)	G, teflon lined septum	Cool 4 deg C	14 days	2-40
Volatile organics (Soil/Sed. Sludge)	G, teflon liner	Cool 4 deg C	14 days	2-40 or 4 oz amber
Extractable Organics (Aqueous)	G, amber teflon liner	Cool 4 deg C	Extraction 7 days Analysis 40 days from extraction	1000
Extractable Organics (Soil/ Sed./Sludge)	G, wide mouth with teflon liner	Cool 4 deg C	Extraction 14 days Analysis 40 days from extraction	16 oz
Total Petroleum Hydrocarbons (Aqueous)	G, teflon liner	Cool 4 deg C H_2SO_4 to pH<2	7 days	1000
Total Petroleum Hydrocarbons (Soil/Sed. Sludge)	G, amber teflon liner	Cool 4 deg C	7 days (Gasoline/ Kerosine site) 28 days (Other)	4 oz
EPTOX (Organics)	G, teflon liner	Cool 4 deg C	14 days	4 oz

TCLP (Volatile Organics)	G, teflon liner	Cool 4 deg C	Extraction 14 days Analysis 14 days from extraction	4 oz
TCLP (Semi-volatiles, Pest., Herb.)	G, teflon liner	Cool 4 deg C	TCLP Extraction 14 days Prep.Extraction 7 days Analysis 40 days from prep. ext.	4-1000 or 16 oz
TCLP (Metals)	G, teflon liner	Cool 4 deg C	TCLP Extraction 180 days(except Mercury) 28 days (Mercury) Analysis 180 days(except Mercury) 28 days (Mercury)	2-1000 or 16 oz

P = Polethylene

G = Glass

* NA2S2O3 should be used in the presence of residual chlorine.

** Ascorbic Acid should be used in the presence of residual chlorine.

INORGANIC CONTAINER/PRESERVATION/HOLDING TIMES/VOLUME

Parameter	Sample Container	Preservation	Maximum Holding Time	Sample Volume(ml)
Acidity	P	Cool 4 deg C	14 days	200
Alkalinity	P	Cool 4 deg C	14 days	200
Ammonia	P	Cool 4 deg C H_2SO_4 to pH<2	28 days	500
BOD	P	Cool 4 deg C	48 hours	400
Bromide	P	None required	28 days	400
COD	P	Cool 4 deg C H_2SO_4 to pH<2	28 days	50
Chloride	P	None required	28 days	50
Chlorine, Total Residual	P	None required	Analyze immediately	200
Color	P	Cool 4 deg C	48 hours	100
Chromium, hexavalent	P	Cool 4 deg C	24 hours	100
Cyanide	P	Cool 4 deg C NaOH to pH>12 0.6g ascorbic acid*	14 days**	500
Fluoride	P	None required	28 days	300
pH	P	None required	Analyze immediately	50
Langlier	P	Cool 4 deg C	24 hours	500
Mercury	P	HNO_3 to pH<2	28 days	100
Metals, except Chromium, hex. and Mercury	P	HNO_3 to pH<2	6 months	100
Nitrate	P	Cool 4 deg C	48 hours	50

Nitrate/ Nitrite	P	Cool 4 deg C H_2SO_4 to pH<2	28 days	50
Nitrite	P	Cool 4 deg C	48 hours	50
Nitrogen, Total Kjeldahl(TKN)	P	Cool 4 deg C H_2SO_4 to pH<2	28 days	100
Nitrogen, Total Organic	P	Cool 4 deg C H_2SO_4 to pH<2	28 days	600
Oil & Grease	G	Cool 4 deg C H_2SO_4 to pH<2	28 days	1000
Organic Carbon, Total (TOC)	P	Cool 4 deg C H_2SO_4 to pH<2	28 days	50
Organic Halides, Total (TOX)	P	Cool 4 deg C H_2SO_4 to pH<2	7 days	250
Orthophosphate	P	Filter immediately Cool 4 deg C	48 hours	100
Oxygen, dissolved	G(BOD bottle)	None required	Analyze immediately	300
Phenols	G	Cool 4 deg C H_2SO_4 to pH<2	28 days	500
Phosphorus, Total	P	Cool 4 deg C H_2SO_4 to pH<2	28 days	100
Reactivity to Cyanide	P	Cool 4 deg C	14 days	50
Reactivity to Sulfide	P	Cool 4 deg C	7 days	50
Solids, Total	P	Cool 4 deg C	7 days	100
Solids, Total Suspended	P	Cool 4 deg C	7 days	250
Solids, Total Dissolved	P	Cool 4 deg C	7 days	250
Solids, Total Volatile	P	Cool 4 deg C	7 days	100

Solids, Settleable	P	Cool 4 deg C	48 hours	250
Specific Conductance	P	Cool 4 deg C	28 days	100
Sulfate	P	Cool 4 deg C	28 days	50
Sulfide	P	Cool 4 deg C add zinc acetate + NaOH to pH>9	7 days	1000
Sulfite	P	None required	Analyze immediately	100
Surfactants	P	Cool 4 deg C	48 hours	100
Turbidity	P	Cool 4 deg C	48 hours	50

G = Glass

P = Polyethylene

*Should only be used in the presence of residual chlorine.

** Maximum holding time is 24 hours when sulfide is present. Optionally all samples may be tested with lead acetate paper before pH adjustments in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.

Microbiological Analyses

Coliform, Total	Sterile P	Cool 4 deg C NA2S2O3 if Res. Chlorine	30 hours- Drinking Water 6 hours- all other sources	100
Coliform, Fecal	Sterile P	Cool 4 deg C NA2S2O3 if Res. Chlorine	6 hours	100
Fecal Streptococci	Sterile P	Cool 4 deg C NA2S2O3 if Res. Chlorine	6 hours	100
Standard Plate Count	Sterile P	Cool 4 deg C NA2S2O3 if Res. chlorine	6 hours	100
Pseudomonas Aeruginosa	Sterile P	Cool 4 deg C NA2S2O3 if Res. chlorine	6 hours	100

* "Microbiological Methods for Monitoring the Environment, Water and Waste, 1978", EPA-600/8-78-017, U.S. Environmental Protection Agency.

** Membrane filter technique and/or Most Probable Number method.

Section 5

Quality Assurance

Quality Assurance Policy and Objectives:

It is the policy of ICM's Management that Quality Assurance is an integral part of all employees' job responsibilities. All employees are expected to follow exactly the quality assurance and quality control procedures set up for their particular position. No changes to these procedures can be made unless they have been authorized by the QA Manager, the company President, and the laboratory Technical Director.

The objective of ICM's Quality Assurance Program is to produce accurate, reproducible, and supportable data to be used for regulatory as well as informational purposes. The various aspects of the program (as outlined in this section) have been implemented to ensure that the data produced is of the highest possible quality.

Quality Assurance Management:

QA Department Organization:

The quality assurance program is directly administered by a Quality Assurance Officer/Manager with assistance from 5 Quality Control Coordinators. They are responsible for data review and to ensure proper QA/QC implementation.

QA/QC Responsibilities and Reporting Relationships:

The QA Officer reports directly to the company president. She is responsible for communication of all QA policies and procedures to the laboratory department managers. The department managers in turn are directly responsible for the Quality Assurance/Quality Control in their respective departments.

QA Document Control Procedures:

All applicable QA/QC documentation is tracked by the Document Control Officer. For a full explanation of these procedures, refer to the section titled Document Control Procedures.

Quality Assurance Program Assessment:

The effectiveness of ICM's Quality Assurance program is evaluated in a variety of ways. ICM's system of internal and external audits provides direct feedback on the program. External audits performed by NJDEPE, EPA, PADER, NYSDOH or individual clients evaluate all aspects of the analytical process from sample log-in and storage, through analysis and method QC, to final data review and report production. Internal audits are periodically conducted by the QA department and the Technical Director. These audits are used to detect and correct any specific problems.

Another system which provides feedback on the QA/QC program is the analysis of blind Performance Evaluation Quality Control Samples. ICM participates in External Performance Evaluation Studies for NJDEPE Drinking Water, Wastewater, and A280s; EPA DMRs and NYSDOH Potable, Non Potable and Solid/Hazardous Categories. On a more frequent basis the QA department administers a program of internal blind QA sample analysis. The results of the analysis of these blind samples helps to evaluate the QA program, the method QC, instrumentation, and the technique of individual analysts.

Finally the QA program is evaluated by the data review process (See Technical and Managerial Review: Data Validation and Data Package Preparation Section). Every data package is thoroughly reviewed prior to submission to the client. The final overall Data package review can detect QA problems from any prior point in the analytical process.

Feedback on QA problems is accomplished using a system of speed memos. As a QA problem is detected the appropriate department manager (and if necessary the technical director) is contacted and a course of corrective action is agreed upon. A speed memo detailing the problem and the proposed corrective action is issued to all affected individuals. The department manager is responsible for implementation of the corrective action and for providing feedback to the QA Manager.

These processes are used to determine if modification of the QA program or structure is needed. Proposed changes are discussed among the company President, the Technical Director, and QA Manager before implementation.

Performance Evaluation Quality Control Samples

Internal:

The Quality Assurance Manager is responsible for administering an In-House blind check sample program. Quality control samples are obtained from the EPA and from a private supplier. Results of these samples are filed with the Quality Assurance Manager. The knowns are then introduced into the system as a typical sample and analyzed as such. The final results are reported to the Quality Assurance Manager and evaluated. This process allows for close monitoring of the accuracy of laboratory analyses on blind samples. If a problem is discovered, the Quality Assurance Manager brings it to the attention of the Company President and Department Manager. With the assistance of the Technical Director, the cause of the problem is determined and appropriate corrective action is taken. Another blind sample is sent through the laboratory to confirm the problem has been resolved.

External:

ICM also participates in the following Performance Evaluation Studies: NJDEPE Drinking Water, NJDEPE Wastewater, NJDEPE A280, EPA DMRs, NYSDOH Potable Water, NYSDOH Non Potable Water and NYSDOH Solid/Hazardous Waste.

Laboratory Audits

Internal:

Periodically the Quality Assurance Manager, along with the Technical Director, conducts internal audits to evaluate the performance of the various departments. The audit involves a thorough laboratory inspection to evaluate the following areas:

* Adherence to all laboratory procedures as specified in applicable New Jersey, Pennsylvania and New York regulations, EPA Contract Laboratory Program protocol, NJDEPE Professional Laboratory Analytical Services requirements and NYSDEC Analytical Services Protocol.
* Verification of methodology
* Adherence to all method QC requirements
* Frequency of dups, spikes, blanks, and QC sample analyses
* Maintenance of documentation in adherence with good laboratory practices
* Verification that laboratory equipment, supplies, and reagents are properly maintained

The findings of the audit are documented and a copy given to the Company President and the Department Manager. Any problems and their prospective resolutions are discussed among the QA Manager, Technical Director, and Department Manager. After an agreed upon time period, it is the responsibility of the QA Manager to ensure that the required corrective action has been implemented. All audit documentation are kept on files by the QA Officer.

External:

Laboratory audits are also conducted by the NJDEPE for both drinking and wastewater certification requirements, Pennsylvania DER for their lab certification program, EPA for discharge permit holders and NYSDOH for Potable, Non Potable and Solid/Hazardous Waste certification.

Quality Control Checks

In order to determine accuracy and precision of laboratory analyses, a system of blank, duplicate, spike, and quality control testing has been established. For every 20 samples or batch of samples (whichever is fewer), one blank, duplicate sample, spiked sample, and external QC sample is analyzed.

The blank must meet QC criteria - no analyte can be detected above the minimum detection limit (except for certain organic analysis which have specific blank requirements). The relative percent difference between duplicates and spike sample recoveries are calculated as follows:

$$RPD = \frac{|\text{Value A} - \text{Value B}|}{\text{Avg. of Value A \& B}} \times 100$$

$$\% \text{ Recovery} = \frac{\text{Spiked sample result} - \text{sample result}}{\text{Amount spike added}} \times 100$$

Monitoring QC Limits

QC data is monitored via Shewhart Quality Control Charts and utilized to identify data trends which may indicate analytical problems.

* Precision:
  The relative percent difference between duplicates (R) and the Shewhart factors are utilized to calculate control limits as follows:
  UCLR (Upper Control Limit) = 3.27 R
  UWLR (Upper Warning Limit*)= 2.51 R
  *UWL corresponds to 95% confidence level.

* Accuracy:
  The average of the recoveries (P) for spikes samples are calculated as well as the standard deviation (Sp). Control limits are then defined as follows:
  UCL (Upper Control Limit) = P + 3Sp
  LCL (Lower Control Limit) = P - 3Sp
  Notes:
  1. Although this approach is resistant to variability in true concentrations, somewhat higher Sp values are observed when low level spikes are employed, such as the 5 ug/l spikes recommended by the NJDEP for GC methods for volatile organics in potable water.
  2. Control limits are calculated as P +/- 2 Sp for certain organic parameters when so directed in Federal Register methods.

The control limits are drawn on the Shewhart graph and the RPDs, the spike recoveries, or the QC recoveries are plotted. In applying the control chart, any points beyond the control limits indicate an out-of-control situation. When an out-of-control situation occurs, analyses must be stopped until the problem has been identified and resolved. These charts are also utilized to identify trends which can be checked and resolved before the system goes out of control.

In addition to the Shewhart limits the laboratory uses contract established limits for CLP Organics.

QA/QC Responsibility

If a particular analysis is not meeting established quality control limits, it is first the responsibility of the analyst to try to determine the cause of the problem and take any necessary corrective action (e.g. preparing new reagents or standards, recalibrating the instrument, etc.). If the analysis still does not meet QC limits and the problem is beyond their expertise, the analyst is to notify their supervisor. It is now the responsibility of the supervisor to investigate the problem. If necessary, the supervisor shall call on the department manager or the technical director for assistance.

QA Corrective Action, Reporting Procedures, & Responsibility Designation

It is the responsibility of the Quality Assurance Manager to facilitate communication of all quality assurance related issues. She reports directly to the company president and updates him on the status of laboratory QA practices as well as relating any QA problems which may exist. The QA Manager provides feedback to department managers on the status of general lab practices. This includes notifying the department managers of the results of external and internal PE analyses, external and internal audits, and comments or problems found through the data review process.

The QA Manager discusses any QA problems found with the appropriate department manager (and if necessary, the technical director) and a course of corrective action is determined. A speed memo is issued to all affected individuals detailing the problem and the proposed corrective action. A copy of the speed memo is retained by the QA manager. The department manager provides feedback to the QA manager on the effectiveness of the corrective action.

PROBLEM RESOLUTION, FEEDBACK and CORRECTIVE ACTION

If any problems with analysis or QC procedures are detected during the data review process, the following procedures are implemented:

The departmental supervisor is contacted and the problem is discussed. It is the supervisor's responsibility to implement a corrective action. This includes notification of the problem to the analyst, as well as the corrective action taken.

Any discrepancies that cannot be resolved are discussed with the technical director, QA manager, and departmental supervisor until a resolution can be agreed upon.

SPECIFIC QA/QC REQUIREMENTS

The analyst is responsible for ensuring all work performed meets the QA/QC requirements specified in the NJDEPE contract, NYSDEC Protocol and the applicable method. The QA/QC requirements include, but are not limited to the following. For a more detailed description see the individual methods.

NJDEPE Task II, III; NYSDEC ASP Category A and B and commercial work:

GC/MS(624, 625)

-The GC/MS system is tuned once every 12 hours. The tune must meet criteria before blanks, standards and samples can be run. Any sample injected after the 12 hour period must be reanalyzed.
-For GC/MS analyses the system is calibrated using an internal standard technique and a 12 hour sequence. The instrument is initially calibrated at 5 concentration levels. The calibration is evaluated using a system of calibration check compounds (CCCs) and system performance check compounds (SPCCs). The percent relative standard deviation for the CCCs must be less than 30% for the initial 5 point calibration to be valid. The SPCCs must have a response factor of at least 0.300 (0.250 for Bromoform) for Volatiles and 0.050 for Semivolatiles for the initial calibration.
-A continuing calibration is performed every 12 hours, immediately after the tune. The percent difference of the CCCs must be less than 25% for the continuing calibration. If any of the CCCs exceed this limit then a new initial calibration must be performed. The SPCCs must have a response factor of at least 0.300 (0.250 for Bromoform) for volatiles and 0.050 for Semivolatiles on the continuing calibration.
-Surrogates are added to each blank, sample, spike and standard. Surrogate recoveries must fall within the specified control limits. If surrogates fall outside the control limits they are reanalyzed. If any one blank surrogate is outside the control limits, the laboratory will take corrective action and reanalyze all associated samples.
-Spike and spike duplicates are run with every batch or every group of 20 samples.
-For TCLP analysis, a MS/MSD is analyzed at a frequency of one sample in twenty. Spiking solution contains all TCLP volatile and/or semivolatile analytes. The spiking solution is added to the TCLP extract at method specified levels.
-For Task II- no analytes can be detected above the MDL for the blank. If the blank exceeds this criteria the system and all associated samples are considered "out of control", and will be reanalyzed. For Task III-no analytes can be detected above the MDL for the blank(except for certain organic analytes which have specific blank requirements).
-Detection limits should achieve the contract or method specific MDL's.

GC/MS(524.2, 525.1)

-The GC/MS system is tuned once every 8 hours. The tune must meet criteria before blanks, standards and samples can be run. Any sample injected after the 8 hour period must be reanalyzed.
-For GC/MS analyses the system is calibrated using an internal standard technique and an 8 hour sequence. The instrument is initially calibrated at 5 concentration levels. For Method 524.2 each analyte and surrogate the RSD must be less than 20% for the initial 5 point calibration to be valid. For Method 525.1 each analyte and surrogate, the RSD must be less than 30% of the initial 5 point calibration to be valid. As an alternative to the RSD meeting the 20%/30% criteria, ICM can generate a second or third order regression calibration curve for quantitation purposes.
-A continuing calibration is performed every 8 hours, immediately after the tune. For Method 524.2 and 525.1, the RF for each analyte and surrogate must be within 30% of the mean value measured in the initial calibration. Alternatively, if a second or third order regression is used, the point from the continuing calibration check for each analyte and surrogate must fall, within the analyst's judgement, on the curve from the initial calibration.
-Surrogates are added to each blank, sample, spike and standard. Surrogate recoveries must fall within the specified control limits. If surrogate fall outside the control limits they are reanalyzed.
-Laboratory fortified blanks are run with every batch or every group of 20 samples.
-For Method 525.1, a laboratory fortified sample matrix is run with every batch or every group of 20 samples.
-A field reagent blank(if supplied by the client) is analyzed with every set of field samples.
-At least quarterly, replicates of laboratory fortified blanks and a quality control sample are analyzed.
-No analytes can be detected above the MDL for the blank.
-Detection limits should achieve the contract or method specific MDL's.

GC-

-For GC analyses the system is calibrated using an external standard technique. The instrument is initially calibrated at five concentration levels. If the relative standard deviation(RSD) of the response factor for any analyte is constant over the calibration range, an average rf may be used for calculation purposes. Otherwise, calculations must be made from the curve. The low point standard is generally 2 times the MDL.
-A continuing calibration is performed daily(every 24 hours). If the response for any parameter varies more than the method allows, the test must be repeated using a fresh calibration standard. If criteria cannot be met a new calibration curve must be generated.

-For PCB only analysis the initial calibration consists of a three to five point curve of Aroclor 1016 and 1260. After the initial calibration a mid-level standard is run for all Aroclors. Every 24 hours and at the end of a sequence a mid-level standard of Aroclor 1016 and 1260 is analyzed. If an Aroclor other than Aroclor 1016 or 1260 is identified, an initial three to five point calibration for the identified Aroclor must be analyzed for confirmation and quantitation.
-The stability of the GC system is monitored by recording the retention times of the surrogate(s). Retention time shift limits vary with surrogate identity and column type.
-QC(or second source) standards are analyzed at a concentration and frequency as specified in the individual method, as are the recovery criteria.
-Surrogates are added to each blank, sample, spike and standard. Surrogate recoveries must fall within the specified control limits.
-For Method 608, spikes and spike duplicates are run at a frequency required by the method. Recovery limits are method specific.
-For NJDEPE Analytical Contract work(Methods 505, 508, 608 and 8080), when pesticides/Aroclors are being analyzed a Aroclor spike(Aroclor 1016 and 1260) is analyzed in addition to the pesticide spike. If samples are only being analyzed for Aroclors, then only an Aroclor spike is required.
-For Methods 505 and 508, Laboratory fortified blanks, laboratory fortified sample matrix and quality control samples are run at concentrations and frequencies specified in the individual methods. Recovery criteria are also method specific.
-For TCLP analysis, a MS/MSD is analyzed at a frequency of one sample in twenty. Spiking solution contains all pesticide compounds except for toxaphene. The spiking solution is added to the TCLP extract, at method specific levels.
-No analytes can be detected above the MDL for the blank. If the blank exceeds the MDL the system is considered "out of control" and the blank and associated samples are reanalyzed.
-Any analytes tentatively identified on a primary GC column must be confirmed by a second analytical technique, dissimilar column or GC/MS.

Metals-

-Atomic Absorption and ICP instruments are calibrated for each analytical run. For graphite furnace and flame atomic absorption, a blank and five calibration standards are run. The ICP is calibrated using a blank and a mixed calibration standard. The agreement between the true value and actual value must be +/-10%.
-Initial Calibration Verification(ICV) is analyzed after the instrument calibration. It must agree +/-10% between the true value and the actual.
-Continuing Calibration Verification(CCV) are run every 10 samples. CCV must be +/-10% of the true value.
-Interference Check Solutions(for ICP only) is run to access the interelement interferences.
-Laboratory Control Sample is analyzed for each analyte and must agree within +/- 25% of the true value. For the NJDEPE Analytical Services Contract, each analyte must agree within +/- 15% of the true value.

-Spike analysis:
a) is done at a frequency of at least 10%. Spike recovery must be within +/-25%(75 - 125%).
b) if the spike recovery is less 40% the sample is diluted and analyzed with another spike.
c) if the sample concentration is less than the MDL, the sample is reported as less than the MDL and not diluted and respiked.
d) if the sample concentration is greater than the linear range the sample is diluted and reanalyzed.
e) For the NJDEPE Analytical Contract, if the spike recovery is less than 40% and if the sample concentration is greater than the MDL, the sample is diluted by a factor of 2 and reanalyzed. If after 2 dilutions the spike recovery is still less than 40%, the data is noted as having an interference problems.
f) if the spike recovery is greater than or equal to 40% and the sample absorbance or concentration is less than or equal to 50% of the spike sample, the sample will be reported as less than the MDL.
g) if sample concentration is less than or equal to 50% of the spike and the spike recovery is between 85-115%, the sample is quantitated directly from the calibration curve.
h) For the NJDEPE Analytical Contract, if the sample concentration is greater than of equal to 50% of the spike and the spike recovery is less than 85% or greater than 115%, the sample must be quantitated by the Method of Standard Addition.
-For TCLP analyses a matrix spike and duplicate is analyzed. TCLP extracts must be analyzed by the Method of Standard Addition, unless a matrix spike is within SW846 acceptable QC limits.
-Duplicate analysis must be within QC limits of +/- 20% or +/- MDL.
-Blanks(preparative, ICB and CCB) are analyzed after the ICV and CCV and must not contain any results greater than the absolute value of the MDL.
-For furnace analyses duplicate injections are required. If duplicate injection readings, for results above the MDL, do not agree within +/- 20% RSD, the sample must be re-analyzed. If the RSD is greater than 20% the individual injection concentration difference between must be less than the MDL.

General Analytical-

-For spectrophotometric tests, standard curves are run at least every 3 months. These curves are checked daily by analyzing a high and a low standard. Acceptance limits are +/- 10% for low range standards and +/- 5% for high range standards.
-For automated analysis, calibrations are made daily using at least five standards and a blank.
-When using titrations to determine concentrations, all titrants are standardized daily.
-The infrared spectrophotometer is calibrated every three months, and checked daily with a mid range standard. The midrange must be within 10% of the true value.
-Blank values must be less than or equal to the MDL.
-Duplicate samples must be run once every 20 samples and be within the QC limits.

-Spike samples must be run once every 20 samples and be within the QC limits of 75-125%.
-External control sample must be run once every 20 samples and be within the 95% C.I.
-For NJDEPE Analytical Contract:
Reactivity-All method performance and QC criteria for the method is followed. Spike recoveries must meet a minimum of 50% recovery limit.
Corrosivity-All method performance and QC criteria for the method is followed. Duplicate samples are analyzed for each analytical batch.
Ignitability-All method performance and QC criteria for the method is followed.

NJDEPE Task IV/CLP:

For Task IV analysis the most current QA/QC requirements and limits specified in the USEPA CLP SOW are adhered to.

GC/MS-
-The GC/MS system is tuned once every 12 hours. The tune must meet criteria before blanks, standards and samples can be run. Any sample injected after the 12 hour period must be reanalyzed.
-For GC/MS analyses the system is calibrated using an internal standard technique and a 12 hour sequence. The instrument is initially calibrated at 5 concentration levels. The calibration must meet the minimum RRF and %RSD criteria.
-A continuing calibration is performed every 12 hours. The percent difference between the initial and continuing curves must be <25%, and also meet the RRF and %RSD criteria.
-Internal standard areas and retention times must be monitored and meet all criteria.
-Spike/spike duplicate are run with every batch or every group of 20 samples.
-Surrogates are added to each blank, sample, spike and standard. Surrogate recoveries must fall within the specified control limits.
-Method blanks, for the NJDEPE contract, for GC/MS volatile analysis must contain less than or equal to three times the Contract Required Quantitation Limit(CRQL) for methylene chloride, acetone and 2-butanone. For semi-volatiles analysis the blank must contain less than three times the CRQL for phthalate esters. For routine, non-contract samples the method blank for volatile and semi-volatile analysis must contain less than of equal to five times the CRQL for the above compounds. For all other compounds, the method blank must contain less than or equal to the CRQL of any TCL analyte. If the method blank exceeds any of these criteria, the contractor must consider the system out of control. Corrective action is taken, and all samples associated with the blank are re-extracted, repurged and/or reanalyzed. Aqueous method blanks are utilized for all matrices.
-Detection limits are the CRQLs as specified by the most recent SOW.

GC-

-Initial calibration sequence consists of 17 standards, a combination of Resolution Checks, Performance Evaluation Mixtures(PEM), Aroclor standards, low, mid and high pesticide standards and blanks, which must meet acceptance criteria before samples can be run.
-Breakdown of DDT and Endrin in the Performance Evaluation Mixtures must be less than 20.0 percent for each compound or 30.0 percent for the combined breakdown.
-Peak resolution must meet QC criteria.
-Continuing calibration, consisting of blanks, PEM and a mid point standard of Mixture A or B, must be run every 12 hours.
-Absolute retention of single and multicomponent analytes and surrogates must be monitored and meet QC criteria.
-Surrogates are calculated for both columns, but QC criteria is only advisory criteria.
-Spike and spike duplicate must be extracted and analyzed with every 20 samples of each matrix. QC criteria is only advisory.
-Method blanks may not contain any targeted compound greater than the CRQL.
-Instrument blanks are analyzed every 12 hours and may not contain any targeted compounds greater than 0.5 times the CRQL.
-Florisil Cartridge Cleanup and Sulfur Removal: Cartridge Performance Check must meet QC criteria: pesticides 80-120% recovery, trichlorophenol in less than 5% and there must be no peaks interfering with the target analytes. All samples, blanks and spikes must be cleaned with florisil cartridges. Samples that require sulfur cleanup must have the method blank cleaned up as well.
-GPC Cleanup: The system is calibrated once every seven days. Calibration is checked daily or before each run and the UV tracing compared to the last calibration tracing. All peaks must be symmetrical. All peaks must exhibit proper resolution, as per QC criteria. For each sample the flow rate, volume of eluate, laboratory room temperature and column pressure must be monitored and meet QC criteria. Blanks can contain no analyte detected at a concentration greater than half the CRQL.

Metals-

-Instrument Calibration is performed prior to each analytical run, at least once per eight hour period.
-Initial Calibration Verification(ICV) is analyzed after instrument calibration. Must agree +/- 10% between the true value and the actual value.
-Initial Calibration Blank(ICB) and Continuing Calibration Blanks(CCB) must not exceed the absolute value of the CRDL.
-Continuing Calibration Verification(CCV) are run every 10 samples. Must agree +/- 10% between the true and actual values.
-Interference Check Samples(ICS) are run for ICP analysis only. They are run to verify interelement and background corrections factors. It is run at least twice per eight hour working shift and must be within the QC criteria of +/-20% of the true value.

-If the absolute value of the concentration of the preparation blank is less than or equal to the CRDL then no correction is made to sample results. If any analyte concentration in the blank is greater than the CRDL the lowest concentration of that analyte in the associated samples must be ten times the blank correction. If this criteria is not met, all samples associated with the blank whose analyte concentration is less than ten times the blank concentration and above the CRDL, must be redigested and reanalyzed.
-Laboratory Control sample is prepared for every batch. It must agree within +/-20% of the true value.
-ICP Serial Dilution is performed on a sample from every group of samples of a similar matrix. It must agree within +/-10% of the original analysis.
-Spike sample analysis is performed on one sample from each group of samples of similar matrix. QC criteria is 75-125%.
-Duplicate sample analysis is performed on sample from each group of samples of a similar matrix. It must meet QC criteria of +/-20%, if the results are equal or greater than 5 times the CRDL or +/- the CRDL if the results are less than five times the CRDL.
-CRI(for ICP analysis) is run at a minimum of twice per eight hour working shift, to verify linearity near the CRDL.
-CRA(for AA analysis) is analyzed only at the beginning of the run to verify linearity near the CRDL.
-Linear Range Analysis(LRA) is for ICP analysis only. Analysis is done quarterly for each element. It must be within 5% of the true value.
-Instrument Detection Limit(IDL) is determined quarterly. IDLs must fall below the CRDLs.
-Furnace analysis requires:
  -All results to fall within the calibration range and to have duplicate injections.
  -When concentrations exceed the CRDL the duplicate injection must meet within 20% RSD or the sample is rerun for a total of 2 injections. If the data still does not meet 20% criteria the data is flagged.
  -The analytical spike is run immediately after the sample and the recovery directly determines how the data should be flagged.
  -Method of standard addition(MSA) must be used if the sample concentration is greater than or equal to 50% of the spike and the spike recovery is less than 85% or greater than 115%.

General Analytical(Cyanide analysis)-

-Instrument calibration is done daily with 1 blank, and three levels of standards,which includes one standard at the CRDL.
-Initial Calibration Verification(ICV) sample is distilled. It is analyzed after the instrument calibration and must be with QC limits of 85-115%.
-Continuing Calibration Verification(CCV) is analyzed every 10 samples or two hours. It must meet QC limits of 85-115%.
-Initial Calibration Blank(ICB) and Continuing Calibration Blank(CCB) values can not exceed the CRDL.

-If the absolute value of the concentration of the preparation blank is less than or equal to the CRDL then no correction is made to sample results. If any analyte concentration in the blank is greater than the CRDL the lowest concentration of that analyte in the associated samples must be 10 times the blank correction. If this criteria is not met, all samples associated with the blank and analyte's concentration is less than 10 times the blank concentration and above the CRDL, must be redigested and reanalyzed.
-Spike sample analysis consisting of one spiked sample is performed on each group of samples of a similar matrix. QC criteria is 75-125%.
-Duplicate sample analysis consisting of one duplicate sample is analyzed for each group of samples of a similar matrix. It must meet QC criteria of +/-20%, if the results are equal of greater than 5 times the CRDL or +/- the CRDL if the results are less than 5 times the CRDL.
-Laboratory Control Sample is performed on soil Cyanide samples only. One laboratory control sample per batch is performed. It must meet control limits of 80-120%.

Data Validation and Review

The Quality Assurance Officer(QAO) oversees the data validation and review process. This process is accomplished through various QA/QC systems which are specified in the QA inspection/correction action section of the SOP. These systems include, but are not limited to: audits, reference material analyses, quality control checks and performance evaluations. The data generated goes through a series of checks for various QA/QC problems and nonconformances. The checks are performed by the analyst, the department supervisor/manager, the QC department and a technical proofer. The system is designed to detect any reporting or calculation errors so they can be addressed prior to data submission.

Data Review Procedure

The following is ICM's standard procedure for analytical data review of NJDEPE Task II, III, IV; NY work and commercial work.

Analyst:

- The analyst is responsible for ensuring that all work performed the specifications and criteria outlined in the method and contract. They are to double check all aspects of their analyses, including instrumental conditions, QA/QC limits, calculations, and compound identification (for Organic analyses).

Department Supervisor/Manager:

- The second data review is performed by the department managers. The manager checks the standards, dilutions, calculations, minimum detection limits, significant figures and QC procedures. They also check the relationship between parameters of a particular sample and between the samples in a specific project.

Data Assembly and Overall Review:

- The third data review is performed by the Quality Control Coordinator. The coordinator reviews the data initially for minimum detection limits, reporting units, holding times and quality assurance data. He/she also assembles the data package and ensures that all required analysis have been performed and property reported and that all required data deliverables, such as the laboratory chronicles, methodologies, nonconformance summary, etc.... are completed and included in the report package.

Final Overall Review

- The fourth data review is performed by a different Quality Control Coordinatator. Their responsibility is to double check the project for completion and to ensure all required deliverables and quality control data is included in the report package. Special emphasis is placed on checking the data deliverables completed by the previous coordinator to ensure they are complete and accurate.

Technical Proofreader(Task II and III):

- The fifth data review is performed following the typing of the project. This review entails not only checking the accuracy of the statistical typing, but also checking that the proper reporting format has been utilized.

Company President:

- The company president's signature on the project verifies that the project is complete and all of the above criteria has been satisfied.

Dept. Mgr._____
QA Mgr. _____

EXTERNAL CHAIN OF CUSTODY PROCEDURES:

A. External chain of custody forms must be used with all samples. For commercial samples, ICM chain of custody is used, (Exhibits B and C). For NJDEPE contract samples, DEPE forms 095 or 096 are used. In addition, other client and state chain of custodies may be used(ie-NY, PA).

B. A sample or sample container is considered to be in custody under the following conditions: 1) It is in the persons' actual possession, 2) It is in the person's view after being in their physical possession, or 3) It was in their possession and then locked in a refrigerator or sealed in a cooler.

C. When sample container coolers are relinquished to field personnel, the person who breaks the sample cooler seal must sign the field chain of custody and Sampling Equipment Custody Record in receipt of the sample containers. Sample containers should be examined by field personnel for breakage or improper preservation. If any breakage or shipping error has occurred, this should be noted on the field chain of custody. The laboratory should be contacted immediately for replacement containers via alternate shuttle.

D. Field Chain of Custody is retained in the field by sampling personnel. This document should stay with the sample coolers at all times.

E. When ICM employees receive samples from sampling personnel in the field, sample receipt procedures should be followed. If samples are received directly from field sampler, coolers will be sealed for transport after receipt by driver. If samples are relinquished to anyone other than field sampler, seals should be used in the interim. ICM drivers will obtain signatures of person who held sealed coolers and then transport coolers to laboratory where seals will be broken by Sample Management Technicians. Whenever custody seals are used, custody seal numbers should be recorded on the Sample Equipment Custody Record.

F. All paperwork, including field chain of custody forms should be checked for completeness and accuracy in the field. If any omissions or errors are noted, field sampling personnel should be questioned at that time. If questions arise that field sampling personnel are unable to answer, samplers should provide name and phone number of the Project Manager.

G. Upon receipt of sample coolers at the laboratory, whether by ICM courier or overnight carrier, coolers are examined for damage or broken custody seals. Condition of sample coolers and seals should be noted on the field chain of custody. If seals and cooler are intact, sample receipt procedures may begin. If seals are not intact or cooler is damaged such that sample integrity is threatened, client must be contacted by sample management or customer service personnel immediately.

H. The Sample Custody Officer is responsible for overseeing the proper external chain of custody procedures are followed.

ICM LABORATORIES — CHAIN OF CUSTODY REPORT

CLIENT:

ADDRESS:

PHONE :

PROJECT:

PROJ. MGR. :

BILL TO:

SEND REPORT TO:

IN CASE OF QUESTIONS UPON SAMPLE RECEIPT CALL:

PHONE:

DELIVERABLES:

- ☐ REDUCED DELIVERABLES NON-CLP FORMAT
- ☐ REDUCED DEL. CLP FORMAT
- ☐ REGULATORY FORMAT
- ☐ FULL DEL. CLP FORMAT
- ☐ NPDES
- ☐ STATE FORMS REQUIRED

TURNAROUND TIME

FAX (PRELIMINARIES) (If required)

HARDCOPY

COOLER TEMP

LABORATORY ID CODE	SAMPLE IDENTIFICATION	SAMPLE DATE	SAMPLE TIME	COMPOSITE	SAMPLE MATRIX: GRAB	SOIL	LIQUID	SLUDGE	OTHER	# OF BOTTLES	ANALYSIS	PRESERVATIVES: H_2SO_4	HNO_3	HCL	NAOH	OTHER

SAMPLED BY: DATE: TIME:

RELINQUISHED BY: DATE: TIME:

RECEIVED BY: DATE: TIME:

RELINQUISHED BY: DATE: TIME:

RECEIVED BY: DATE: TIME:

RELINQUISHED BY: DATE:

COMMENTS:

COMPOUND LIST

- [ ] PRIORITY POLLUTANT
- [ ] TARGET COMPOUND LIST
- [ ] NJAC 7:14A APP B

CONCENTRATIONS EXPECTED

- ☐ HIGH
- ☐ MEDIUM
- ☐ LOW

IS SAMPLE CHLORINATED?

☐ YES ☐ NO

110

ICM LABORATORIES — CHAIN OF CUSTODY RECORD

CLIENT: _____

MAILING ADDRESS: _____

_____

PHONE: _____

ADDRESS FROM WHICH SAMPLES WERE TAKEN:

_____

_____

ANALYSIS REQUIRED FOR: (Please Check One)

- ☐ INFORMATION ONLY
- ☐ MORTGAGE COMPANY COMPLIANCE
- ☐ HEALTH DEPT COMPLIANCE
- ☐ NJDEPE COMPLIANCE
- ☐ STATE FORMS REQUIRED

PWSID # _____

SAMPLING PERIOD

- ☐ MONTHLY
- ☐ QUARTERLY
- ☐ ANNUALLY
- ☐ OTHER _____

COPY OF RESULTS TO:

_____

_____

#SAMPLES/PERIOD _____

(Check box if applies)

SAMPLE CONTAINERS OBTAINED FROM ICM ____ YES ____ NO

SAMPLES COLLECTED BY ICM ____ YES ____ NO

IS SAMPLE CHLORINATED ____ YES ____ NO

☐ IS SAMPLE A LEAD & COPPER SAMPLE(SEE BELOW)

SAMPLERS NAME: _____

SAMPLING & ANALYSIS REQUESTED BY: _____

FOR TOTAL COLIFORM SAMPLES:

- ☐ IS THIS A REPEAT SAMPLE
- ☐ IS THIS A ROUTINE SAMPLE
- ☐ IS THIS A CHECK SAMPLE

FOR 502.2 SAMPLES: _____

IS SAMPLE:

- ☐ RAW ☐ TREATED
- ☐ CHECK SAMPLE

LABORATORY IDENTIFICATION	SAMPLE IDENTIFICATION	SAMPLE DATE	SAMPLE TIME	# OF BOTTLES	ANALYSES (TIC IN OTHER ANALYSES) T/C	POTABLE PACKAGE	VOLATILE SCREEN						COMMENTS:

SAMPLES DELIVERED TO ICM BY: _____

DATE: _____

TIME: _____

SAMPLES RECEIVED BY ICM: _____

DATE: _____

TIME: _____

PAID: ☐ CASH ☐ CHECK

LEAD & COPPER SAMPLES: (Please complete following information)

NUMBER OF DISTRIBUTION TAP SAMPLES REQUIRED _____

PLEASE CHECK APPROPRIATE BOX:

LOC TYPE	DESCRIPTION	TIER	LOC TYPE	DESCRIPTION	TIER
☐ A	Lead Service Lines	1	☐ D	Building & Multifamily Residences Containg Lead Pipes or Service Lines	2
☐ B	Single Family Structures with Copper Pipe & Lead Solder Installed after 1982	1	☐ E	Single Family Structures that contain Copper Pipe with Lead Solder Installed before 1983	3
☐ C	Building & Multifamily Residences with Copper Pipes & Lead Solder installed after 1982	2	☐ F	Other	3

LABORATORY WATER

The source of ICM's deionized water is a Polymetric System which consists of a single activated carbon filtration cylinder followed by three mixed bed cation/anion exchange Resin cylinders. The carbon cylinder is designed to remove all trace organic contaminants, and the resin cylinders remove all of the inorganic anions and cations. The water produced from this system is 16 megohm-cm or better which exceeds Type I through Type III water quality requirements. The resisitivity is monitored by the system and new tanks are installed when needed.

ICM also has a backup Polymetric System in case the main source shows contamination. If both sources of laboratory water show contamination purchased bottle water will be used. Prior to the purchased bottle water being used the water will have to adhere to all the N.J.A.C. (N.J.A.C. 7:18) requirements and method blank criteria, see Analysis of Laboratory Water in the Preparation and QA/QC Procedures for Laboratory Water section.

ANALYSIS OF LABORATORY WATER

Laboratory deionized water is used as method or preparative blanks for all analysis done in house. The method blank must meet QC criteria-no analyte can be detected above the minimum detection limit (except for certain organic analysis which have specific blank requirements). If analytes are found above the MDL the analysis is rerun. If the analyte is confirmed, the use of the water is discontinued until the source of the contamination is found.

The New Jersey Administrative Code(N.J.A.C. 7:18) requirements for laboratory water are adhered to. These include:
-annual analysis for trace metals(Pb, Cd, Cr, Cu, Ni, Zn) must not be greater than 0.05 mg/l, total metals must be equal to or less than 1.0 mg/l.
-annual analysis for bactericidal properties. The result must be between 0.8-3.0.
-daily analysis for conductance. The conductance is maintained below 2 micromhos/cm at 25 degrees C.
-monthly analysis for pH, chlorine residual and standard plate count. pH must be 5.5-7.5, residual chlorine 0.0 and standard plate count <500 colonies/ml.

It is the responsibility of the Departmental Managers and the Quality Assurance Officer to monitor the laboratory water meets all QC criteria.

PROCEDURE FOR TRACKING TRIP AND FIELD BLANKS

The deionized water used in the preparation of trip and field blanks can be traced back to the laboratory analyzed blank for the day the blanks were prepared.

All trip and field blanks originate from the Sample Login/Receiving Department. They can be traced by using the date the blanks were prepared. The date of preparation is found on the sample equipment record and/or the field chain of custody. This date can then be traced to the laboratory and compared to results of laboratory analyzed blanks.

FIELD QUALITY ASSURANCE AND QUALITY CONTROL

Quality Control and quality assurance(QA/QC) samples are intended to provide control over the collection of environmental measurements and subsequent validation, review, and interpretation of generated analytical data. The following is a breakdown by matrix of blank sample requirments.

1) Non-aqueous matrix

A. Field Blanks-The purpose of this blank is to place a mechanism of control on sample equipment handling, preparation, storage and shipment. The performance of field blanks requires two(2) sets of identical bottles; one set filled with demonstrated analyte free water provided by the laboratory and one set of identical empty bottles with field blank labels. The field blank bottles will correspond to the sample parameters being analyzed.

At the field location, in an area suspected to be contaminated, the water is passed from the full set of bottles through the dedicated or field decontaminated sampling device and into the empty set of bottles.

B. Trip Blanks-No trip blanks are required for non-aqueous samples.

C. Frequency-For sampling events lasting more than one day, field blanks for the non-aqueous matrix should be performed at a rate of 10% of the total number of samples collected throughout the event. For example: If forty samples are to be collected over six days-10% of 40 samples or 4 field blanks should be performed. If a one day sampling event has less than ten samples collected, then one field blank should be done.

2) Aqueous Matrix

A. Field Blanks-Field blanks are performed as per section I.A.

B. Trip Blanks-Trip blanks are used exclusively for volatile organic analysis(aqueous sampling only) and its purpose is to measure possible cross contamination of samples during shipping to and from the site to the lab. The trip blank is never opened and travels with the empty sample bottles to the site and travels with the samples collected back to the laboratory. The trip blank shall not be held on site for more than 2 calendar days.

C. Frequency-The frequency for field blanks for an aqueous sampling event is one per day. Field blanks are not generally required for potable sampling events or when samples are collected into the sample container directly. If during potable sampling, a known source of contamination exists within close proximity of the potable source, then a field blank may be required. The frequency for trip blanks are to be included at a rate of one set per sample shipment.

3) Duplicate Samples

The collection of duplicate samples is to provide evaluation of laboratory performance by comparing analytical results of two samples(one duplicate) from the same sample location.

The frequency of duplicate samples for both the aqueous and non-aqueous matrix is a minimum of 5% of the total number of samples collected or one duplicate sample per twenty collected samples.

When obtaining duplicate samples for a soil matrix, homogenization of the sample is required. This is done by mixing soil together until a consistent physical appearance is achieved. Then the sample is divided in half and the soil container is filled alternately from each half. Homogenization is never performed for soil samples being analyzed for volatile organics due to the loss of volatiles while mixing the sample.

The duplicate samples for the aqueous matrix should be obtained by alternately filling sample containers from the same sampling device for each parameter.

4) QA/QC Handling Time

The field and trip blank samples must travel with sample containers and must arrive on-site within one day of their preparation in the laboratory. Blanks and their associated samples may be held on-site or no longer than two calender days and must arrive back in the laboratory within one day of shipment from the field. Thsi constitutes a maximum of a four(4) day handling time. Blanks and all samples must be maintained a 4^{o} C while stored on-site and during shipment to the laboratory. The only acceptable exception to this handling time is stormwater runoff samples.

5) pH Monitoring of Samples

To monitor and verify sample containers pH status, a small amount of the sample is poured into a clean beaker or the container cap and a pH test paper strip or pH meter is used to verify pH status on a sample. The pH test aliquot is not put back into the sample. Sample preservation kits are available if a sample pH preservative is absent or additional preserve is needed to acheive the required pH.

6) pH Meter and Conductivity Meter Calibration

A. pH meter Calibration

1) Turn power on
2) Rinse pH probe with deionized water
3) Place probe in buffer solution 4
4) Press pH button and the STD button
5) Wait for reading to stabilize at 4.00
6) Rinse pH probe with deionized water
7) Place pH probe in buffer solution 10 and press STD
8) Wait for reading to stabilize at 10.00
9) Rinse pH probe with deionized water
10) Place pH probe in buffer solution 7
11) If reading is approximately 7.00 END and record in logbook

NOTE: Replace buffer solutions if pH reading doesn't match buffer soutions. To prevent undo maintance store pH probe in buffer or deionized water and always rinse pH probe with deionized water after every use.

7) Conductivity Meter Calibration

A. Turn power on

B. Turn switch to Batt+, then Batt-. Meter should read within Batt OK scale.

C. Rinse conductivity probe with deionized water

D. Turn range switch to position X1K.

E. Place probe in 1000 micromhos conductivity standard solution

F. Adjust calibration knob if needed to get meter reading of 1000 micromhos. If so END.

G. If 1000 micromhos reading cannot be obtained then turn power off

H. Using flat head screwdriver, adjust th zero adjustment screw on the meter so the needle indicates zero.

I. Repeat step A thru G.

NOTE: Always rinse probe with deionized water after every use and store it in deionized water when not in use. Never allow meter to get wet or cold.

8) Field Logbooks

All samplers should have a logbook that is bound with water resistant pages. All information regarding the site and sampling procedures must be documented. Notations should be made with reference to time and date. All information available is recorded in the logbook.

Section 6

Certifications

Certification Summation

ICM is a New Jersey Department of Environmental Protection and Energy (NJ DEPE Lab ID #14116) certified laboratory. ICM is also a NJDEPE Contract Laboratory (A60084) under the X-26174 contract for Task III (Regulatory) and Task IV (CLP) analysis.

In addition, we are also certified by the following:

1. Pennsylvania Department of Environmental Resources
   Certification Number 68-387

2. Delaware Health and Social Services
   Certification Number NJ-104

3. New York State Department of Health for Potable, Non-Potable Water and Solid Waste analysis.
   Certification Number 11376

4. New York State Department of Health for CLP accreditation.
   Certification Number 11376

5. State of Connecticut, Department of Public Health and Addiction Services.
   Certification Number PH-0160

6. State of Maryland Department of Health and Mental Hygiene Laboratories Administration
   Certification Number 244

ICM has met the qualifications necessary to do EPA Contract Laboratory Program level organics and inorganic analyses. ICM has recently completed a full EPA organics contract and still routinely works on EPA contracts called Special Analytical Services (SAS) Contracts. These contracts are only available to laboratories who are in good standing in the EPA CLP program.

STATE OF NEW JERSEY

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Let's protect our earth

Certifies That

INDUSTRIAL CORROSION MANAGEMENT, INC.
1152 Route 10
Randolph NJ 07869

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

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14116
PERMANENT CERTIFICATION NUMBER

July 16, 1982
DATE

COMMISSIONER
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF QUALITY ASSURANCE
ANNUAL CERTIFIED PARAMETER LIST FOR 1995-1996

INDUSTRIAL CORROSION MGT, INC (14116) IS CERTIFIED TO PERFORM THE ANALYSES BELOW UNTIL JUNE 30 1996.

DRINKING WATER LABORATORY CERTIFICATION

MICROBIOLOGY

303 TOT COLI-MEMBRANE FILTER

305 TOT COLI-MPN (10ML/20ML)

309 TOTAL COLIFORM (ONPG-MUG)

315 FECAL COLIFORM (TC TO EC)

321 E. COLI (ONPG-MUG)

LIMITED CHEMISTRY

001 ALKALINITY, TITRIMETRIC

003 CALCIUM, EDTA TITRIMETRIC

004 CONDUCTIVITY

005 ORTHOPHOSPHATE, COLORIMET

008 TEMPERATURE

020 NITRITE, AUTO CD REDUCTIO

034 CYANIDE, SPECTROPHOTO

934 NITRATE, AUTO CD REDUC

935 FLUORIDE-ELECTRODE

936 FLUORIDE-COLOR/PRE DISTIL

DRINKING WATER LABORATORY CERTIFICATION

LIMITED CHEMISTRY

944 TURBIDITY

945 CHLORINE RESIDUAL

947 CHLORIDE, HG OR AG NITRAT

948 COLOR, PLATINUM COBALT

949 ABS/LAS METHYLENE BLUE

950 ODOR, CONSISTENT SERIES

951 PH, GLASS ELECTRODE

952 TOT DISS SOLIDS, TOT RES

953 HARDNESS, EDTA

956 SULFATE, GRAVIM OR TURBID

METALS

010 CALCIUM, ICAP

017 ALUMINUM, ICAP

022 SILICA (ICP)

025 ANTIMONY, GRAPH FURNACE

030 NICKEL, ICAP

031 THALLIUM, GRAPH FURNACE

036 BERYLLIUM, ICAP

912 HG,MANUAL COLD VAPOR

914 AS, GRAPHITE FURNACE

916 CD, GRAPHITE FURNACE

DRINKING WATER LABORATORY CERTIFICATION

METALS

918	PB, GRAPHITE FURNACE
920	SE, GRAPHITE FURNACE
921	AG, GRAPHITE FURNACE
954	NA, ATOMIC ABSORPTION
961	BARIUM, ICAP
962	CADMIUM, ICAP
963	CHROMIUM, ICAP
965	SILVER, ICAP
966	COPPER, ICAP
967	IRON, ICAP
968	MANGANESE, ICAP
969	ZINC, ICAP

ORGANICS

502.2	VOC (PT/GC)
524.2	VOC (PT/GC-MS)

WATER POLLUTION LABORATORY CERTIFICATION

MICROBIOLOGY

74054	FECAL STREPTOCOCCI
74055	FECAL COLIFORM
74056	TOTAL COLIFORM
74057	ENTEROCOCCI

WATER POLLUTION LABORATORY CERTIFICATION

MICROBIOLOGY

74058 HETEROTROPHIC PLATE COUNT

74059 PSEUDOMONAS AERUGINOSA

LIMITED CHEMISTRY

00010 TEMPERATURE

00076 TURBIDITY

00080 COLOR

00095 SPECIFIC CONDUCTANCE

00299 DISS OXYGEN-ELECTRODE

00300 DISS OXYGEN-WINKLER

00310 BOD(5/20 DAY)

00320 CARBONACEOUS BOD(5/20DAY)

00340 COD

00400 HYDROGEN ION-PH

00410 ALKALINITY

00436 ACIDITY

00500 TOT SOLIDS

00505 TOT VOLATILE SOLIDS

00530 SUSP SOLIDS

00545 SETT SOLIDS-VOLUMETRIC

00556 OIL AND GREASE

00605 ORGANIC NITROGEN

WATER POLLUTION LABORATORY CERTIFICATION

LIMITED CHEMISTRY

00610	AMMONIA NITROGEN
00615	NITRITE
00625	TOT KJELDAHL NITROGEN
00630	NITRATE
00650	PHOSPHORUS, TOT AS PO4
00660	ORTHOPHOSPHATE AS PO4
00665	PHOSPHORUS, TOT AS P
00671	ORTHOPHOSPHATE AS P
00680	ORGANIC CARBON, TOTAL
00681	ORGANIC CARBON, DISSOLVED
00720	CYANIDE, TOTAL
00722	CYANIDE, AMEN TO CHLOR
00740	SULFITE
00745	SULFIDE
00900	HARDNESS
00940	CHLORIDE
00945	SULFATE
00951	FLUORIDE, TOTAL
00955	SILICA
01032	CR HEX
32730	PHENOLS
38260	SURFACTANTS

WATER POLLUTION LABORATORY CERTIFICATION

LIMITED CHEMISTRY

50060 CHLORINE RESIDUAL

70300 TOT DISS SOLIDS

METALS

00915 CALCIUM (ICAP)

00925 MAGNESIUM (ICAP)

00929 SODIUM (ICAP)

00935 POTASSIUM (ICAP)

00956 SILICA (ICAP)

01000 ARSENIC (ICAP)

01002 ARSENIC (AA/GF)

01005 BARIUM (ICAP)

01010 BERYLLIUM (ICAP)

01020 BORON (ICAP)

01025 CADMIUM (ICAP)

01030 CHROMIUM (ICAP)

01035 COBALT (ICAP)

01040 COPPER (ICAP)

01045 IRON (ICAP)

01049 LEAD (ICAP)

01051 LEAD (AA/GF)

01055 MANGANESE (ICAP)

WATER POLLUTION LABORATORY CERTIFICATION

METALS

01057	THALLIUM (ICAP)
01059	THALLIUM (AA/GF)
01060	MOLYBDENUM (ICAP)
01065	NICKEL (ICAP)
01075	SILVER (ICAP)
01085	VANADIUM (ICAP)
01090	ZINC (ICAP)
01095	ANTIMONY (ICAP)
01097	ANTIMONY (AA/GF)
01102	TIN (AA/GF)
01105	ALUMINUM (ICAP)
01145	SELENIUM (ICAP)
01147	SELENIUM (AA/GF)
71900	MERCURY (COLD VAPOR)

ORGANICS

601	PURGEABLE HALOCARBONS(GC)
602	PURGEABLE AROMATICS (GC)
608	PESTICIDES & PCBS (GC)
624	PURGEABLES (GC/MS)
625	B/N, ACIDS & PEST (GC/MS)

THIS LIST MUST BE CONSPICUOUSLY DISPLAYED WITH THE PERMANENT CERTIFICATE AT THE LABORATORY

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection
Office of Quality Assurance
CN424
Trenton, NJ 08625-0424
Tel (609) 292-3950
Fax (609) 777-1774

Robert C. Shinn, Jr.
Commissioner

August 1, 1996

14116 INDUSTRIAL CORROSION MGT,INC
1152 ROUTE 10
RANDOLPH NJ 07869
ATTN: RICHARD LEVINE

Dear Laboratory Manager:

On July 1, 1996, the N.J.A.C. 7:18, Regulations Governing the Certification of Laboratories and Environmental Measurements became effective. The mailing of the 1996/1997 renewal applications and fee invoices have been delayed. Therefore, a new annual parameter list was not issued to replace the list which expired June 30, 1996.

Enclosed is a copy of your current laboratory certification status. This document will serve as a temporary annual parameter list. The temporary annual parameter list will be valid until an updated list is issued or June 30, 1997.

The Office of Quality Assurance (OQA) is currently revising the application and printing copies of the new regulations. Once this is complete, OQA will mail the application package to your laboratory. Upon receipt of the application please review it carefully, complete the necessary sections and return it to our office. Based on the information from the application an invoice will be generated and mailed to you. Once our office receives payment from your laboratory an annual certified parameter list will be issued.

Please direct all correspondence and inquiries to me at (609) 633-6752, or by letter to this Office at the letterhead address.

Sincerely,

Michael D. DiBalsi
Supervising Environmental Specialist
Office of Quality Assurance

Enclosure

127-1

CERTSUM DATABASE

7/31/96 TEMPORARY ANNUAL PARAMETER LIST

CERTIFICATION ID 14116 EPA NJ

LAB NAME INDUSTRIAL CORROSION MGT,INC

ADDRESS 1152 ROUTE 10

CITY RANDOLPH STATE NJ ZIP 07869

MANAGER RICHARD LEVINE

PHONE 201-584-0330 LOT/BLOCK FAX:

A.DRINKING WATER CERTIFIC: C

I. MICROBIOLOGY(DW): C
C 303,T.c(mf) C 309,T.c(ONPG) C 321,E.c(ONPG)
C 305,T.c(ft) C 315,F.c(TC-->EC) 323,T.c(Colisure)
307,T.c(PA) 317,E.c(EC+MUG) 325,E.c(Colisure)
319,E.c(NA+MUG)

II. LIMITED CHEMISTRY(DW): C
C 935,F,"Electrode"
C 936,F,"Distill_Color"
937,F,"Auto_Aliz_F_Blue"
938,F,"Modified_Auto"
940,F,"Zr_Erio_Cyanide"
939,F,"Auto_Electrode"
931,F,"Ion Chrom"
932,Nitrate,"Cd_Red"
933,Nitrate,"Auto_Hydr"
C 934,Nitrate,"Auto_Cd_Red"
919,Nitrate,"Electrode"
957,Nitrate,"Ion Chrom"
926,As,"Ag_DEDT_Carb"
C 947,Cl,"Hg_Ag_NO3"
958,Cl,"Ion Chrom"
C 946,Cl,"Potentiometric"
C 945,Chlorine Residual
C 953,Hardness
C 951,pH,"Glass Electrode"
955,Sodium
C 956,Sulfate
959,Sulfate,"Ion Chrom"
C 952,Total Dissolv Solids
C 944,Turbidity
927,Copper
928,Iron
929,Manganese
930,Zinc
C 948,Color,"Pt_Co"
C 950,Odor,"Const_Series"
C 949,ABS/LAS,"Methylene Bl"

III. METALS(DW): C
910,As."Hyd.Gen"
C 914,As,"GF"
C 960,As,"ICP"
901,Ba,"AA"
915,Ba,"GF"
C 961,Ba,"ICP"
907,Cd,"AA"C.E.
C 916,Cd,"GF"
C 962,Cd,"ICAP"
908,Cr,"AA,C.E.
917,Cr,"GF"
C 963,Cr,"ICP"
909,Pb,"AA,C.E.
C 918,Pb,"GF"
C 912,Hg,"MCV"
913,Hg,"ACV"
911,Se,"Hyd.Gen
C 920,Se,"GF"
902,Ag,"AA"
C 921,Ag,"GF"
C 965,Ag,"ICP"
903,Cu,"AA"
922,Cu,"GF"
C 966,Cu,"ICP"
904,Fe,"AA"
923,Fe,"GF"
C 967,Fe,"ICP"
905,Mn,"AA C.E."
924,Mn,"GF"
C 968,Mn,"ICP"
C 954,Na,"AA"
906,Zn,"AA"
925,Zn,"GF"
C 969,Zn,"ICP"
C 970,Na,"ICP"

III.(a),Metals(Pb&Cu Rules & 7/30/92 & Proposed'93 Rules)C
C 009,Ca"AA"
C 010,Ca"ICP"
011,Cu"PltFur
012,Cu"ICP/MS
C 013,Pb"PltFur
014,Pb"ICP/MS
015,Al"GF"
016,Al"AA"
C 017,Al"ICP"
019,Al"ICP/MS
C 022,SiO2"ICP"
024,Sb "Hydr."
C 025,Sb "GF"
026,Be "GF"
027,Be "ICP/MS"
028,Ni "AA"
029,Ni "GF"
C 030,Ni "ICP"
031,Tl "GF"
032,Tl "ICP/MS"
047,Hg "ICP/MS"
C036,Be,"ICP"
037,Sb,"ICP/MS"
038,As,"ICP/MS"
039,Ba,"ICP/MS"
040,Cd,"ICP/MS"
041,Cr,"ICP/MS"
042,Mn,"ICP/MS"
043,Ni,"ICP/MS"
044,Se,"ICP/MS"
045,Ag,"ICP/MS"
046,Zn,"ICP/MS"

II(a).Limited Chem(Pb&Cu Rules & 7/30/92 Rules)C
C 001,Alk. "Titr"
002,Alk."E-Titr"
C 003,Ca,"Titr"
C 004,Conductiv."
C 005,o-P(P)Un/Col
006,o-P(P)"Auto Col"C
007,SiO2
C 008,Temperature
018,Asbestos"TEM"
019,NO2"Spectrophot"C
C 020,NO2,Auto-R
021,NO2,Cd-Red
023,NO2,"IC"
C 033,SO4,"Color
C 034,CN,"Spect"
035,o-P(P),"IC"

IV. ORGANICS(DW):C
501.1, TOTAL THM'S
501.2, TOTAL THM'S
502.1, VOC P&T GC(Pack)
C 502.2 VOC P&T GC(Capil)
502.2T THM's only
503.1 VOAC,PT/Arom.
504 DBE &DB3CP"GC"
505 OrganoHal Pest/PCB
505P OrganClPest"EMLT"
506 Adipat/Phthal(PID)
507 N/P-Pest. "GC"
508 Cl-Pest."GC"
508A PCB's-Confimation
508P OrganoCl Pests"EMLT"
515.1 Chl.Herbs."GC"
515.1H Regul.Herbs/PCP(2,4-D;Silvex;Dalapon)
C 524.2 VOC's-GC/MS(Capillary)
524.1 VOC's-GC/MS(Packed)
525.1 PAH/PEST"GC/MS"
531.1 Carbamates(HPLC)
547 Glypnosate(HPLC)
548 Endothall(GC/ECD)
549 Diquat (HPLC)
550 PAH,(HPLC)liq/liq
550.1 PAH (HPLC)SPE
551 Disinfection Biproducts
551T (Trihalomethanes only)
552.1 Haloacetic acid/Dalapon
555 Chlorinated Acids
1613 2,3,7,8 TCDD(Dioxin)

V. Radiological(DW)
401 Gross alpha
402 Gross beta
403 Sr-89
404 Sr-90
405 Ra-226
406-Ra-228
407 Ra-Tot
408 H3
409 U
410 Cs-134
411 Cs-137
412 I-131
414 Co-60
415 Ru-106
416 Zn-65
417 K
418 Pu-239
419 Ba-133

VI. Radon(DW):
413 Radon

Legend:
C(Certified) A(Applied) S(Suspended)
c(Certified by Capillary Column GC)

7/31/96 TEMPORARY ANNUAL PARAMETER LIST

CERTIFICATION ID 14116 EPA NJ
LAB NAME INDUSTRIAL CORROSION MGT,INC
ADDRESS 1152 ROUTE 10
CITY RANDOLPH STATE NJ ZIP 07869
MANAGER RICHARD LEVINE
PHONE 201-584-0330

8. WATER POLLUTION CERTIFICATION: C

I. MICROBIOLOGY(WP): C

C 74055 F.Coli C 74054 F.Strep C 74058 Heterotro Pl
C 74056 T.Coli C 74057 Enterococci C 74059 Pseudomonas aerug.

II. LIMITED CHEMISTRY(WP): C

C	00436	Acid	C	00500	TS	C	00660	oP,PO4	01042	Cu,T
C	00410	Alkal	C	70300	TDS	C	00671	oP,P	01045	Fe,T
C	00610	NH4-N	C	00530	SS	C	00630	NO3	01051	Pb,T
C	00310	BOD5/20C		00545	SS,V	C	00615	NO2	00927	Mg,T
C	00340	COD		00546	SS,G	C	00556	Oil&Gr	01055	Mn,T
C	00940	Cl	C	00505	TVolS	C	00680	OrC,T	01067	Ni,T
C	50060	Cl2,R	C	00095	SCond	C	00681	OrC,D	00937	K, T
C	00080	Color	C	00945	SO4	C	00605	OrN	C 00955	SiO2
C	00720	CN, T	C	00745	S--		01105	Al,T	00929	Na,T
C	00722	CN,Cl2	C	00740	SO3		01002	As,T	01087	V, T
C	00300	DO,WIN	C	38260	Surf		01012	Be,T	01092	Zn,T
C	00299	DO,El	C	00010	Temp		01022	B, T	C 00320	CBOD
C	00951	F,TOT	C	00076	Turb		01027	Cd,T	(5 & 20 DAY)	
C	00900	Hardn	C	32730	Phen		00916	Ca,T		
C	00400	H+,pH	C	00650	P,PO4	C	01032	Cr,VI		
C	00625	TKN	C	00665	P,P		01034	Cr,T		

III.METALS(WP): C

	01106	Al,AA/GF	C	01035	Co,ICAP		01210	Pd,AA/GF			
C	01105	Al,ICAP		01042	Cu,AA/GF		01171	Pt,AA/GF			
C	01097	Sb,AA/GF	C	01040	Cu,ICAP		28201	Rh,AA/GF			
C	01095	Sb,ICAP		71910	Au,AA/GF		27901	Ru,AA/GF			
C	01002	As,AA/GF		01046	Fe,AA/GF	C	01147	Se,AA/GF			
C	01000	As,ICAP	C	01045	Fe,ICAP	C	01145	Se,ICAP			
	01007	Ba,AA/GF	C	01051	Pb,AA/GF		01077	Ag,AA/GF			
C	01005	Ba,ICAP	C	01049	Pb,ICAP	C	01075	Ag,ICAP			
	01012	Be,AA/GF		00937	K,AA		00930	Na,AA			
C	01010	Be,ICAP	C	00935	K,ICAP	C	00929	Na,ICAP			
C	01020	B,ICP		00927	Mg,AA	C	00956	SiO2,ICAP			
	01027	Cd,AA/GF	C	00925	Mg,ICAP	C	01059	Tl,AA/GF			
C	01025	Cd,ICAP		01056	Mn,AA	C	01057	Tl,ICAP			
	00916	Ca,AA	C	01055	Mn,ICAP	C	01102	Sn,AA/GF			
C	00915	Ca,ICAP	C	71900	Hg,CV		01152	Ti,AA/GF			
	01032	CrVI,AA		01062	Mo,AA/GF		01087	V,AA/GF	C	01104	Sn, ICP
	01034	Cr,AA/GF	C	01060	Mo,ICAP	C	01085	V,ICAP			
C	01030	Cr,ICAP		01067	Ni,AA/GF		01092	Zn,AA/GF			
	01037	Co,AA/GF	C	01065	Ni,ICAP	C	01090	Zn,ICAP			

IV. ORGANICS(WP): C

C 601 Purgeable Halocarbon, P&T/GC/HECD
C 602 Purgeable Aromatics,P&T/GC/PID
604 Phenols
C 608 Pesticides & PCB's
C 608P Organochlorine Pesticides: Aldrin/Dieldrin/DDD/DDE/DDT/Heptachlor/Chlordane
608PB PCB's only
610 PAH's
612 Chlorinated Hydrocarbons,Extr.w GC/ECD
c 624 Purgeables,P&T w GC/MS
C 625 B/N, Acids, Pesticides, Extr. w. GC/MS

V. BIOASSAY(WP):

99004 Acute Toxicity

VI. Radon(WP):

82303 Radon

C. AIR

I. Radon/Radon Progeny

451,Ra,"Charcoal Cannister"
452,Ra,"Alpha-Track"
453,Ra,"Pumo_Carbon_Grab"
454,Ra,"RPISU"
455,Ra,"Charcoal_Liquid_Scintillation"

Continuous Monitoring

00401 CONT pH
00011 CONT Temperature
50061 CONT Cl2 Residual
00091 CONT Conductivity

Legend: C (Certified); A (Applied); S (Suspended)
c (Certified by Capillary Column GC)

Pennsylvania Department of Environmental Protection

P. O. Box 1467
Harrisburg, Pennsylvania 17105-1467
November 1, 1996

(717) 783-7150
FAX# (717) 783-1502

Bureau of Laboratories

Certified Mail Z 398 777 959

Richard Levine, Laboratory Director
Industrial Corrosion Management
1152 Route 10
Randolph, NJ, 07869

RE: Laboratory Certification Status
DEP# 68-387, EPA# NJ00104, WS037

Dear Mr. Levine:

Recently, a set of chemical Performance Evaluation samples were sent to you for analysis through EPA's Quality Assurance Program. The results of your analyses, the true values, and acceptance limits are provided on the attached data report. Based on this report, your current status in the Laboratory Certification Program in Pennsylvania is as shown below:

Category of Analysis	Certification Status
TM2, CN, C, VOC1*	Classified as "Certified"
_____	Information on approved methods, data reporting instructions, and a laboratory identification number, if applicable, will be forwarded.
_____	Classified as "Provisionally Certified"
_____	You must follow the procedures in Appendix A of the "Critical Elements of Chemistry" and/or correct the deviations listed on your laboratory's on-site report in order to be upgraded to "Certified".
_____	Classified as "Not Certified"
	No drinking water analysis data will be accepted by the Department or its Designee in the category listed until satisfactory Performance Evaluation results have been achieved.

Other Comments:

* VOC1 by Method 524.2 is satisfactory.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, P.O. Box 8457, Harrisburg, PA 17105-8457, (717) 787-3483. TDD users may contact the Board through the Pennsylvania Relay Service (800) 654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedures may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at (717) 787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

If you have any questions on your laboratory's status, contact Mr. Edward Maser.

Sincerely,

Ted Lyter

P. Ted Lyter, Chief
Laboratory Certification
Department of Environmental Protection

DELAWARE HEALTH
AND SOCIAL SERVICES

DIVISION OF PUBLIC HEALTH

CERTIFICATE OF APPROVAL FOR DRINKING WATER ANALYSIS

issued to

Industrial Corrosion Management, Inc.

located at

1152 Route 10

Randalph, New Jersey 07869

is granted approval for recopricity enforcement purposes under
the Safe Drinking Water Act
for the following parameters

FULL CERTIFICATION:

Total Coliform Membrane Filter, Total Coliform Multiple Tube, MMO-MUG, E. coli (EC Medium & MUG), Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc, Nitrate, Nitrite, Fluoride, VOC-1, VOC-3, VOC-4, TDS, Calcium, pH units, Alkalinity, Sodium, Sulfate, Cyanide

PROVISIONAL CERTIFICATION:

Certificate Number: NJ104

Date of Issue: June 10, 1996

Expiration Date: June 30, 1997

Mahadeo P. Verma, Ph.D., MPH, ICLD
DIRECTOR OF LABORATORIES

Edward G. Hallock
PROGRAM MANAGER
OFFICE OF DRINKING WATER

NEW YORK STATE DEPARTMENT OF HEALTH

BARBARA A. DEBUONO, M.D., M.P.H. Commissioner

Expires 12:01 AM April 1, 199
ISSUED April 1, 1996
REVISED July 24, 1996

INTERIM CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

Lab ID No.: 11376

Director: MR. RICHARD LEVINE
Lab Name: INDUSTRIAL CORROSION MGMT
Address : 1152 ROUTE 10
RANDOLPH NJ 07869-1896

is hereby APPROVED as an Environmental Laboratory for the category

ENVIRONMENTAL ANALYSES NON POTABLE WATER

All approved subcategories and/or analytes are listed below:

Chlor. Hydrocarbon Pesticides :
- 4,4'-DDD
- 4,4'-DDE
- 4,4'-DDT
- alpha-BHC
- Aldrin
- beta-BHC
- Chlordane Total
- delta-BHC
- Dieldrin
- Endrin aldehyde
- Endrin
- Endosulfan I
- Endosulfan II
- Endosulfan sulfate
- Heptachlor
- Heptachlor epoxide
- Lindane
- Methoxychlor
- Toxaphene

Wastewater Miscellaneous :
- Cyanide, Total
- Phenols
- Oil & Grease Total Recoverable
- Hydrogen Ion (pH)
- Specific Conductance
- Surfactant (MBAS)
- Temperature
- Organic Carbon, Total

Chlorophenoxy Acid Pesticides (ALL)
Haloethers (ALL)
Nitroaromatics and Isophorone (ALL)
Polychlorinated Biphenyls (ALL)
Purgeable Aromatics (ALL)
TCLP Additional Compounds (ALL)

Mineral :
- Alkalinity
- Chloride
- Fluoride, Total
- Sulfate (as SO4)
- Hardness, Total

Acrolein and Acrylonitrile (ALL)
Wastewater Bacteriology (ALL)
Benzidines (ALL)
Chlorinated Hydrocarbons (ALL)
Wastewater Metals I (ALL)
Nitrosoamines (ALL)
Phthalate Esters (ALL)
Purgeable Halocarbons (ALL)

Nutrient :
- Nitrite (as N)
- Nitrate (as N)
- Orthophosphate (as P)
- Phosphorus, Total

Wastewater Metals III :
- Cobalt, Total
- Molybdenum, Total
- Thallium, Total

Demand (ALL)
Wastewater Metals II (ALL)
Polynuclear Aromatics (ALL)
Priority Pollutant Phenols (ALL)
Residue (ALL)

Serial No.: 033119

Wadsworth Center

Property of the New York State Department of Health. Valid only at the address shown.
Must be conspicuously posted. Valid certificate has a red serial number.

DOH-3317 (3/95)

NEW YORK STATE DEPARTMENT OF HEALTH

BARBARA A. DEBUONO, M.D., M.P.H. Commissioner

Expires 12:01 AM April 1, 199
ISSUED April 1, 1996
REVISED July 24, 1996

INTERIM CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

Lab ID No.: 11376
Director: MR. RICHARD LEVINE
Lab Name: INDUSTRIAL CORROSION MGMT
Address : 1152 ROUTE 10
RANDOLPH NJ 07869-1896

is hereby APPROVED as an Environmental Laboratory for the category

ENVIRONMENTAL ANALYSES/ POTABLE WATER

All approved subcategories and/or analytes are listed below:

Volatile Aromatics (ALL)

Volatile Halocarbons (ALL)

Serial No.: 033120

Wadsworth Center

Property of the New York State Department of Health. Valid only at the address shown.
Must be conspicuously posted. Valid certificate has a red serial number.

DOH-3317 (3/95)

NEW YORK STATE DEPARTMENT OF HEALTH

BARBARA A. DEBUONO, M.D., M.P.H. Commissioner

Expires 12:01 AM April 1, 195
ISSUED April 1, 1996
REVISED July 24, 1996

INTERIM CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

Lab ID No.: 11376
Director: MR. RICHARD LEVINE
Lab Name: INDUSTRIAL CORROSION MGMT
Address : 1152 ROUTE 10
RANDOLPH NJ 07869-1896

is hereby APPROVED as an Environmental Laboratory for the category

ENVIRONMENTAL ANALYSES/SOLID AND HAZARDOUS WASTE

All approved subcategories and/or analytes are listed below:

Characteristic Testing :
- Corrosivity
- Ignitability
- Reactivity
- TCLP
- EP. Toxicity

Miscellaneous :
- Cyanide, Total
- Hydrogen Ion (pH)

Metals II (ALL)
Polychlorinated Biphenyls (ALL)
Purgeable Aromatics (ALL)
Acrolein and Acrylonitrile (ALL)
Chlor. Hydrocarbon Pesticides (ALL)
Haloethers (ALL)
Nitroaromatics Isophorone (ALL)
Phthalate Esters (ALL)
Purgeable Halocarbons (ALL)
Chlorophenoxy Acid Pesticides (ALL)
Chlorinated Hydrocarbons (ALL)
Metals I (ALL)
Polynuclear Arom. Hydrocarbon (ALL)
Priority Pollutant Phenols (ALL)

Serial No.: 033121

Wadsworth Center

Property of the New York State Department of Health. Valid only at the address shown.
Must be conspicuously posted. Valid certificate has a red serial number.

DOH-3317 (3/95)

NEW YORK STATE DEPARTMENT OF HEALTH

BARBARA A. DEBUONO, M.D., M.P.H. Commissioner

Expires 12:01 AM April 1, 19
ISSUED April 1, 1996
REVISED July 24, 1996

INTERIM CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

Lab ID No.: 11376
Director: MR. RICHARD LEVINE
Lab Name: INDUSTRIAL CORROSION MGMT
Address : 1152 ROUTE 10
RANDOLPH NJ 07869-1896

is hereby APPROVED as an Environmental Laboratory for the category

CONTRACT LABORATORY PROTOCOL (CLP)

All approved subcategories and/or analytes are listed below:

CLP Inorganics | CLP PCB/Pesticides | CLP Semi-Volatile Organics | CLP Volatile Organics

Serial No.: 033122

Wadsworth Center

Property of the New York State Department of Health. Valid only at the address shown.
Must be conspicuously posted. Valid certificate has a red serial number.

DOH-3317 (3/95)

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Wadsworth Center The Governor Nelson A. Rockefeller Empire State Plaza P.O. Box 509 Albany, New York 12201-0509

Barbara A. DeBuono, M.D., M.P.H.
Commissioner

Karen Schimke
Executive Deputy Commissioner

June 26, 1996

Dear Laboratory Director:

Please note that your 1995-96 Certificate(s) of Approval, originally extended to June 30, 1996 has/have been further extended to July 31, 1996. This action has been necessitated by the lack of an approved New York State budget.

Enclosed please find your current 1996-97 ELAP fee statement. Upon receipt of at least one quarter of the annual amount due, your 1996-97 Certificate(s) of Approval will be issued.

Verification of your laboratory's approved ELAP status is available by calling the Program Office at (518) 485-5570.

Sincerely,

Joyce Joslin
Administrative Aide
Environmental Laboratory
Approval Program

Enc.

State of Connecticut, Department of Public Health

APPROVED ENVIRONMENTAL LABORATORY

THIS IS TO CERTIFY THAT THE LABORATORY DESCRIBED BELOW HAS BEEN APPROVED BY THE STATE DEPARTMENT OF PUBLIC 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.

INDUSTRIAL CORROSION MANAGEMENT, INC.

LOCATED AT 1152 ROUTE 10 IN RANDOLPH, NJ 07869 AND

REGISTERED IN THE NAME OF RICHARD S. LEVINE

THIS CERTIFICATE IS ISSUED IN THE NAME OF RICHARD S. LEVINE 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, WASTEWATER AND/OR TRADE WASTE, SOIL

135

Examination For:

Bacteria
Inorganic Chemicals
Organic Chemicals

SEE COMPUTER PRINT-OUT FOR SPECIFIC TESTS APPROVED

THIS CERTIFICATE EXPIRES March 31 19 98 AND IS REVOCABLE FOR CAUSE BY THE STATE DEPARTMENT OF PUBLIC HEALTH.

DATED AT HARTFORD, CONNECTICUT, THIS 30th DAY OF May, 19 96

NO. PH-0160

OL 181B REV 1-96

Paul Schur

DIRECTOR, DIVISION OF ENVIRONMENTAL HEALTH

Rec'd 7/23/96

CONNECTICUT STATE DEPARTMENT OF HEALTH

LABORATORY DIVISION

WEDNESDAY JULY 17, 1996 9:13 AM

REGISTRATION DATE 04/01

PH0160 INDUSTRIAL CORROSION MANAGEMENT,INC 1152 ROUTE 10 RANDOLPH, NJ 07869
REGISTRANT RICHARD S. LEVINE DIRECTOR RICHARD S. LEVINE
CO-DIRECTOR
MEDICARE NUMBER- INTERSTATE NUMBER-

TEST 200 POTABLE WATER
TEST 201 WASTEWATER AND/OR TRADE WASTE
TEST 203 SOIL
TEST 211 MICROBIOLOGY
TEST 212 TOTAL COLIFORM-MEMBRANE FILTER
TEST 213 TOTAL COLIFORM-MULTIPLE TUBE FERMENTATION
TEST 214 FECAL COLIFORM-MEMBRANE FILTER
TEST 215 FECAL COLIFORM-MULTIPLE TUBE FERMENTATION
TEST 216 FECAL STREPTOCOCCUS-MEMBRANE FILTER
TEST 217 FECAL STREPTOCOCCUS-MULTIPLE TUBE FERMENTATION
TEST 218 STANDARD PLATE COUNT
TEST 224 MMO-MUG TEST
TEST 229 ENTEROCOCCI- MF
TEST 230 CHEMISTRY
TEST 231 INORGANIC CHEMICALS
TEST 232 PHYSICAL EXAMS
TEST 233 COLOR
TEST 234 ODOR
TEST 235 TURBIDITY
TEST 236 PH
TEST 237 CONDUCTIVITY
TEST 238 TEMPERATURE
TEST 239 MINERALS
TEST 240 ACIDITY
TEST 241 ALKALINITY
TEST 242 HARDNESS
TEST 243 SULFATE
TEST 244 SULFIDE
TEST 245 SULFITE
TEST 246 BROMIDE
TEST 247 CHLORIDE
TEST 248 FLUORIDE
TEST 249 CHLORINE
TEST 250 NUTRIENTS
TEST 251 AMMONIA
TEST 252 KJELDAHL NITROGEN
TEST 253 ORGANIC NITROGEN
TEST 254 NITRATE
TEST 255 NITRITE
TEST 256 ORTHO-PHOSPHATE

TEST 257	TOTAL PHOSPHORUS
TEST 258	MISCELLANEOUS
TEST 259	TOTAL SOLIDS
TEST 260	TOTAL DISSOLVED SOLIDS
TEST 261	TOTAL VOLATILE SOLIDS
TEST 262	TOTAL SUSPENDED SOLIDS
TEST 263	CYANIDE
TEST 264	IGNITABILITY
TEST 265	SURFACTANTS
TEST 266	DEMAND
TEST 267	BOD
TEST 268	COD
TEST 269	TOC
TEST 270	METALS
TEST 271	ALUMINUM
TEST 272	ANTIMONY
TEST 273	ARSENIC
TEST 274	BARIUM
TEST 275	BERYLLIUM
TEST 276	BORON
TEST 277	CADMIUM
TEST 278	CHROMIUM TOTAL
TEST 279	CHROMIUM VI
TEST 280	COBALT
TEST 281	COPPER
TEST 282	IRON
TEST 283	LEAD
TEST 285	MAGNESIUM
TEST 286	MANGANESE
TEST 287	MERCURY
TEST 288	MOLYBEDNUM
TEST 289	NICKEL
TEST 290	POTASSIUM
TEST 291	SELENIUM
TEST 292	SILVER
TEST 293	SODIUM
TEST 294	THALLIUM
TEST 295	TIN
TEST 296	TITANIUM
TEST 297	VANADIUM
TEST 298	ZINC
TEST 311	ORGANIC CHEMICALS
TEST 312	PURGEABLE HALOCARBONS
TEST 313	PURGEABLE AROMATICS
TEST 314	PESTICIDES
TEST 315	HERBICIDES
TEST 316	PCB
TEST 317	PCB IN OIL
TEST 319	ACROLEIN AND ACRYLONITRILE
TEST 320	PHENOLS
TEST 321	BENZIDINES
TEST 322	PHTHALATE ESTERS
TEST 323	NITROSAMINES
TEST 324	NITROAROMATICS AND ISOPHORONE
TEST 325	POLYNUCLEAR AROMATIC HYDROCARBONS

TEST 326	HALOETHERS
TEST 327	CHLORINATED HYDROCARBONS
TEST 329	BASE/NEUTRALS AND ACIDS
TEST 331	OIL AND GREASE
TEST 332	GROSS HYDROCARBONS (TPH)

№ 455

STATE OF MARYLAND

DEPARTMENT OF HEALTH AND MENTAL HYGIENE
LABORATORIES ADMINISTRATION

Certifies That

INDUSTRIAL CORROSION MANAGEMENT, INC
1152 Route 10, Randolph, New Jersey 07869

having duly met the requirements of the

Regulations Governing Laboratory Certification
And Standards Of Performance In Accordance With
The Annotated Code of Maryland,
is hereby approved as a

State Certified Water Quality Laboratory

To perform the analyses indicated on the Annual Certified Parameter List,
which must accompany this certificate.

Approved Analyses: **Metals 1,2; Inorganic 1,2,3,5; VOC 1**

Certification # **244**

Date Issued **October 29, 1996**

Expiration Date **September 30, 1997**
(Not Transferable)

J. Mehsen Joseph
Director, Laboratories Administration

This certification is subject to unannounced laboratory inspections

PREVIOUSLY DISPLAYED IN THE LABORATORY WITH THE ANNUAL CERTIFIED PARAMETER LIST

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Section 7

Services

Services

ICM Laboratories strives to meet the needs of our clients. Our professionals work diligently to provide high quality data and manage analytical projects to meet all client specifications.

Highlights of the services we offer are as follows:

Rush Analysis

ICM realizes that emergencies can arise and analytical information is required as fast as possible. We have established systems within in the laboratory to be able to accommodate samples which require expedited turnaround times. ICM routinely analyzes parameters such as Petroleum Hydrocarbons and Volatiles in 24 hours.

Sample Shuttles

Logistics play an important role for a laboratory. Samples must arrive within a certain time frame in order to meet various regulatory agency requirements. ICM provides sample pick-up and delivery service to aid our clients within a 175 mile radius. We employ overnight carrier services for distances greater than 175 miles.

Sample pick-up service typically requires a 24 hour notice to be scheduled. We do, however, accommodate clients that have emergency situations and require sample transportation immediately, as best as possible.

ICM drivers are trained in sample handling and custody procedures. They have also been trained in sampling and can perform tests such as pH, temperature, conductivity, dissolved oxygen, and residual chlorine.

ICM provides sample containers and laboratory de-ionized water to our clients. Sample container glassware is purchased from I-Chem and is certified clean. Our laboratory de-ionized water is a Polymetric System and produces 16 megohm-cm or better. This exceeds Type I through Type III water quality requirements.

Sampling

Field sampling services are available for the collection of ground water samples. We routinely sample monitoring wells, industrial discharges, surface waters, and potable water. All our field samplers are certified in accordance with OSHA regulations.

Sales & Client Services

Our sales and client service staff are our main point of contact with our clients. Our representatives are knowledgeable about environmental testing procedures and regulations and must be able to communicate information to and from our clients.

Client Services set up the analytical programs for each client and communicate specific project requirements to the laboratory via an IBM mainframe computer. Client Services coordinate the sample shuttle service and are available to give project status on the telephone.

Our Sales staff have technical backgrounds and are a useful resource to our client. They are able to answer questions regarding common laboratory technical issues. The sales staff meet with our clients to work out project information and relay the information to the laboratory.

Bulletin Board Program

In response to our client's request, ICM has developed a Bulletin Board Program that will notify a client of a permit or action level exceedence. Our Bulletin Board System could be utilized by any client that wishes to be notified if their results exceed a certain threshold level. This system works quite simply. At the onset of a project, the client would discuss with either the Sales or Client Service representative the action or permit levels for particular project. The ICM representative will then set the program up for the client in the IBM AS/400 Mainframe System.

As the analysts enter their results for the samples, they are made aware of the threshold levels. If any of the results exceed the levels indicated by the client, the information is immediately entered into the Bulletin Board System.

The Bulletin Board entries are then received by the appropriate Client Service Representative. This individual verbally notifies the client of the sample excursion. Immediately following verbal notification, the representative will send a written notification of the excursion via fax.

Immediate notification of exceeded permit limits or threshold levels can save thousands of dollars. You now have opportunity to resample to bring your monthly averages down or quickly act on a site when necessary.

Computer Data Management

1. Computer System

ICM maintains an IBM AS400 Model E20 computer system which supports 250 devices (terminals, printers) and has 32 megabytes of RAM and 3 gigabit of storage. The AS400 is infinitely expandable.

The IBM system provides in house sample tracking, analytical calculations, reporting, laboratory Standard Operating Procedures, as well as ordering of supplies, equipment inventory, accounting, billing, and payroll. All software is developed by ICM. We have two programmers/operators available full time to make changes and modifications as necessary. Any modification to the software are thoroughly checked by the laboratory and QA personnel before they are placed on line.

2. Back-ups

All data on the IBM is backed up daily (including weekends). Two separate back-up copies are maintained and rotated every other day. Back-up is performed and secured by the two computer programmer/operators. One copy of the back-up always remains off premise. Recovery can be made easily from the back-ups. In cases where recovery has been required, the back-up was able to restore the system within hours without any data or software loss.

3. Security

ICM utilizes the security system that IBM has created for the AS400. Access to the system is restricted by programming that IBM developed and ICM maintains. Only the two programmers have access to the source code and data files. Individual users can only perform their assigned tasks on the system. The user is given a security classification and must remain within the classification's level of clearance.

The area that houses the computer system hardware is always restricted and locked.

4. Electronic Data Transfer

Computer technology has come a long way in the past years. Information can now be transferred instantaneously and decisions can be made quickly. ICM has always believed in the efficiency created through computerization and automation.

As a service to our clients, ICM does offer electronic data transfer. The AS400 permits external communication via mode, TCP/IP and other protocols. Initially, ICM would meet with the client and discuss the format which they would like their data presented. ICM would then develop the format and ask the client to review it for approval.

Once the format is developed, we would implement the program into the laboratory information management system. As the work comes into the laboratory, all information developed for the client would be linked by account and project number.

As for the formats that ICM offers, we generally set up our clients in Lotus, FoxPro, or Quatro Pro. Currently our clients mostly request spreadsheet summary tables for their electronic data. However, some have requested database setups such as FoxPro.

Although we mostly offer Lotus, ICM is very flexible and will work hard to meet our client's needs. ICM's computer programmers will speak with our client's computer people and set up a system that would best meet the client's needs.

Reporting

Several levels of reporting packages are offered based on the levels of quality assurance and deliverables required. Deliverables offered are those required by the State of New Jersey, New York, and Pennsylvania. ICM is flexible and can customize a report to meet another state or client requirements.

The following is a summation of the report packages offered. For a more detailed accounting of the individual contents of each package please review the Appendix section of this document. A report will be generated per chain of custody received, unless otherwise specified by the client.

1. Full Laboratory Data Deliverables--US EPA CLP Methods

   US EPA Statement of Work forms are used to report the data. This report package offers a high level of quality assurance data. Specific US EPA CLP methods are utilized to perform the analysis. ICM utilizes the organics and inorganics most current Multi-Media, Multi-Concentration Statement of Work.

2. Full Laboratory Data Deliverables--Non-USEPA CLP Methods

This package is commonly termed "Regulatory Format". Similar to the CLP package, Regulatory Format offers a high level of quality assurance. Typically, this package is solely required in New Jersey. Methods utilized for this deliverable are from SW-846 and 40 CFR 136, 141 and 142. New Jersey State forms are used to report the data.

3. Reduced Laboratory Data Deliverables--USEPA CLP Methods

ICM has termed this package "CLP II". Samples for this deliverable would be run according to USEPA CLP methods, however the report package would not include the comprehensive quality assurance deliverables the first option offered. CLP result forms would still be used in this package.

4. Reduced Laboratory Data Deliverables--Non-USEPA CLP Methods

This is the most commonly requested deliverable package. ICM calls this deliverable package Reduced Deliverables II. Methodologies utilized for this deliverable would be SW-846, 40 CFR 136, 141, and 142, as well as Standard Methods etc. ICM delivers the data for this report on its own forms. Reduced Deliverables II is typically used for site remediation.

5. Reduced Laboratory Data Deliverables--NPDES

In the past this package has been called "Tier II". The deliverables are taken from the Division of Hazardous Waste Management Remedial Investigation Guidance Document. ICM reporting forms are used and methods utilized are the same as for the Reduced Deliverables II package. ICM calls this package "Reduced Deliverables I.

6. NYSDEC ASP Category A

All methods and reporting criteria are packaged in accordance with NYSDEC ASP. This package has a minimal level of quality assurance criteria. ICM reporting forms are used for the data.

7. NYS ASP Category B

All methods and reporting criteria are packaged in accordance with NYSDEC ASP. The level of quality assurance criteria is extensive in this package. ICM reporting forms are used in this package.

8. NYS DEC CLP Package

   All methods and reporting criteria are packaged in accordance with NYS DEC. The level of quality assurance is similar to USEPA CLP full deliverables. CLP forms are used to report the data.

9. Standard Report

   The standard report is our basic package. This report includes a field chain of custody, sample results, and surrogate recoveries for organic analysis.

Billing

The billing department prepares all invoices based on quotations prepared for the client from the sales department. Clients are billed on a per sample per chain of custody basis. Therefore, if a client has sent 10 samples on one day and another 20 on the next, the 10 samples will be billed separately from the 20.

Appendix I

APPENDIX
FULL INORGANICS
COMPLETE SDG FILE (CSF)
INVENTORY SHEET

Lab Name: _____ City/State: _____

Case No. _____ SDG No. _____ SDG Nos. to Follow: _____ _____ _____

SAS No. _____ Contract No. _____ SOW No. _____

All documents delivered in the Complete SDG File must be original documents where possible. (Reference Exhibit B, Section II F and Section III U)

	Page Nos.		(Please Check:)	
	From	To	Lab	Region
1. Inventory Sheet (DC-2) (Do not number)			___	___
2. Cover Page	___	___	___	___
3. Inorganic Analysis Data Sheet (Form I-IN)	___	___	___	___
4. Initial & Continuing Calibration Verification (Form IIA-IN)	___	___	___	___
5. CRDL Standards For AA and ICP (Form IIB-IN)	___	___	___	___
6. Blanks (Form III-IN)	___	___	___	___
7. ICP Interference Check Sample (Form IV-IN)	___	___	___	___
8. Spike Sample Recovery (Form VA-IN)	___	___	___	___
9. Post Digest Spike Sample Recovery (Form VB-IN)	___	___	___	___
10. Duplicates (Form VI-IN)	___	___	___	___
11. Laboratory Control Sample (Form VII-IN)	___	___	___	___
12. Standard Addition Results (Form VIII-IN)	___	___	___	___
13. ICP Serial Dilutions (Form IX-IN)	___	___	___	___
14. Instrument Detection Limits (Form X-IN)	___	___	___	___
15. ICP Interelement Correction Factors (Form XIA-IN)	___	___	___	___
16. ICP Interelement Correction Factors (Form XIB-IN)	___	___	___	___
17. ICP Linear Ranges (Form XII-IN)	___	___	___	___
18. Preparation Log (Form XIII-IN)	___	___	___	___
19. Analysis Run Log (Form XIV-IN)	___	___	___	___
20. ICP Raw Data	___	___	___	___
21. Furnace AA Raw Data	___	___	___	___
22. Mercury Raw Data	___	___	___	___

Form DC-2 ILM03.0

		Page Nos.		(Please Check:)	
		From	To	Lab	Region
23.	Cyanide Raw Data	___	___	___	___
24.	Preparation Logs Raw Data	___	___	___	___
25.	Percent Solids Determination Log	___	___	___	___
26.	Traffic Report	___	___	___	___
27.	EPA Shipping/Receiving Documents				
	Airbill (No. of Shipments ___)	___	___	___	___
	Chain-of-Custody Records	___	___	___	___
	Sample Tags	___	___	___	___
	Sample Log-In Sheet (Lab & DCl)	___	___	___	___
	SDG Cover Sheet	___	___	___	___
28.	Misc. Shipping/Receiving Records (list all individual records)				
	Telephone Logs	___	___	___	___
	_____	___	___	___	___
	_____	___	___	___	___
29.	Internal Lab Sample Transfer Records & Tracking Sheets (describe or list)	___	___	___	___
	_____	___	___	___	___
	_____	___	___	___	___
30.	Internal Original Sample Prep & Analysis Records (describe or list)				
	Prep Records _____	___	___	___	___
	Analysis Records _____	___	___	___	___
	Description _____	___	___	___	___
31.	Other Records (describe or list)				
	Telephone Communication Log	___	___	___	___
	_____	___	___	___	___
	_____	___	___	___	___

32. Comments:

_____

_____

Completed by (CLP Lab):

_____	_____	_____
(Signature)	(Print Name & Title)	(Date)

Audited by (EPA):

_____	_____	_____
(Signature)	(Print Name & Title)	(Date)

APPENDIX

ORGANICS COMPLETE SDG FILE (CSF) INVENTORY SHEET

LABORATORY NAME _____
CITY/STATE _____

CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____
_____ _____ SAS NO. _____

CONTRACT NO. _____
SOW NO. _____

All documents delivered in the complete SDG file must be original documents where possible. (REFERENCE EXHIBIT B, SECTION II and SECTION III.)

	PAGE NOs FROM	PAGE NOs TO	CHECK LAB	CHECK EPA
Inventory Sheet (Form DC-2) (Do not number)	___	___	___	___
SDG Case Narrative	___	___	___	___
SDG Cover Sheet/Traffic Report	___	___	___	___
Volatiles Data				
a. QC Summary				
System Monitoring Compound Summary (Form II VOA)	___	___	___	___
Matrix Spike/Matrix Spike Duplicate Summary (Form III VOA)	___	___	___	___
Method Blank Summary (Form IV VOA)	___	___	___	___
GC/MS Instrument Performance Check (Form V VOA)	___	___	___	___
Internal Standard Area and RT Summary (Form VIII VOA)	___	___	___	___
b. Sample Data	___	___		
TCL Results - (Form I VOA)			___	___
Tentatively Identified Compounds (Form I VOA-TIC)			___	___
Reconstructed total ion chromatograms (RIC) for each sample			___	___
For each sample:				
Raw spectra and background-subtracted mass spectra of target compounds identified			___	___
Quantitation reports			___	___
Mass spectra of all reported TICs with three best library matches			___	___
c. Standards Data (All Instruments)	___	___		
Initial Calibration Data (Form VI VOA)			___	___
RICs and Quan Reports for all Standards			___	___
Continuing Calibration Data (Form VII VOA)			___	___
RICs and Quantitation Reports for all Standards			___	___
d. Raw QC Data				
BFB	___	___	___	___
Blank Data	___	___	___	___
Matrix Spike/Matrix Spike Duplicate Data	___	___	___	___

ORGANICS COMPLETE SDG FILE (CSF) INVENTORY SHEET (Cont.)

CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____
_____ _____ SAS NO. _____

	PAGE NOs FROM	PAGE NOs TO	CHECK LAB	CHECK EPA
Semivolatiles Data				
a. QC Summary				
Surrogate Percent Recovery Summary (Form II SV)	___	___	___	___
MS/MSD Summary (Form III SV)	___	___	___	___
Method Blank Summary (Form IV SV)	___	___	___	___
GC/MS Instrument Performance Check (Form V SV)	___	___	___	___
Internal Standard Area and RT Summary (Form VIII SV)	___	___	___	___
b. Sample Data				
TCL Results (Form I SV-1, SV-2)	___	___		
Tentatively Identified Compounds (Form I SV-TIC)			___	___
Reconstructed total ion chromatograms (RIC) for each sample			___	___
For each sample:				
Raw spectra and background-subtracted mass spectra of target compounds			___	___
Quantitation reports			___	___
Mass spectra of TICs with three best library matches			___	___
GPC chromatograms (if GPC performed)			___	___
c. Standards Data (All Instruments)				
Initial Calibration Data (Form VI SV-1, SV-2)	___	___		
RICs and Quan Reports for all Standards			___	___
Continuing Calibration Data (Form VII SV-1, SV-2)			___	___
RICs and Quantitation Reports for all Standards			___	___
Semivolatile GPC Calibration Data-UV detector traces			___	___
d. Raw QC Data				
DFTPP				
Blank Data	___	___	___	___
Matrix Spike/Matrix Spike Duplicate Data	___	___	___	___
	___	___	___	___
Pesticides				
a. QC Summary				
Surrogate Percent Recovery Summary (Form II PEST)	___	___	___	___
MS/MSD Duplicate Summary (Form III PEST)	___	___	___	___
Method Blank Summary (Form IV PEST)	___	___	___	___

CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____
_____ _____ SAS NO. _____

	PAGE NOs FROM	TO	CHECK LAB	EPA
Pesticides (cont.)				
b. Sample Data	___	___		
TCL Results - Organic Analysis Data Sheet (Form I PEST)			___	___
Chromatograms (Primary Column)			___	___
Chromatograms from second GC column confirmation			___	___
GC Integration report or data system printout			___	___
Manual work sheets			___	___
For pesticides/Aroclors confirmed by GC/MS, copies of raw spectra and copies of background-subtracted mass spectra of target compounds (samples & standards)			___	___
c. Standards Data	___	___		
Initial Calibration of Single Component Analytes (Form VI PEST-1 and PEST-2)			___	___
Initial Calibration of Multicomponent Analytes (Form VI PEST-3)			___	___
Analyte Resolution Summary (Form VI PEST-4)			___	___
Calibration Verification Summary (Form VII PEST-1)			___	___
Calibration Verification Summary (Form VII PEST-2)			___	___
Analytical Sequence (Form VIII PEST)			___	___
Florisil Cartridge Check (Form IX PEST-1)			___	___
Pesticide GPC Calibration (Form IX PEST-2)			___	___
Pesticide Identification Summary for Single Component Analytes (Form X PEST-1)			___	___
Pesticide Identification Summary for Multicomponent Analytes (Form X PEST-2)			___	___
Chromatograms and data system printouts A printout of retention times and corresponding peak areas or peak heights			___	___
Pesticide GPC calibration data - UV detector traces			___	___
d. Raw QC Data				
Blank Data	___	___	___	___
Matrix Spike/Matrix Spike Duplicate Data	___	___	___	___

ORGANICS COMPLETE SDG FILE (CSF) INVENTORY SHEET (Cont.)

CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____
_____ _____ SAS NO. _____

	PAGE NOs FROM	TO	CHECK LAB	EPA
Miscellaneous Data				
Original preparation and analysis forms or copies of preparation and analysis logbook pages	___	___	___	___
Internal sample and sample extract transfer chain-of-custody records	___	___	___	___
Screening records	___	___	___	___
All instrument output, including strip charts from screening activities (describe or list)				
_____	___	___	___	___
_____	___	___	___	___
EPA Shipping/Receiving Documents				
Airbills (No. of shipments ___)	___	___	___	___
Chain-of-Custody Records	___	___	___	___
Sample Tags	___	___	___	___
Sample Log-In Sheet (Lab & DC1)	___	___	___	___
Miscellaneous Shipping/Receiving Records (describe or list)				
_____	___	___	___	___
_____	___	___	___	___
Internal Lab Sample Transfer Records and Tracking Sheets (describe or list)				
_____	___	___	___	___
_____	___	___	___	___
Other Records (describe or list)				
Telephone Communication Log	___	___	___	___
_____	___	___	___	___
_____	___	___	___	___

Comments: _____

Completed by: _____ _____ _____
(CLP Lab) (Signature) (Printed Name/Title) (Date)

Audited by: _____ _____ _____
(EPA) (Signature) (Printed Name/Title) (Date)

Appendix II

APPENDIX

ORDER OF DATA DELIVERABLES FOR NJDEPE REGULATORY FORMAT

Title Page

Table of Contents

Chain of Custody
- -External(Field C-of-C)
- -Internal

Methodologies

Data Summary Package
- -Nonconformance Summary

- -GC/MS Volatiles
  - -Quality Control Data
    - Tune summary
    - Surrogate recovery summary
    - Method blank summary
    - MS/MSD summary
    - Internal standard summary
    - Calibration summary
  - -Sample Data Package
    - Sample results and MDLs
    - Sample chromatograms
    - Quantitation reports
    - Mass spectra
    - Library searches
  - -Standards Data Package
    - Initial calibration data
    - Continuing calibration data
    - Chromatograms, quantitation reports, spectra of stds.
  - -Raw QC Data package
    - BFB spectra and mass listing
    - Method blank chromatogram, quantitation reports and mass spectra
    - MS/MSD chromatograms, quantitation reports and mass spectra
    - Copy of Instrument Run Log

- -GC/MS Extractables
  - -Quality Control Data
    - Tune summary
    - Surrogate recovery summary
    - Method blank summary
    - MS/MSD summary
    - Internal standard summary
    - Calibration

-Sample Data Package
  Sample results and MDLs
  Sample chromatograms
  Quantitation reports
  Mass spectra
  Library searches
-Standards Data Package
  Initial calibration data
  Continuing calibration data
  Chromatograms, quantitation reports, spectra of stds.
-Raw QC Data Package
  DFTPP spectra and mass listing
  Method blank chromatogram, quantitation reports and mass spectra
  MS/MSD chromatograms, quantitation reports and mass spectra
  Copy of Instrument Run Log
-Extraction Logs
-GPC Analysis
  U.V. traces for all initial calibrations
  Weekly calibrations
  Daily calibrations
  Blanks
  Verify that:
    -all peaks are identified
    -% resolution calculations

-GC Analysis
-Quality Control Data
  Surrogate recovery summary
  Method blank summary
  MS/MSD summary
  Calibration summary
-Sample Data Package
  Sample results and MDLs
  Sample chromatograms
  Quantitation reports
  Confirmatory chromatogram
  Confirmatory quantitation report
-Standards Data Package
  Initial calibration data
  Continuing calibration data
  Chromatograms, quantitation reports, spectra of stds.
  Calibration data for confirmation columns
-Raw QC Data Package
  Method blank chromatogram, quantitation report
  MS/MSD chromatogram
  Copy of Instrument Run Log
-Extraction Logs
-GPC Analysis
  U.V. traces for all initial calibrations
  Weekly calibrations
  Daily calibrations
  Blanks
  Verify that:
    -all peaks are identified
    -% resolution calculations

-Metals
  -Quality Control Data
    Method blank summary
    MS summary
    Duplicate summary
    Standard addition reports(if applicable)
    Serial dilution summary(ICP)
    Laboratory control sample
    Interference check sample
    Calibration summary
  -Sample Data Package
    Sample results and MDLs
    Quantitation reports
  -Standards Data Package
    Initial calibration data
    Continuing calibration data
    Quantitation reports
    ICAP interference table
  -Raw QC Data Package
    Reagent blank data
    MS data printout
    Duplicate data printout
    Standard addition data(if applicable)
    Serial dilution data(ICP)
    Laboratory control sample data
    Copy of Instrument Run Log

-General Analytical
  -Quality Control Data
    Reagent blank summary
    Duplicate summary
    MS results(if applicable)
    Calibration summary
  -Sample Data Package
    Sample results and MDLs
    Quantitation reports
  -Standards Data Package
    Initial calibration data
    Continuing calibration data(if applicable)
    Quantitation reports
  -Raw QC Data Package
    Reagent blank data
    MS data printout
    Duplicate data printout

-TCLP
  -Quality Control Data
    Method blank summary
    TCLP blank summary
  -Sample Data Package
    Sample results summary

Appendix III

APPENDIX

ORDER OF DATA DELIVERABLES FOR REDUCED DELIVERABLES II

Title/Cover Page

Chain of Custody
External Chain of Custody
Internal Chain of Custody

Methodology Review

Laboratory Chronicles

Conformance/Non-conformance Summary

Analytical Results(in numerical order) Each Lab number is in the following order:

-GC/MS Volatile Results, plus report(if requested), worksheet, chromatogram, spectra
-GC/MS Semivolatile Results, plus report(if requested), worksheet chromatogram, spectra
-GC Results, chromatogram/s
-Metals Results
-General Chemistry Results
-Petroleum Hydrocarbon Results

All analytical result pages for organic analyses will contain the following information: date sample received, date sample extracted, data sample analyzed, sample weight/volume, sample moisture content, dilution factor, GC column, list of analytes, method detection limit, practical quantitation limit and detected analyte concentrations.

Analytical result pages for inorganic analyses will contain the following information: sample identification number, sample matrix, date sample received, date sample analyzed, sample moisture content, dilution factor, list of target analytes and detected analyte concentrations and method detection limits.

Quality Assurance data (in the same order as the Lab Reports)
For GC/MS Analyses(Volatiles, Semivolatiles):

-Tuning Results Summary
-Method Blank Results Summary
-Calibration Summary
-Surrogate Recovery Summary
-Matrix Spike/Matrix Spike Duplicate Results Summary
-Internal Standard Summary

For GC Analyses:
-Method Blank Results Summary
-Standards Summary
-Surrogate Recovery Summary
-Matrix Spike/Matrix Spike Duplicate Results Summary
-Retention Time Shift Summary(if applicable)

For Metals Analyses:
-Blank Results Summary
-Calibration Summary
-ICP Interference Check Sample Results Summary
-Spike Sample Results Summary
-Duplicate Sample Results Summary
-Laboratory Control Sample Results Summary
-Serial Dilution Summary

For General Chemistry Analyses:
-Blank Results Summary
-Spike Sample Results Summary
-Duplicate Sample Results Summary

For Petroleum Hydrocarbon Analyses:
-Blank Results Summary
-Spike Sample Results Summary
-Duplicate Sample Results Summary
-IR spectra for standards, blanks and samples

Appendix IV

APPENDIX

ORDER OF DATA DELIVERABLES FOR REDUCED DELIVERABLES I

Title Page

Table of Contents

Data Summary

Laboratory/Client Cross Reference Page

Deliverables Checklist

Field Chain of Custody

Analysis Request

Laboratory Chronicles

Conformance/Nonconformance Summary

Methodology Summaries (in the same order as Lab Reports)

Analytical Results(in numerical order)-Each Lab number is in the following order:

- -VOA results, plus report(if requested), quant report, chromatogram, spectra
- -AF results, plus report(if requested), quant report, chromatogram, spectra
- -BN results, plus report(if requested), quant report, chromatogram, spectra
- -Pest/PCB results, chromatogram
- -Metals
- -Pet. Hydro
- -General Analytical

(All analytical result sheets will contain the results, Method Detection Limit and blank results)

Quality Assurance data (in the same order as the Lab Reports)

For GC/MS analyses (VOAs, ABNs):

- -Non-targeted peaks for the blank (if samples required plus peaks)
- -Blank quant report, chromatogram, spectra
- -Surrogate summary sheet
- -Spike/Spike Duplicate summary sheet
- -Tune sheets
- -Initial and Continuing Calibration sheets

For Pest/PCBs analyses:
- Blank chromatogram
- Surrogate summary sheet
- Retention time shift-with initial and continuing calibration dates (if required by the method)
- Spike/Spike Duplicate summary sheet
- Chromatogram of standard(if there is a hit in the sample)

Metals analyses:
- Duplicate summary sheet
- Spike recovery summary sheet

Petroleum Hydrocarbon and General Analytical analyses:
- Spike recovery summary sheet
- Duplicate summary sheet

NYSDEC ASP Category A

1. SDG Narrative:
   -containing laboratory name, SDG number, samples in SDG and a description of any problems encountered(manual edits). The SDG shall also include the standard verbatim used for CLP packages, with the Laboratory Managers signature.

2. Contract Lab Sample Information Sheets(CLSIS)

3. NYSDEC Data Package Summary Forms

4. Chain-of-Custody Forms(both external and internal)

5. Sample Data
   a. GC/MS Volatile Data
      Result Page (Form I-VOA)
      Tenatively Identified Compounds (Form I-VOA-TICs)
   b. GC/MS Semivolatile Data
      Result Page (Form I-SV-1 SV-2)
      Tenatively Identified Compounds (Form I-SV-TICs)
   c. Pesticide/PCB Data
      Result Page (Form I-PEST)
   d. GC Organic Data
      Result Page
   e. Inorganic Data
      Result Page (Form I-IN)
   f. Toxicity Characteristic Leaching Procedure(TCLP) Data
      Result Page (Form I-TCLP)

Appendix VI

NYSDEC ASP Category B

1. SDG Narrative
-shall include Laboratory name, Case number, Sample Delivery Group(SDG), sample numbers in SDG, Contract number, and any problems encountered(including an explanation for all flagged edits-manual edits-on quantitation lists). The SDG shall also include the standard verbatim used for CLP packages, with the Laboratory Manager signature.

2. Contract Lab Sample Information Sheets(CLSIS)

3. NYSDEC Data Package Summary Forms

4. Chain of Custody Forms
-both external and internal chain-of-custodies for each sample

5. GC/MS Volatiles Data
   a. QC Summary
      (1) System Monitoring Compound Summary(Form II-VOA)
      (2) Matrix Spike/Matrix Spike Duplicate Summary(Form III-VOA)
      (3) QC Check Sample/Standard
      (4) Method Blank Summary(Form IV-VOA)
      (5) GC/MS Instrument Performance Check(Form V-VOA)
      (6) Instrument Detection Limits

   b. Sample Data
      (1) Organic Analysis Data Sheet(Form I-VOA)
      (2) Tentatively Identified Compounds(Form I-VOA-TIC)
      (3) Reconstructed Total Ion Chromatograms(RIC) for each sample
      (4) Quantitation reports
      (5) Spectra of all compounds identified in the sample

   c. Standards Data
      (1) Initial Calibration Data(Form VI-VOA)
          Initial stds. RICs and quantitation reports
      (2) Continuing Calibration Data (Form VII-VOA)
          Continuing stds. RICs and quantitation reports

   d. Raw QC Data
      (1) BFB for each 12 hour period
          Bar graph spectrum
          Mass listing
          RIC
      (2) Blank Data
          Results (Form I-VOA)
          Tentatively Identified Compounds (Form-I-VOA-TIC)
          RIC and quantitation report
          Spectra for all compounds identified in the sample
      (3) Matrix Spike Blank Data
          Results (Form I-VOA)
          RIC and quantitation report

(4) Matrix Spike Data
Results (Form I-VOA)
RIC and quantitation report
(5) Matrix Spike Duplicate Data
Results (Form I-CLP-VOA)
RIC and quantitation report
(6) QC Check Sample/Standard
Results (Form I-VOA)
RIC and quantitation report

e. Copy of Calculations

f. Copy of Extraction Logs

6. GC/MS Semivolatiles Data

a. QC Summary
(1) Surrogate Percent Recovery Summary (Form II-SV)
(2) Matrix Spike/Matrix Spike Duplicate Summary (Form III-SV)
(3) QC Check Sample/Standard
(4) Method Blank Summary (Form IV-SV)
(5) GC/MS Instrument Performance Check (Form V-SV)
(6) Internal Standard Area and RT Summary (Form VIII-SV)
(7) Instrument Detection Limits

b. Sample Data
(1) Organic Analysis Data Sheet (Form I-SV-1,SV-2)
(2) Tentatively Identified Compounds (Form I-SV-TIC)
(3) RICs for each sample
(4) Quantitation reports
(5) Spectra of all compounds identified in the sample
(6) GPC chromatograms(if applicable)

c. Standards Data
(1) Initial Calibration Data (Form VI-SV-1, SV-2)
Initial stds RICs and quantitation reports
(2) Continuing Calibration Data (Form VII-SV-1, SV-2)
Continuing stds RICs and quantitation reports
(3) Internal Standard Area Summary (Form VIII-SV-1, SV-2)
(4) GPC Calibration Data

d. Raw QC Data
(1) DFTPP for each 12 hour period
Bar graph spectrum
Mass listing
RIC
(2) Blank Data
Results (Form I-SV-1, SV-2)
TIC (Form I-SV-TIC)
RIC and quantitation report
Spectra for all compounds identified in the sample

(3) Matrix Spike Blank Data
Results (Form I-SV-1, SV-2)
RIC and quantitation report
Spectra for all compounds identified in the sample
(4) Matrix Spike Data
Results (Form I-SV-1, SV-2)
RIC and quantitation report
(5) Matrix Spike Duplicate Data
Results (Form I-SV-1, SV-2)
RIC and quantitation report
(6) QC Check Sample/Standard Results (FORM I-SV, SV-2)
RIC and quantitation report

e. Copy of Calculations

f. Copy of Extraction Logs

7. GC/ECD Pesticide/Aroclor Data
a. QC Summary
(1) Surrogate Percent Recovery Summary (Form II-PEST)
(2) Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank Summary (Form III-PEST)
(3) QC Check Sample/Standard Recovery
(4) Method Blank Summary (Form IV-PEST)
(5) Instrument Detection Limits

b. Sample Data
(1) Organic Analysis Data Sheet (Form I-PEST)
(2) Copies of pesticide chromatograms(first and second GC column)
(3) UV traces from GPC, if applicable
(4) GC/MS confirmation, if applicable

c. Standards Data
(1) Initial Calibration of Single Component Analytes (Form VI-PEST-1 and PEST-2)
(2) Initial Calibration of Multicomponent Analytes (Form VI-PEST-3)
(3) Analyte Resolution Summary (Form VI-PEST-4)
(4) Calibration Verification Summary (Form VII-PEST-1)
(5) Calibration Verification Summary (Form VII-PEST-2)
(6) Analytical Sequence (Form VIII-PEST)
(7) Florisil Cartridge Check (Form IX-PEST-1)
(8) Pesticide GPC Calibration (Form IX-PEST-2), if applicable
(9) Pesticide Identification Summary for Single Component Analytes (Form X-PEST-1)
(10) Pesticide Identification Summary for Multicomponent Analytes (Form X-PEST-2)
(11) Chromatograms and data system printouts for all standards
(12) Pesticide GPC Calibration Data

d. Raw QC Data
   (1) Blank Data
       Results (Form I-PEST)
       Chromatogram and data system printout
   (2) Matrix Spike Data
       Results (Form I-PEST)
       Chromatogram and data system printout
   (3) Matrix Spike Duplicate Data
       Results (Form I-PEST)
       Chromatogram and data system printout
   (4) Matrix Spike Blank Data
       Results (Form I-PEST)
       Chromatogram and data system printout
   (5) QC Check Sample/Standard
       Results (Form I-PEST)
       Chromatogram and data system printout

e. Copy of Calculations

f. Copy of Extraction Logs

8. GC Organic Data
   a. QC Summary
      (1) Surrogate Percent Recovery Summary (Form II-GC)
      (2) Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank Summary (Form III-GC)
      (3) QC Check Sample/Standard Results (Form I-PEST)
          Chromatograms and data system printouts
      (4) Method Blank Summary (Form IV-GC)
      (5) Instrument Detection Limits

   b. Sample Data
      (1) Organic Analysis Data Sheet (Form I-GC)
      (2) Copies of chromatograms and data system printouts for first and second columns
      (3) GPC chromatograms, if applicable

   c. Standards Data
      (1) Initial Calibration Data
      (2) Continuing Calibration Data
      (3) QC Check Sample/Standard
      (4) Standard chromatograms and data system printouts for all standards

   d. Raw QC Data
      (1) Blank Data
          Results
          Chromatogram and data system printout
      (2) Matrix Spike Data
          Results
          Chromatogram and data system printout

(3) Matrix Spike Duplicate Data
Results
Chromatogram and data system printout
(4) QC Check Sample/Standard
Results
Chromatogram and data system printout

e. Copy of Calculations

f. Copy of Extraction Log

9. Inorganic Data
a. Inorganic Analysis Data Sheet (Form I-IN)

b. Quality Control Data
(1) Initial and Continuing Calibration Verification (Form II-IN (Part 1))
(2) CRDL Standard for AA and Linear Range Analysis for ICP (Form II-IN (Part 2))
(3) Blanks (Form III-IN)
(4) ICP Interference Check Sample (Form IV-IN)
(5) Spike Sample Recovery (Form V-IN (Part 1))
(6) Post Digest Spike Sample Recovery (Form V-IN (Part 2))
(7) Duplicates (Form VI-IN)
(8) Quality Control Sample (Form VII-IN)
(9) Standard Addition Results (Form VIII-IN)
(10) ICP Serial Dilutions (Form IX-IN)
(11) Holding Times (Form X-IN)

c. Verification of Instrument Parameters
(1) Instrument Detection Limits (Quarterly) (Form XI-IN)
(2) ICP Interelement Correction Factors (Annually) (Form XII-IN (Part 1))
(3) ICP Interelement Correction Factors (Annually) (Form XII-IN (Part 2))
(4) ICP Linear Ranges (Quarterly) (Form XIII-IN)

d. Raw Data
-must contain all instrument readouts including: standards, duplicates, sample results, including those readouts that may fall below the IDL.

e. Digestion Logs

10. Wet-Chemical Data
    a. Result Sheet

    b. Quality Control Data
        (1) Initial and Continuing Calibration Verification
        (2) CRQL Standard for Wet-Chemical Analysis
        (3) Blanks
        (4) Spike Sample Recovery
        (5) Post Digest Sample Recovery
        (6) Duplicates
        (7) Laboratory Control Sample
        (8) Holding Times

    c. Raw Data
        -shall include all instrument readouts used to obtain sample results, standards and duplicates.

    d. Digestion and Distillation Logs

11. Toxicity Characteristic Leaching Procedure(TCLP) Data

    a. Results (Form I-TCLP)

    b. TCLP Inorganic Quality Control Data
        (1) Initial and Continuing Calibration Verification (Form II-IN (Part 1))
        (2) CRDL Standard for AA and Linear Range Analysis for ICP (Form II-IN (Part 2))
        (3) Blanks (Form III-IN)
        (4) ICP Interference Check Sample (Form IV-IN)
        (5) Spike Sample Recovery (Form V-IN (Part 1))
        (6) Post Digest Spike Sample Recovery (Form V-IN (Part 2))
        (7) Duplicates (Form VI-IN)
        (8) Quality Control Sample (Form VII-IN)
        (9) Standard Addition Results (Form VIII-IN)
        (10) ICP Serial Dilutions (Form IX-IN)
        (11) Holding Times (Form X-IN)

    c. Verification of Instrument Parameters
        (1) Instrument Detection Limits (Quarterly) (Form XI-IN)
        (2) ICP Interelement Correction Factors (Annually) (Form XII-IN (Part 1))
        (3) ICP Interelement Correction Factors (Annually) (Form XII-IN (Part 2))
        (4) ICP Linear Ranges (Quarterly) (Form XIII-IN)

    d. Raw Data

    e. Digestion Logs

Appendix VII

INORGANICS COMPLETE SDG FILE (CSF) INVENTORY SHEET

LABORATORY NAME _____ CITY/STATE _____
CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____ _____ _____ SAS NO. _____
CONTRACT NO. _____ ASP DATE _____

All documents delivered in the complete SDG file must be original documents where possible. (REFERENCE EXHIBIT B, SECTION II AND III.)

		PAGE NOS. FROM	PAGE NOS. TO	CHECK LAB	CHECK NYSDEC
1.	Inventory Sheet (Form DC-2) (Do not number)				
2.	Cover Page				
3.	Inorganic Analysis Data Sheet (FORM I - IN)				
4.	Initial & Continuing Calibration Verification (FORM IIA - IN)				
5.	CRDL Standards For AA and ICP (FORM IIB - IN)				
6.	Blanks (FORM III - IN)				
7.	ICP Interference Check Sample (FORM IV - IN)				
8.	Spike Sample Recovery (FORM VA - IN)				
9.	Post Digest Spike Sample Recovery (FORM VB - IN)				
10.	Duplicates (FORM VI - IN)				
11.	Laboratory Control Sample (FORM VII - IN)				
12.	Standard Addition Results (FORM VIII - IN)				
13.	ICP Serial Dilutions (FORM IX - IN)				
14.	Instrument Detection Limits (FORM X - IN)				
15.	ICP Interelement Correction Factors (FORM XIA - IN)				
16.	ICP Interference Correction Factors (FORM XIB - IN)				
17.	ICP Linear Ranges (FORM XII - IN)				
18.	Preparation Log (FORM XIII - IN)				
19.	Analysis Run Log (FORM XIV - IN)				
20.	ICP Raw Data				
21.	Furnace AA Raw Data				
22.	Mercury Raw Data				

FORM DC-2-IN-1

INORGANICS COMPLETE SDG FILE (CSF) INVENTORY SHEET (Cont.)

CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____ _____ _____ SAS NO. _____

	PAGE NOS: FROM	TO	CHECK LAB	NYSDEC
23. Cyanide Raw Data				
24. Preparation Logs Raw Data				
25. Percent Solids Determination Log				
26. Contract Lab Sample Information Sheet (CLSIS)				
27. NYSDEC Shipping/Receiving Documents				
Airbill (No. of Shipments ____)				
Chain-of-custody Records				
Sample Tags				
Sample Log-In Sheet (Lab & DC1)				
SDG Cover Sheet				
28. Misc Shipping/Receiving Records				
(list all individual records)				
Telephone Logs				
_____				
_____				
29. Internal Lab Sample Transfer Records &				
Transfer Sheets (describe or list)				
_____				
_____				
30. Internal Original Sample Prep & Analysis				
Records (describe or list)				
Prep Records _____				
Analysis Records _____				
Description _____				
31. Other Records (describe or list)				
Telephone Communications Log				
_____				
_____				
32. Comments:				
_____				
_____				

Completed by (CLP Lab)

_____ _____ _____

(Signature) (Print Name & Title) (Date

Audited by (NYSDEC)

_____ _____ _____

(Signature) (Print Name & Title) (Date

FORM DC-2-IN-2

APPENDIX

ORGANICS COMPLETE SDG FILE (CSF) INVENTORY SHEET

LABORATORY NAME _____ CITY/STATE _____
CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____ _____ _____ SAS NO. _____
CONTRACT NO. _____ ASP DATE _____

All documents delivered in the complete SDG file must be original documents where possible. (REFERENCE EXHIBIT B, SECTION II AND III.)

		PAGE NOS. FROM	PAGE NOS. TO	CHECK LAB	CHECK NYSDEC
1.	Inventory Sheet (Form DC-2) (Do not number)	___	___	___	___
2.	SDG Case Narrative	___	___	___	___
3.	Contract Lab Sample Information Sheet (CLSIS)	___	___	___	___
4.	Volatiles Data				
	a. QC Summary				
	Surrogate Percent Recovery Summary (Form II-CLP-VOA)	___	___	___	___
	Lab Control Sample Recovery (Form III-CLP-VOA	___	___	___	___
	Method Blank Summary (Form IV-CLP-VOA)	___	___	___	___
	Tuning and Mass Calibration (Form V-CLP-VOA)	___	___	___	___
	b. Sample Data				
	TCL Results (Form I-CLP-VOA)	___	___	___	___
	Tentatively Identified Compounds (Form I-CLP-VOA-TIC)			___	___
	Reconstructed total ion chromatograms (RIC) for each sample			___	___
	For each sample: Raw spectra and background-subtracted mass spectra of target compounds identified			___	___
	Mass spectra of all reported TICs with three best library matches			___	___
	c. Standards Data (All Instruments)				
	Initial Calibration Data (Form VI-CLP-VOA)	___	___	___	___
	RICs and Quant Reports for all Standards	___	___	___	___
	Continuing Calibration (Form VII-CLP-VOA)	___	___	___	___
	RICs and Quant Reports for all Standards	___	___	___	___
	Internal Standard Area and RT Summary (Form VIII-CLP-VOA)	___	___	___	___
	d. QC Data				
	BFB	___	___	___	___
	Blank Data	___	___	___	___
	Matrix Spike Blank Data	___	___	___	___
	Matrix Spike Data	___	___	___	___
	Matrix Spike Duplicate Data	___	___	___	___
5.	Semivolatiles Data				
	a. QC Summary				
	Surrogate Percent Recovery Summary (Form II-CLP-SV)	___	___	___	___
	MS/MSD Summary (Form III-CLP-SV)	___	___	___	___
	Method Blank Summary (Form IV-CLP-SV)	___	___	___	___
	Tuning and Mass Calibration (Form V-CLP-SV)	___	___	___	___

ORGANICS COMPLETE SDG FILE (CSF) INVENTORY SHEET (Cont.)

CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____ _____ _____ SAS NO. _____

	PAGE NOS. FROM	TO	CHECK LAB	NYSDEC
5. Semivolatiles Data (cont.)				
b. Sample Data				
TCL Results (Form I-CLP-SV)	___	___	___	___
Tentatively Identified Compounds (Form I-CLP-SV-TIC)			___	___
Reconstructed total ion chromatograms (RIC) for each sample			___	___
For each sample:				
Raw spectra and background-subtracted mass spectra of target compounds identified			___	___
Mass spectra of all reported TICs with three best library matches			___	___
GPC chromatograms (if GPC performed)			___	___
c. Standards Data (All Instruments)				
Initial Calibration Data (Form VI-CLP-SV)	___	___	___	___
RICs and Quant Reports for all Standards	___	___	___	___
Continuing Calibration (Form VII-CLP-SV)	___	___	___	___
RICs and Quant Reports for all Standards	___	___	___	___
Internal Standard Area and RT Summary (Form VIIIB-CLP-SV and Form VIIIC-CLP-SV)	___	___	___	___
d. QC Data				
DFTPP	___	___	___	___
Blank Data	___	___	___	___
Matrix Spike Blank Data	___	___	___	___
Matrix Spike Data	___	___	___	___
Matrix Spike Duplicate Data	___	___	___	___
6. Pesticides				
a. QC Summary				
Surrogate Percent Recovery Summary (Form II-CLP-PEST)	___	___	___	___
MS/MSD Summary (Form III-CLP-PEST)	___	___	___	___
Method Blank Summary (Form IV-CLP-PEST)	___	___	___	___
B. Sample Data				
TCL Results (Form I-CLP-PEST)	___	___	___	___
Chromatograms (Primary Column)			___	___
Chromatograms from second GC column confirmation			___	___
GC Integration report or data system printout and calibration plots			___	___
Manual work sheets			___	___
UV traces from GPC (if available)			___	___
For pesticides/Aroclors confirmed by GC/MS, copies of raw spectra and copies of background-subtracted mass spectra of target compounds (samples & standards)			___	___

FORM DC-2-ORG-2

ORGANICS COMPLETE SDG FILE (CSF) INVENTORY SHEET (Cont.)

CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____ _____ _____ SAS NO. _____

	PAGE NOS. FROM	TO	CHECK LAB	NYSDEC
6. Pesticides Data (cont.)				
c. Standards Data				
Pesticides Evalution Standards Summary (Form VIII-CLP-PEST-1)	___	___	___	___
Pesticides Evalution Standards Summary (Form VIII-CLP-PEST-2)	___	___	___	___
Pesticides/Arocior Standards Summary (Form IX-CLP-PEST)	___	___	___	___
Pesticides/Arocior Identification (Form X-CLP-PEST)	___	___	___	___
Standard chromatograms and data system printout for all Standards	___	___	___	___
For pesticides/Arociors confirmed by GC/MS, copies of spectra for standards used.	___	___	___	___
d. QC Data				
Blank Data	___	___	___	___
Matrix Spike Blank Data	___	___	___	___
Matrix Spike Data	___	___	___	___
Matrix Spike Duplicate Data	___	___	___	___
7. Miscellaneous Data				
Original preparation and analysis forms or copies of preparation and analysis logbook pages	___	___	___	___
Internal sample and sample extract transfer chain-of-custody records	___	___	___	___
Screening records	___	___	___	___
All instrument output, including strip charts from screening activities (describe or list)	___	___	___	___
_____	___	___	___	___
_____	___	___	___	___
8. NYSDEC Shipping/Receiving Documents				
Airbills (No. of shipments ____)	___	___	___	___
Chain-of-Custody Records	___	___	___	___
Sample Tags	___	___	___	___
Sample Log-In Sheet (Lab & DC-1)	___	___	___	___
SDG Cover Sheet	___	___	___	___
Miscellaneous Shipping/Receiving Records (describe or list)				
_____	___	___	___	___
_____	___	___	___	___

FORM DC-2-ORG-3

ORGANICS COMPLETE SDG FILE (CSF) INVENTORY SHEET (Cont.)

CASE NO. _____ SDG NO. _____ SDG NOS. TO FOLLOW _____ _____ _____ SAS NO. _____

	PAGE NOS. FROM	TO	CHECK LAB	NYSDEC
6. Internal Lab Sample Transfer Records and Tracking Sheets (describe or list)				
_____	___	___	___	___
_____	___	___	___	___
10. Other Records (describe or list)				
Telephone Communication Log				
_____	___	___	___	___
_____	___	___	___	___

11. Comments: _____

Completed by: _____ _____ _____
(CLP Lab) (Signature) (Printed Name/Title) (Date)

Audited by: _____ _____ _____
(NYSDEC) (Signature) (Printed Name/Title) (Date)

FORM DC-2-ORG-4

APPENDIX F

QUALIFICATIONS OF KEY PERSONNEL

Richard Parrish, P.G.

6 Florida Avenue
Commack, New York 11725
(516) 543-8822

Highlights of Qualifications

- Proven success in implementing productivity-enhancement programs
- Excellent personnel and financial management skills and experience
- Strong practical and theoretical foundation in improving engineering and production methods
- Solid experience working with government regulatory agencies

Professional Experience

Impact Environmental, Kings Park, New York — 1989-Present
Senior Geologist

Supervised geologists, industrial engineers, environmental biologists and computer analysts to develop and implement sampling and analysis operations, quality assurance programs and performance measurement systems. Managed all aspects of corporate finance and budgeting (one million dollar gross per year). Performed staffing analysis, computer systems analysis, computer simulation programming.

Served as supervisor and contract manager on over three hundred petrochemical spill sites throughout New York State, representing both generators and government agencies. Provided contract and sub-contract services to Fortune-500 companies including: Pepsicola Bottling Co. (Pespsico), Coca-Cola Bottling Co., Texaco (Star Enterprises), Burger King Corp., AT&T, Laidlaw, Blockbuster Video, Gencor and Reith-Rieley Construction Co. Provided contract and sub-contract services to regional financial institutions including: European American Bank, The Dime Savings Bank, Key Bank of New York, Fleet Bank, State Bank of Long Island, Long Island Commercial Bank, Shawmut, Roslyn Savings Bank, Home Federal Savings and Sterling Commercial Capital.

Pioneered the solid waste recycling industry. Major projects included the first beneficial use determinations (BUD) issued in the State of New York and the State of Indiana for the utilization of non-hazardous petroleum hydrocarbon contaminated soils as an asphalt aggregate. Said projects included designing, installing, permitting and testing pollution control apparatus (thermal oxidizers). Authored twelve BUD petitions for various other solid waste related projects in New York State. Developed new process for the recycling of petroleum hydrocarbon contaminated soils in the State of New York. Process was approved by the New York State Department of Environmental Conservation in November 1995.

Supervised RI/FS work plans development for Grove Cleaners and select sites within the New Cassel Industrial Park, Inactive Hazardous Waste Disposal Site.

Achievements

- Certified Professional Geologist, Tennessee Department of Commerce, 1994.
- Senior Project Manager for the Mt. Hope Soil Recycling Facility, Calverton, NY.
- Senior Project Manager for the Prima Soil Recycling Facility, Holtsville, NY.
- Senior Project Manager for the Rason Soil Recycling Facility, Cedarhurst, NY.
- Senior Project Manager for the ART Soil Recycling Facility, Indianapolis, IN.
- Recipient of the Long Island Association Young Entrepreneur of the Year, 1992.
- Recipient of Hofstra University School of Business Achievement Award, 1992.

Town of Smithtown, Department of Environmental Protection,
Smithtown, New York 1985-1988

Investigator/Aide

Incident response supervisor for town hazardous material spill unit. Enforced the town health and safety codes. Assisted Suffolk County Health Department in enforcing sanitary codes. Investigated and prepared detailed reports of violations of the \New York State Environmental Conservation Laws for submission to State Conservation Officers. Worked on various marine habitat/population surveys. Supervised all town sampling and analysis programs. Trained town employees on OSHA issues including the Written Hazard Communication Laws and "Right to Know" legislation.

Achievements

- Coauthored the Town of Smithtown Underground Storage Tank Management Program.
- Senior Project Manager for the State funded Nissequogue River Pollution Study.
- Senior Project Manager, Town of Smithtown Landfill Worker Safety and Hazardous Material Exposure Reduction Program; received an award for meritorious achievement.
- Lead Agent for a joint investigation between the Town of Smithtown and the Suffolk County District Attorneys Office to prosecute Chemtronics Corporation of Hauppauge.
- Senior Project Manager, Town of Smithtown Beach Water Quality Management Plan; included the sampling of beach waters in Smithtown by town officials and analysis by the county forensic laboratory for fecal coliform

Education

Masters in Waste Management - SUNY Stony Brook, Candidate (1996)
Bachelors of Arts - Earth and Space Science - SUNY Stony Brook, 1989
Waste Management Certificate Program, Waste Management Institute, CED, 1994

Training

United State Environmental Protection Agency, Office of Remedial and Emergency Response, forth hour training for Hazardous Materials Response for First Responders, Rochester, New York, 1988.

United State Environmental Protection Agency, Office of Remedial and Emergency Response, twenty-four hour training for Sampling for Hazardous Materials, Princeton, New Jersey, 1989.

New York State Law Enforcement Seminar, Stony Brook, New York, 1989.

Organizations

Member of the New York State Department of Environmental Conservation's Citizens Advisory Committee for Inactive Hazardous Material Waste Disposal Sites, 1989

National Wellwater Association, 1992

Member of the National Association of Environmental Professionals, 1992

National Asphalt Manufacturers Association, 1993

Long Island Association, 1990

Long Island Venture Group, 1992

Environmental Assessment Association, 1994

Keith M. Franzen
27 Winston Road, Centereach, New York, 11720 • (516) 732-2842

EDUCATION:

Bachelors of Engineering Degree, Mechanical Engineering, December 1993
State University of New York at Stony Brook

Bachelors of Science Degree, Construction Management, December 1991
Utica College of Syracuse University
Dean's Honor List - Spring 1991

Professional Engineer Candidate - Part A Satisfied

EMPLOYMENT:

Impact Environmental, Kings Park, New York
Engineering Geologist [May 1993 - Present]
Employed to perform geological engineering and design engineering tasks for Phase I and II Environmental Site Assessments and Corrective Action Plans. Responsible for scheduling projects, the preparation of reports and supervision of field personnel. Managed the design and construction of various hazardous substance containment structures.

Employment Highlights

- Project Manager for the Suffolk County Health Department Remedial Investigation Project conducted at the New York Institute of Technology Central Islip Campus. Involved defining the periphery of contamination originating from eight abandoned waste water lagoons.
- Project Manager for the New York State Department of Transportation Farragut Service Station Corrective Action Plan. Integral in the design and execution of an Investigation Report to determine the nature and extent of site contamination. Participated in the installation and operation of a groundwater pump and treat system to mitigate a dissolved product plume. Project value $200,000.
- Project Manager for over fifty active New York State Department of Environmental Conservation spill sites. Projects have included all phases of Corrective Action Plan stipulations between clients and the State of New York. Average project value $25,000.

Franzen Construction, Centereach, New York
Owner [August 1990 - May 1994]
Self-employed construction contractor. Performed design work, construction and evaluations of structural integrity of wood frame structures. Contracted for residential home improvements requiring carpentry, mason, plumbing and electrical skills.

TRAINING:

Geoprobe Operating Seminar, Kejr Engineering, Salina Kansas - Trained in the operation of the *Geoprobe* Model 8L Hydraulic Probing System. Interface with both standard and macro-bore assemblies. Member of the *Geoprobe* 100 Plus Club.

Knowledgeable in both Macintosh and IBM - compatible operating systems: System Software; MacDraw, MacWrite, Claris CAD, Claris Works, Excel, Surfer, Autocad R12, Harvard Graphics and Quattro Pro.

George Wright
407 East 87th Street, Apt. 2A
New York, NY 10128
Tel. 212-860-4512
e-mail: g_wright@pipeline.com

Experience:

Metrocommute, Inc. — *New York, New York*
Environmental Scientist — 1997 to Present
Perform air quality modeling and noise analyses for mobile and stationary sources. Assist in traffic field studies and measure ambient noise. Prepare environmental impact statements and Phase I site assessments for development projects in the city. Provide weather forecasts for traffic field studies and the firm's Internet site, metrocommute.com.

New York City Department of Environmental Protection (DEP) — *New York, New York*
Environmental Scientist — 1995 to 1997
Reviewed submitted EISs for air quality, noise, traffic, and hazardous materials. Performed air quality modeling, traffic studies, and ambient noise measurement for city projects. Provided technical assistance for the city's Brownfields Program. Served as a liaison between DEP and the mayor's office. Reviewed projects for compliance with state hazardous materials procedures.

Lockwood Greene, Inc. — *New York, New York*
Air Quality Consultant — 1996
Performed an air quality analysis and prepared a report for a SUNY cogeneration facility in Buffalo.

New York City Department of City Planning — *New York, New York*
Environmental Specialist — 1993 to 1995
Conducted traffic, air quality, and noise field studies throughout the city. Assisted in the development of screening procedures for air quality and hazardous materials for zoning initiatives. Reviewed submissions and conducted analyses for air quality, noise, and hazardous materials.

Gibbs and Hill, Inc. — *New York, New York*
Environmental Specialist — 1991 to 1993
Performed dispersion modeling to predict air pollutant impacts for stationary and mobile sources. Prepared and reviewed Phase I and Phase II site remediations in Long Island. Conducted well sampling for PCB laden oil at the Pennsylvania and Fountain Avenue landfills in Canarsie, Brooklyn. Assisted in the preparation of job proposals for work in NY, NJ, and CT.

New Jersey Department of Agriculture — *Verona, New Jersey*
Environmental Scientist — 1987 to 1991
Assisted in the review and implementation of soil erosion plans throughout northern New Jersey. Developed computer programs for channel flow, rip-rap sizing, sediment basins, and soil erosion.

Enviroplan, Inc. — *Roseland, New Jersey*
Air Quality Scientist — 1984 to 1985
Aided in the modeling of stationary sources using EPA dispersion models.

Education:

Rutgers University
BS, MS Meteorology — 1984, 1993

Occupational Health and Safety Administration (OSHA)
40-Hour HAZWOPER Training Course — 1992

Skills: Experience with MS Office, Quark Express, Illustrator, Photoshop, Auto CAD, air quality models, noise monitoring, and FORTRAN programming; keyboarding 55 WPM; ability to sketch and paint.