

# RCRA FACILITY INVESTIGATION MANAGEMENT PLANS FORMER IBM KINGSTON FACILITY

# Prepared for:

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# TABLE OF CONTENTS

SEC	<u> FION</u>			PAGE
1.0	INTI	RODUCTIO	ON	3
	1.1		ound	
	1.2		3	
2.0	PRO	JECT MAN	NAGEMENT PLAN	7
	2.1		Management Approach	
	2.2		Organization	
	2.3	Project	Personnel	8
	2.4	Project	Schedule	11
3.0	DAT	A MANAC	GEMENT PLAN	12
	3.1	Data Do	ocumentation Procedures	12
	3.2	Progress	s Reporting Procedures and Documentation	12
	3.3		cal Data Record	
	3.4	Data Pre	esentation Format	14
	3.5	Project	Filing Procedures	15
4.0	OUA	LITY ASS	SURANCE PROJECT PLAN	16
	4.1		ction	
	4.2		ality Objectives	
		4.2.1	DQO Definition	
		4.2.2	Types of Data to Be Collected	17
		4.2.3	Membrane Interface Probe/Electric Conductivity Investigation	17
		4.2.4	Soil Sampling	
		4.2.5	Groundwater Sampling	17
		4.2.6	Storm Sewer Sampling	
	4.3		S Requirements	10
		4.3.1	Precision	
		4.3.2	Accuracy	
		4.3.3	Representativeness	
		4.3.4	Completeness	21
		4.3.5	Comparability	
		4.3.6	Sensitivity	
	4.4		duction and Reporting	22
	4.5	Data Eva	aluation Procedures	23
	4.6	Data Usa	ability Summary Report	24
	4.7	Samplin	g and Field Measurements	24
		4.7.1	Standard Operating Procedures	25
		4.7.2	List of SOPs	25
	4.8		d Sample Documentation	25
		4.8.1	Sample Records	25
		4.8.2	Field Logs and Records	23
		4.8.3	Chain-of-Custody Procedures	27
	4.9		ory Methods and Procedures	27

		Iay 2009 33-87071
5.0	HEALTH AND SAFETY PLAN	29
6.0	COMMUNITY RELATIONS PLAN	30
7.0	REFERENCES	31
	LIST OF TABLES	
Table 1		
Table 2		
Table 2		
Table 4		lule
Table 5	이 사람들은 사람들이 되었다면 하는데 이번에 가장 이 사람들이 되었다면 하는데 이번에 가장 아니는 사람들이 되었다면 하는데 이번에 가장 아니는데 이번에 가장 아니다면 하는데 아니다면 아니다면 하는데 아니다면 하는데 아니다면 하는데 아니다면 하는데 아니다면 하는데 아니다면 하는데 아니다면 아니다면 아니다면 아니다면 아니다면 아니다면 아니다면 아니다면	idic
Table 6	[ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [	
Table 7		
Table 8		
Table 9		
Table 1		ls
Table 1		
Table 1	12 Analytical Methods, Sample Containers, Preservation and Holding Times	for
	Soil Samples	
Table 1	13 Analytical Methods, Sample Containers, Preservation and Holding Times Aqueous Samples	for
	LIST OF FIGURES	
Figure	1 Site Location Map	
Figure		
Figure		
Figure		
	APPENDICES	
Append	dix A Standard Operating Procedures	
Append	dix B Lancaster Laboratory Quality Assurance Project Plan (Compact Disc)	
Append		
Append	dix D Site-Specific Health and Safety Plan	

# 1.0 INTRODUCTION

Golder Associates Inc. (Golder) has prepared this RCRA Facility Investigation (RFI) Management Plans document, on behalf of International Business Machines Corporation (IBM), for portions of the former IBM Kingston Facility (Facility or Site) located at 300 Enterprise Drive, Kingston, Ulster County, New York (see Figure 1). These RFI Management Plans were prepared as required by Section E.5(c) of Module III – Corrective Action Requirements for Solid Waste Management Units and Areas of Concern, of the October 4, 1996 Hazardous Waste Management Permit #3-5154-00067/00090 (6 NYCRR Part 373) and referenced herein as the RCRA Permit. Specifically, the RFI Management Plans were prepared pursuant to Appendix III-B, "Guidance for a RCRA Facility Investigation," of the RCRA permit.

# 1.1 Background

The Site is located north of the City of Kingston in the Town of Ulster, Ulster County, New York and is bounded by John M. Clarke Drive and Route 9W to the east, Old Neighborhood Road and Route 209 to the north, Esopus Creek to the west and Boices Lane to the south (see Figure 2). The approximately 258-acre property was first developed by IBM from farmland during the 1950s. The primary activities included the manufacturing of electric typewriters and the development, manufacture and testing of computer systems and related components and technologies. IBM ceased operations at the Facility during mid-1990s. In 1998 IBM sold the Facility to AG Properties of Kingston, LLC and Ulster Business Complex, LLC, who renamed the Site, TechCity, and subdivided the property into multiple parcels. The Site is currently owned and managed by TechCity Properties, Inc. (TechCity or Owner).

The portion of the Site located east of Enterprise Drive is referred to as the East Campus and includes the majority of the buildings associated with the Facility, many of which are vacant. The portion located west of Enterprise Drive was previously referred to as the West Campus and includes the Bank of America building (former IBM Facility Buildings B201, B202 and B203); a large parking area south and west of the Bank of America facility (Parcel 1); and generally undeveloped land further to the southwest (Parcel 2) and north (Parcel 3) of the Bank of America facility.

The Site is listed as a New York State Inactive Hazardous Waste Disposal Site (6 NYCRR Part 375) and Resource Conservation and Recovery Act (RCRA) Hazardous Waste Site. The Site is currently managed in compliance with the above noted RCRA Permit. The RCRA Permit

requires post-closure care and monitoring of the closed Industrial Waste Sludge Lagoon (IWSL) and implementation of Corrective Measures for groundwater exhibiting concentrations of volatile organic compounds (VOCs) above New York State Groundwater Quality (6 NYCRR Part 703) Standards (NYSGWQS). IBM completed extensive RCRA Facility Investigations (RFIs) during the 1990s to delineate the occurrence and extent of VOCs in groundwater beneath the Site.

Corrective Measures implemented by IBM include operation and maintenance of a groundwater perimeter control system (see Figure 2). The perimeter control system consists of a storm sewer system, an unsaturated portion of the surficial sand unit that underlies the Site, and a groundwater collection system (GWCS). IBM currently performs groundwater quality monitoring to evaluate the effectiveness of the perimeter control system. Annual monitoring reports are submitted to the New York State Department of Environmental Conservation (NYSDEC).

# 1.2 Purpose

Consistent with the RCRA permit, RFI Management Plans are required as part of any RFI Work Plans (RFIWPs) developed for the Site. These RFI Management Plans were developed specifically for the RFIWPs prepared for the following formerly inaccessible Solid Waste Management Units (SWMUs):

Storag	e Tanks
G	Former Waste PCE Tank
Spill A	reas
V	Portions of the Building 005 Plume
Indus	rial Waste Sewer System
M	Portions of the Industrial Waste Sewer Lines
Solver	nt Recovery Units
Al	3 Former Building 001 TCA Recovery Unit

IBM was recently notified by TechCity that access to these SWMUs will soon be available as a result of ongoing and proposed demolition activities.

A Site layout and investigation area map depicting the locations of each SWMU is provided in Figure 2. The main objectives of RFIWPs prepared for these SWMUs are to better define the nature and extent of the groundwater impacts at the Site and to evaluate whether additional Corrective Measures are needed to reduce or prevent the generation and/or migration of VOC-impacted groundwater.

In addition, these RFI Management Plans will be used to support further assessment of groundwater quality conditions in a portion of the Facility referred to as the "Triangle Plume Area," which is being investigated as part of a separate Investigation Work Plan (IWP). Existing site data indicate that a small portion of the groundwater plume emanating from the East Campus of the Facility may be migrating under Enterprise Drive to the Triangle Plume Area beneath Parcel 1. Therefore, IBM will undertake a supplemental assessment to better define the nature and extent of the groundwater impacts in the vicinity of the Triangle Plume Area and to evaluate whether additional Corrective Measures can be effectively implemented to reduce or prevent the migration of groundwater impacts beneath Parcel 1.

The following RFI Management Plans have been prepared and will be followed during the performance of the proposed work:

- Project Management Plan includes a description of the project management approach, the Project Team Organization Chart and the proposed project schedule;
- Data Management Plan includes a description of the process by which investigation data will be documented, tracked and presented;
- Quality Assurance Project Plan (QAPP) includes a description of the data quality objectives; sampling and field measurement standard operating procedures (SOPs), and sample analysis procedures;
- Health and Safety Plan (HASP) includes the health and safety procedures that will be followed during implementation of the work plans; and
- Community Relations Plan includes a description of how information collected during the performance of this work will be disseminated to involved stakeholders.

These RFI Management Plans provided herewith have been specifically developed for the proposed work associated with SWMUs G, V, M and AB and the Triangle Plume Area and are

-6-

May 2009 Ref: 083-87071

not intended to supersede or replace any RFI Management Plans developed previously for other portions of the Site subject to the RCRA permit. The existing RFI Management Plans are still considered in effect for routine and on-going groundwater monitoring, collection and treatment.

# 2.0 PROJECT MANAGEMENT PLAN

This section presents the Project Management Plan (PMP) that will be implemented during the performance of the RFIWPs for SWMUs G, V, M and AB and the IWP for the Triangle Plume Area. The PMP provides the overall project management approach that will be used during the performance of the proposed work, the proposed project organization, a description of the anticipated Project Team and their qualifications and the currently proposed project schedule.

-7-

# 2.1 Project Management Approach

The RFIWPs and the IWP include the performance of similar subsurface investigation tasks, the collection and analysis of field and laboratory data and the preparation of a report presenting findings and conclusions with recommendations regarding the need for further investigation and/or remediation of the subject SWMUs and the Triangle Plume Area.

Each work plan generally includes the following key project activities:

- Preparation and submittal of a RFIWP or an IWP for NYSDEC review and approval prior to the commencement of work. A meeting will be held with NYSDEC representatives as part of the review process, if necessary;
- Receipt of unencumbered site access notice from TechCity. Unencumbered access
  includes access to work areas that are free from physical impediments, free from the
  presence of hazardous materials and free from the presence of ambient air conditions
  requiring respirators of any type due to mold or other conditions;
- Contractor coordination;
- Mobilization;
- Performance of a field investigation that includes the collection of additional stratigraphic, chemical and hydraulic data utilizing Membrane Interface Probe/Electrical Conductivity (MIP/EC) investigation techniques; confirmatory soil, groundwater and/or sewer sampling; and the collection of select biogeochemical parameters to assist in the evaluation of potential corrective measures technologies;
- Data management and evaluation, including refinement of the existing Site conceptual model using Environmental Visualization System/Mining Visualization System (EVS/MVS®) modeling software;
- Report preparation, including both periodic progress reports and the preparation of the RFIWP and/or IWP Reports;
- Community and Owner relations; and

Responding to NYSDEC comments and questions.

Each work plan has been specifically developed to address localized SWMU and area-specific requirements. To meet the study objectives presented in each work plan, investigation approaches have been proposed that include the collection and analysis of real-time data to allow for field adjustments of the number, location, and depth of samples based on investigation findings. This approach will allow for efficient assessment of Site conditions. As such, the scope and extent of investigations presented in the work plans are considered preliminary and subject to refinement during the course of the field investigation based on the judgment of the Project Team. Additional area-specific information and procedures are provided in the work plans, which are incorporated into the RFI Management Plans by reference.

The performance of this work will be organized and executed so that the activities required for successful project implementation are performed in a technically appropriate and timely manner, with NYSDEC oversight. Appropriate lines of communication will be maintained with the Owner and NYSDEC.

# 2.2 Project Organization

Figure 3 presents the proposed Project Organization Chart for the performance of the RFWIPs and IWP. Appropriate points of contact for both NYSDEC and IBM are noted along with the Project Team personnel currently assigned and envisioned to perform the work.

# 2.3 Project Personnel

The work described herein will be conducted by a multi-disciplinary Project Team personnel from both IBM and Golder. Golder will be assisted in the execution of the proposed field and analytical programs by qualified subcontractors. A brief summary of the experience of the assigned personnel and their role in the performance of the work are as follows:

# Michael Kominek: IBM Project Coordinator

Michael Kominek is IBM's Project Coordinator and will be the primary liaison between IBM, NYSDEC and TechCity. Mr. Kominek has overall responsibility for IBM on the execution and performance of the RFIWPs and IWP.

# Alistair Macdonald P.G., LSP, Principal: Golder Project Director

Alistair Macdonald, a Principal of Golder with over 23 years of experience, will serve as the Project Director for this work. Mr. Macdonald will be the senior Golder management representative responsible for the execution and performance of the RFIWPs and IWP and will provide overall project technical review and quality assurance (QA) functions. He will interact with NYSDEC and TechCity as needed and as directed by IBM, in addition to reviewing and approving major project report deliverables prior to submittal.

### Anthony Savino: Golder Project Manager

Anthony Savino is a Senior Consultant at Golder with over 30 years of experience and will serve as the Golder's Project Manager for this work. Mr. Savino will be responsible for overall project management and schedule execution, providing appropriate technical input, interacting with NYSDEC and TechCity and the completion of project-related deliverables.

#### Christopher Hemingway, P.G.: Golder Senior Hydrogeologist

Christopher Hemingway is a Senior Hydrogeologist at Golder with over 12 years of experience. Mr. Hemingway will be responsible for technical direction and management of the field investigation program and coordination with subcontractors. He will be responsible for the preparation of project-related deliverables.

#### James Valenti, P.G: Golder Health and Safety Coordinator

James Valenti will serve as Golder's Health and Safety Coordinator. Mr. Valenti has over 18 years experience and will be responsible for overall direction and evaluation of health and safety issues related to implementation of field activities. He provided assistance and direction in the preparation of the Site-Specific Heath and Safety Plan (HASP) that is included in Section 5.0 of the RFI Management Plans.

# Daniel Gorman: Golder Field Team Leader

The team leader for the field investigation work will be Daniel Gorman. Mr. Gorman has over 6 years of experience and will be responsible for the day-to-day-coordination of the environmental field activities. He will also be the in-field Health and Safety Officer (HSO) and will be responsible for implementation of the QAPP requirements related to field activities. He will also assist in data evaluation and interpretation activities.

#### Cindi Lucas: Golder Data Manager

The project chemist for this work will be Cindi Lucas. Ms. Lucas has over 8 years of experience and will be responsible for the coordination and review of laboratory sample analyses, the validation of analytical results, and for documenting compliance with the requirements and objectives of the QAPP. She will also prepare the Data Summary Usability Report (DUSR) for this effort.

#### Subcontractors

In addition to Golder staff, the execution of the work plans will require the use of qualified subcontractors, as noted in the Project Organization Chart, and will include the following service providers:

- Direct-push drilling subcontractor Environmental Probing Investigations Inc.;
- MIP/EC investigation contractor Peak Investigations;
- New York State Department of Health (NYSDOH)-certified analytical laboratory Lancaster Laboratories;
- Soil physical properties analytical services Oxidation Systems, Inc; and
- New York State Licensed Surveyor Brinnier and Larios P.C.

Qualifications of these subcontractors will be submitted to NYSDEC upon request. IBM will advise NYSDEC of changes to this proposed Project Team as warranted during the performance of the work.

# 2.4 Project Schedule

Figure 4 presents the currently envisioned schedule for the performance of the RFIWPs and IWP.

Field activities are currently anticipated to begin April 13, 2009 within the Triangle Plume Area, following NYSDEC concurrence with the IWP, as this area is located atop open land (as opposed to beneath an existing structure as with the SWMUs) and is accessible to IBM and its consultants and contractors. Work in the SWMUs will occur subsequently upon receipt of NYSDEC approvals of the RFIWPs and unencumbered site access notice from TechCity for the buildings in question.

As investigation approaches have been proposed in the work plans to allow for the collection and analysis of real-time data and refinement of the work scopes during the course of the field investigations, the duration of the field investigations may differ from the project schedule presented herein.

IBM will advise NYSDEC of schedule variances that may occur and will provide alternative timeframes for the completion of project activities remaining as warranted.

#### 3.0 DATA MANAGEMENT PLAN

This section presents the Data Management Plan (DMP) that will be implemented during the performance of the RFIWPs for SWMUs G, V, M and AB and the Triangle Plume Area.

This DMP provides the procedures that will be used to document investigation data and results generated by the work plans, project progress reporting and documentation activities, data recording procedures, analytical data presentation formats, and project document retention procedures.

#### 3.1 Data Documentation Procedures

Field data generated will be documented following the procedures presented in the QAPP (see Section 4.0) and the SOPs included in Appendix A. The analytical laboratory, Lancaster Laboratories, will provide data following NYSDEC Analytical Services Protocol (ASP) Category B data deliverables requirements and will follow the documentation procedures identified in the Laboratory Quality Assurance Project Plan included in Appendix B.

# 3.2 Progress Reporting Procedures and Documentation

The work described in the RFIWPs and the IWP will be conducted by a multi-disciplinary Project Team of personnel from both IBM and Golder. Golder will also be assisted in the performance of the work by qualified subcontractors.

The Golder Field Team Leader will be responsible for summarizing the results of the MIP/EC investigations and recording the decisions and rationale made during the advancement of soil borings, the installation of temporary wells and the performance of groundwater sampling. The Field Team Leader will also record general progress, issues and corrective actions taken during the execution of the field program, including reporting this information to the Golder Project Manager.

Each day, the results of the MIP/EC work will be summarized and transmitted to key Project Team members for review and the locations for the next series of probes will be selected. In the event of unusual field conditions are encountered or unique MIP/EC results are obtained, the Golder Field Team Leader will contact the Golder Project Manager and/or the Golder Senior Hydrogeologist, upon discovery, so that appropriate field decisions, notifications and/or corrective measures may be implemented as needed.

The Golder Data Manager will be responsible for laboratory coordination, summarizing progress on data receipt and data deliverables. The Data Manager will also perform the evaluation of the data and identify issues and corrective actions taken to the Golder Project Manager for samples submitted to Lancaster Laboratories for characterization.

Progress reports will be provided to the Golder Project Manager on a weekly basis. The progress reports will be submitted to the Golder Project Manager via an e-mail memorandum that will describe the results of the field-derived data, the numbers and types of samples submitted for laboratory analysis, sample receipt confirmation, problems encountered and recommended solutions or corrective actions taken.

# 3.3 Analytical Data Record

Golder uses EQuIS® (Environmental Quality Information System) to electronically manage groundwater quality, water level elevation and soil analytical data. EQuIS® is a web-enabled environmental data management system written in the Microsoft .NET Framework, and is hosted at Golder in a Microsoft SQL Server environment. Only authorized Golder personnel have access to the database.

EQuIS® uses a variety of tools and customizable business rules to enforce data quality and provides links to many third-party tools commonly used for data visualizations and data analysis (e.g. EVS/MVS®). Laboratory analytical data will be acquired, checked and loaded into EQuIS® for secure tracking and reporting of data. The results of the MIP/EC investigations and physical characterization of soils will not be stored in EQuIS®, but will be stored and tracked as part of the analytical data records in Microsoft Excel® spreadsheets.

The following describes the method by which the laboratory analytical data will be acquired, checked and loaded into EQuIS\*:

- Field samples will be collected following the procedures outlined in the RFIWPs, IWP, QAPP and SOPs;
- Samples will be delivered to the laboratory where analytical testing is completed. Copies
  of the chain of custody (COC) and field sample forms will be sent by overnight courier or
  scanned to electronic copy and e-mailed to the Golder Project Manager;
- Following sample analysis, Electronic Data Deliverables (EDDs) will be produced by the laboratory and e-mailed to the Golder Data Manager. The EDDs will be uploaded into the EQuIS<sup>®</sup> Data Processor (EDP) along with additional information from the field forms. The data added to the EDDs will include, but is not limited to:

- Sample location codes;
- Sample matrix codes:
- Sample type codes;
- Parent sample codes for replicate samples; and
- Sample delivery group codes.

The information will be checked and revised as necessary such as time stamps for proper format and test information. The EQuIS® EDP will check the EDDs for common laboratory errors, such as chronological event errors, duplicate rows, orphan samples, and inconsistencies with the EQuIS® system's valid value tables. Once the data are checked and reviewed, the EDD packages will be uploaded into the database. The data will then available to be queried and reported by EQuIS® Enterprise or EQuIS® Professional.

# 3.4 Data Presentation Format

EQuIS<sup>®</sup> Enterprise is a read-only web-based reporting function through which data will be processed and reported through a set of customizable pre-designed functions. EQuIS<sup>®</sup> Professional provides additional format functionality, such as cross-tabbing, trend graphs and isopleths for export to different formats, including Microsoft Excel<sup>®</sup>. Golder will use a combination of these tools to present analytical result data tables and trend graphs for the final RFIWP and IWP Reports.

Additionally, EVS/MVS® modeling will be used to evaluate the distribution of chemicals in soil and groundwater at the Site. Three-dimensional simulations of chemical distribution, along with chemical mass estimates, will be useful to help evaluate potential future corrective measures options and to illustrate the effectiveness/performance of these remedial options to NYSDEC and affected stakeholders.

Specifically, the use of EVS/MVS<sup>®</sup> will provide the following items in an efficient manner:

- Visual understanding of chemical distribution;
- Potential source areas and volumes to focus remedial technology evaluations;
- · Soil volumes having chemical concentrations above selected criteria and standards; and
- Information that may be used during the assessment of future end use options (e.g., industrial/commercial and ecological enhancements).

A report will be prepared that summarizes and documents the investigations activities and results. Appropriate summary tables, figures (e.g. Site map showing locations of mass and volume estimates and sample points used) and appendices (i.e. boring logs and well information) will be included in the report.

# 3.5 Project Filing Procedures

Field and analytical data, and associated reports generated by Golder and its subcontractors in performance of the work will be maintained in the Golder Newark, New Jersey office. A portion or all of the project files may also be maintained by Golder in a secure, off-site storage facility for a period of not less than seven (7) years. The types of project records and forms that will be maintained by Golder, include, but are not necessarily limited to, the items presented in the following table:

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records
Field Notes Sample Collection Forms Field Log Books Chain of Custody Forms Air Bills Telephone Logs and E-mails	Field Notes Sample Tracking Logs Equipment Calibration Logs Analytical Run Logs Equipment Maintenance Logs Corrective Action Reports Field Sample Results Progress Reports Telephone Logs and E-mails	Sample Receipt and Custody Forms Standards Logs Calibration Forms Sample Preparation Logs Analytical Run Logs Equipment Maintenance Logs Corrective Action Reports Sample QC Forms Instrument QC Forms Instrument Raw Data Electronic Data Deliverables	Data Review Checklists Data Usability Summary Reports Outlying QC Summary Forms Telephone Logs and E-mails

# 4.0 QUALITY ASSURANCE PROJECT PLAN

#### 4.1 Introduction

This section provides the Quality Assurance Project Plan (QAPP) for the performance of the RFIWPs for SWMUs G, V, M and AB and the IWP for the Triangle Plume Area. The QAPP describes the data quality objectives, data reduction, reporting and evaluation procedures, sample and field measurement standard operating procedures (SOPs), sample analysis procedures and quality guidelines that will be followed by Golder and the analytical laboratory for the performance of the proposed work.

Tables 1 through 13 provide supplemental information pertaining to the following items:

- · Target analyte parameter lists proposed for sampling and analysis;
- Sampling plans and data quality objectives for each SWMU and the Triangle Plume Area:
- Precision, accuracy, representativeness, completeness, comparability and sensitivity (PARCCS) measurement performance criteria;
- · Laboratory precision and accuracy criteria;
- · Laboratory detection and reporting limits; and
- Proposed analytical methods, sample containers, preservation and holding time requirements.

Appendix A includes the SOPs that will be used in the performance of the work plans. Appendix B includes the Laboratory QAPP that describes the procedures that will use in performing the chemical analysis of the environmental samples collected as part of the proposed work. The Laboratory QAPP is provided as a compact disc (CD). Lastly, additional area-specific information and procedures are provided in the work plans, which are incorporated into this QAPP by reference.

### 4.2 Data Quality Objectives

#### 4.2.1 DOO Definition

The data quality objectives (DQOs) define the type, quantity and quality of data required to address specific environmental questions and support proper environmental decisions. DQOs are a common sense, graded approach to establish that the level of detail in planning is commensurate with the importance and intended purpose of the work and the use of available resources.

# 4.2.2 Types of Data to Be Collected

The following subsections identify the types of data that will be collected at the Site and the associated DQOs. Both screening level and laboratory analyzed environmental media sampling data will be generated in the performance of the work plans. Tables 1 through 6 present information related to the target analyte parameter lists proposed for sampling and analysis and sampling schedules and DOQs for each SWMU and the Triangle Plume Area.

# 4.2.3 Membrane Interface Probe/Electric Conductivity Investigation

Membrane Interface Probe/Electrical Conductivity (MIP/EC) Investigations will be conducted to better define the soil stratigraphy and distribution of VOCs in the subsurface. The MIP/EC system is an, in situ qualitative analytical tool for gathering large amounts of screening level data in a short period of time.

The DQO for this type of sampling is to gather real-time qualitative data that allows the field team to modify and expand the number, location and depth of boreholes, as needed, to allow for a more rapid and complete assessment of the nature and extent of VOC soil and groundwater impacts.

# 4.2.4 Soil Sampling

Soil samples will be collected for lithologic description and chemical characterization. Samples for laboratory analysis will be collected using an Encore\* sampler (or equivalent) and submitted to the analytical laboratory under appropriate chain-of-custody (COC) for analysis of VOCs using EPA Method 8260B. In addition, a subset of the soil samples will be analyzed for parameters such as natural oxygen demand, grain size, and permeability.

The DQO for the soil sampling is to collect confirmatory VOC concentration information to verify the results of the MIP/EC screening data. The additional parameters analyzed in the soil samples will be used internally for evaluating potential corrective measure technologies, as warranted.

# 4.2.5 Groundwater Sampling

Three (3) types of groundwater samples will be collected during the field investigations, and analyzed in the laboratory as follows:

- Groundwater grab samples will be collected using GeoProbe<sup>®</sup> techniques (i.e., SP-15 Sampler or DT-21 Profiler) to confirm MIP/EC readings from specific zones in the boreholes advanced to collect the soil samples. These samples will be analyzed for VOCs using EPA Method 8260B. No purging or field parameter sampling will be performed prior to collecting these groundwater samples;
- Groundwater samples will be collected from temporary well casings installed at select
  locations using a GeoProbe<sup>®</sup> drill rig. Groundwater samples will be collected using lowflow purging and sampling techniques. Samples will be analyzed for VOCs using EPA
  Method 8260B. Select samples will also be analyzed for biogeochemical parameters
  (excluding metals); and
- Groundwater samples will be collected and analyzed for VOCs using EPA Method 8260B and biogeochemical parameters from existing Site monitoring wells in the vicinity of each SWMU and the Triangle Plume Area. Groundwater samples will also be collected using low-flow purging and sampling techniques.

The DQO for the groundwater grab sampling is to collect confirmatory VOC concentration information to verify the results of the MIP/EC screening data. The DQO for the groundwater VOC data generated from the temporary and existing monitoring wells is to assist with the assessment of the extent of groundwater impacts at the Site. The biogeochemical parameters collected for the groundwater data will be used for evaluating potential corrective measure technologies as warranted.

### 4.2.6 Storm Sewer Sampling

Water quality samples will be collected from two storm water catch basins and two storm sewer manholes for the Triangle Plume Area. Samples will be collected and submitted to the analytical laboratory under COC procedures for analysis of VOCs using EPA Method 8260B. The DQO for the storm sewer water sampling is to determine the presence or absence of VOCs in water within the sewer system.

# 4.3 PARCCS Requirements

This section describes the approach to the measurement performance criteria using data quality indicators expressed as precision, accuracy, representativeness, completeness, comparability and sensitivity (PARCCS). Where possible, acceptance criteria are specified to establish minimum acceptability levels for use of data in the overall decision making process. Tables 7 through 11 present the PARCCS criteria, including detection and reporting limits that are proposed for this work.

#### 4.3.1 Precision

Precision refers to the degree to which repeated measurements are similar to one another. Precision measures the agreement (i.e., reproducibility) among individual measurements, obtained under prescribed similar conditions. Measurements that are precise are in close agreement with one another.

Field precision is assessed through the collection and measurement of field duplicates, which will be collected at an approximate rate of one (1) duplicate per twenty (20) field analytical samples collected. A field duplicate sample is defined as two (2) or more representative portions taken from the same sampling location, homogenized, split and submitted for identical analyses. The field duplicate sample is submitted to the laboratory blind (i.e., submitted as an individual sample and not identified as a field duplicate) so as to impartially represent field precision. Field duplicates will be collected at an approximate frequency of 1 per every 20 primary samples (except grab groundwater samples collected using GeoProbe® techniques for MIP/EC confirmation purposes).

Precision in the laboratory is assessed through the calculation of relative percent differences (RPD) between sample results. The RPD is calculated according to the following formula:

$$RPD = \frac{2 \times |Conc.Sample \ 1 - Conc.Sample \ 2|}{|Conc.Sample \ 1 + Conc.Sample \ 2|} \times 100$$

General precision control limits for the work are provided in Tables 7 through 10. The precision control limits provided are based on the laboratory quality control (QC) limits, which are routinely re-evaluated following the procedures in the laboratory quality assurance (QA) policies and the requirements of the analytical methods. Should the laboratory QC limits change between the submission of this QAPP and the sample analyses, the limits in place at the time of sample analysis will be used to evaluate the data, and updated QAPP tables will be submitted as an addendum, as warranted.

Analytical precision will be determined through the analysis of laboratory control spike duplicates and field duplicates for organic analyses, and also through laboratory duplicates for inorganic analyses. Field precision will be determined through the analysis of field duplicate pairs for both organic and inorganic analyses. If the RPDs for field or laboratory duplicates are within evaluation criteria, the original field sample result should be used, and not the duplicate

sample result. If the RPDs for field or laboratory duplicates are not within evaluation criteria, the data will be qualified as estimated and the more conservative value should be used.

# 4.3.2 Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference or true value. The accuracy measurement is generally determined by the percent recovery (%R) of a known value. Accuracy as %R is determined by the following equation:

$$\% R = \frac{(Spike Sample Conc.-Sample Conc.)}{Spike Amount Added} \times 100$$

Accuracy in the field is assessed through the use of equipment rinsate and trip blanks to assess the potential of cross contamination. In addition, field accuracy is assessed by the adherence to all sample handling, preservation and holding time criteria.

Laboratory accuracy is assessed through the analysis of standard reference materials (SRM), laboratory control samples (LCS), Matrix Spike/Matrix Spike Duplicate (MS/MSD), surrogate compounds, and the determination of the %R for these measurements. General accuracy control limits for the contract laboratory are provided in Tables 7 through 10. Where accuracy criteria are not met, data will be qualified as either estimated (i.e., minor deviation from accuracy criteria) or rejected (i.e., major deviation from accuracy criteria). Data qualified as rejected should not be used for decision making purposes.

# 4.3.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, a parameter variation at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary.

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the work plans are followed and that proper sampling techniques are used. The RFIWP and IWP sampling programs were designed to provide data representative of Site conditions. During development of these programs, consideration was given to historical activities, existing analytical data, physical setting and processes. Using the proper analytical procedures, appropriate methods, meeting sample holding times and meeting QC criteria for each parameter affirms representativeness in the laboratory. An additional assessment of representativeness will be made through field duplicates. While field duplicates are primarily

used to assess precision, these samples also indicate sample homogeneity and therefore the representativeness of the Site.

# 4.3.4 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data that was expected under normal conditions. Data is considered valid and complete if QC elements have met the criteria established in this QAPP. Qualified data may be considered usable and will be considered complete on a case-by-case basis.

Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$Completeness = \frac{(number\ of\ valid\ measurements)}{(number\ of\ planned\ measurements)} \times 100$$

The laboratory and field completeness goal for this work is greater than 90 percent. Field measurements not collected from a specified location, or samples not collected due to environmental conditions, will be identified in the RFIWP or IPW Reports. Data qualified by the laboratory or by the data reviewer as estimated is usable, and therefore considered complete; however, data qualified as rejected are not usable and do not count toward completeness goals.

#### 4.3.5 Comparability

Comparability is an expression of the confidence with which one data set can be compared to another. Comparability of data is achieved by providing site-wide sample collection and analyses following the same protocol. Comparability depends upon the proper design of the sampling program and will be satisfied by following the work plans, SOPs, and using proper sampling techniques. The Field Team Leader will routinely oversee field activities and verify compliance with the work plans and SOPs.

Analytical data are comparable when similar analytical methods are used as identified in Tables 12 and 13. Appropriate laboratory personnel will review and have a working knowledge of the Laboratory SOPs to be used during the analysis of samples for the investigations. Additionally, the Laboratory QA Manager will review the data generated, verify compliance with method requirements, and verify that QA objectives are met.

Comparability between the data generated by fixed laboratory analysis and the data obtained through field measurements using MIP/EC methods will be assessed by submitting soil grab samples to the fixed laboratory for analysis.

- 22 -

# 4.3.6 Sensitivity

Sensitivity is defined as the capability of a method or instrument to discriminate between measurement responses representing different levels of a variable of interest. Two measurement responses of interest in assessing sensitivity are the method detection limit (MDL) and the practical quantitation limit (PQL).

The MDL is defined as the minimum concentration of a substance that can be identified, measured and reported with a 99 percent confidence that the substance concentration is greater than zero for a specific matrix containing the substance. The MDLs are determined as outlined in 40 CRF Part 136. The PQL is defined as the level of measurement that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operations. The PQLs are generally 2-5 times greater than the MDLs.

The sensitivity for field measurements will be determined, in part, by the limitations of field instrumentation as described in the manufacturer's manual and specific field measurement SOPs. Other factors that will influence sensitivity include matrix and environmental conditions.

The MDL and PQL goals for this work are identified in Table 11. The laboratory will verify the PQLs defined by a point on the calibration curve which is at or below the stated PQL. Should the laboratory MDL or PQL change between the submission of this QAPP and the sample analyses, the limits in place at the time of sample analysis will be used to evaluate the data, and updated QAPP tables will be submitted as an addendum, as warranted.

# 4.4 Data Reduction and Reporting

Field data will be recorded on field data sampling sheets, field log book, and in the case of MIP/EC data, electronically. The field data will be summarized and reported, as appropriate, in the RFIWP and IWP Reports. Field data will be managed by Golder according to the DMP (see Section 3.0).

The laboratory will provide data following NYSDEC Analytical Services Protocol (ASP) Category B data deliverables requirements. The laboratory data will be managed by the Golder Data Manager following the DMP, and reported in the RFIWP and IWP Reports.

### 4.5 Data Evaluation Procedures

One hundred (100) percent of the laboratory-analyzed environmental media sampling data will undergo a Stage 2A data review by the Golder Data Manager.

The Stage 2A data review, as defined in the EPA 540-R-08-005 (January 13, 2009), will include the verification and examination of the following items:

- · Chain of custody
- · Cooler receipt form
- Laboratory case narrative
- · Sample summary forms
- · Holding times
- · Method blanks
- Trip blanks (aqueous volatiles only)
- · Field equipment rinsate blanks (for field decontaminated sampling equipment)
- Surrogate spikes (organics)
- Matrix spike/matrix spike duplicates (MS/MSDs)
- Post-digestion spikes (inorganics)
- Laboratory control samples (LCS)
- Serial dilutions (ICP only)
- · Field duplicates

The data review will utilize the guidance provided by USEPA Region II Standard Operating Procedures (SOPs) HW-24, Revision 2 (Validating Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry SW846 8260B) and HW-2, Revision 13 (Evaluation of Metals Data for the Contract Laboratory Program (CLP) based on SOW – ILM05.3), where applicable to the analytical methodologies.

The data will be evaluated relative the specific QC criteria presented in this QAPP and in consideration of the NYSDEC ASP requirements. The QC criteria presented in this QAPP are derived from USEPA methodology and laboratory historical performance, and are subject to change based on periodic laboratory re-evaluation as specified in the analytical methods. If the USEPA Region II Data Validation SOPs do not specifically address an analytical method, the QC criteria identified by the analytical method, ASP and this QAPP will be used. Data will be qualified as estimated (J/UJ) or rejected (R) based on the results of the data reviews.

If significant QC deficiencies that might require rejection of data are identified in the laboratory case narrative, the Golder Data Manager will address the issues identified by the laboratory. If required, data will be qualified as rejected (R).

# 4.6 Data Usability Summary Report

A Data Usability Summary Report (DUSR) will be prepared for the soil, groundwater and storm sewer samples collected and analyzed for VOCs and the biogeochemical parameters identified in Tables 2 through 6, following the completion of the data evaluation. The DUSR will be prepared following the guidelines described in the NYSDEC Division of Environmental Remediation (DER) Draft DER-10 Technical Guidance for Site Investigation and Remediation (December 2002), Appendix 2B.

In general, the DUSR will describe the results of the data review, identify the associated samples and analytical parameters, discuss any deficiencies noted during the data review, and identify any potential effects of QC deficiencies on the data.

The findings of the data evaluations described above will be presented the DUSR. The qualified data will be noted in the DUSR, along with associated QC deficiencies, and the qualified laboratory data will be incorporated into the Site chemistry database.

The laboratory will perform data reduction in accordance with the individual analytical methodologies used for this project, and following NYSDEC ASP. The Laboratory QAPP (see Appendix B) provides additional information regarding the laboratory data reduction procedures.

# 4.7 Sampling and Field Measurements

The specific sampling and field measurement activities proposed for each area of the Site are detailed in the individual RFIWPs and the IWP, which are incorporated into this QAPP by reference. The SOPs and field and sample documentation procedures that will be employed in the execution of the field work are summarized in the sections which follow.

# 4.7.1 Standard Operating Procedures

SOPs are written instructions that document routine or repetitive activities to be followed by an individual or organization. The development and use of SOPs are an integral part of a successful quality system as SOPs provide individuals with information to perform work properly, and facilitate consistency in the quality and integrity of work products and results. The proper use and execution of SOPs minimizes variation and promotes quality through consistent implementation of a process or procedure, even in cases of temporary or permanent personnel changes.

# 4.7.2 List of SOPs

Appendix A includes the SOPs that will be followed for the performance of the RFIWPs and IWP. These SOPs include specific procedures for the investigation activities, sample collection and documentation, decontamination, field calibration and analysis, and investigative-derived waste management.

The following SOPs describe procedures that will be used in field activities:

- SOP 1 Utility Clearance Procedures
- SOP 2 Temporary Well Installation and Groundwater Sample Collection
- SOP 3 Chain-of-Custody Procedures
- SOP 4 Log Books and Field Form Procedures
- SOP 5 Equipment Decontamination
- SOP 6 Soil Boring and Soil Sampling Procedures
- SOP 7 Storm Sewer Sampling Procedures
- SOP 8 Investigation Derived Waste Procedures
- SOP 9 Membrane Interface Probe Procedures
- SOP 10 Borehole and Temporary Well Decommissioning Procedures

# 4.8 Field and Sample Documentation

# 4.8.1 Sample Records

Each soil, groundwater and storm sewer sample collected as part of the work will be labeled with a unique sample identification (ID) which reflects the sample location, type of sample collected, and depth from which the sample was collected, as applicable. Each sample label and container will also be marked with the Site name, data and time the sample was collected, analysis to be performed (e.g. EPA Method 8260B), and any relevant sample preservative used (e.g. HCl).

- 26 -

The specific sample IDs for each sampling type will be as follows:

MIP/EC

MIP-XX; where MIP indicates Membrane Interface Probe and XX represents the sample probe identification. MIP samples will be continuously logged in the field during probing activities. The MIP sample IDs will be noted in the field log book and on the MIP log output generated by the instrumentation.

Soil Borings

SB-XX BB-EE; where SB indicates soil boring sample, XX represents the sample location, BB indicates the beginning of the sample interval and EE indicates the end of the sample interval. The beginning and ending sample intervals shall be noted in the units of feet.

Groundwater

SBW-XX BB; where SBW indicates a groundwater grab sample from a soil boring, XX represents the sample location, and BB indicates the depth at which the water sample was collected.

TW-XX BB; where TW indicates a temporary well point, XX represents the sample location, and BB indicates the temporary well depth at which the water sample was collected.

MW-XX; where MW indicates an existing monitoring well and XX represents the existing monitoring well ID as noted on the appropriate RFIWP or IWP figures provided in the work plans.

Storm Sewer

CSXXX; where CS denotes catch basin or sewer manhole and XXX indicates the sample location. Note: These designations were used during the initial sewer system investigation performed by Groundwater Sciences Corporation in 1994 and will be retained for this work for consistency purposes.

#### Field Logs and Records 4.8.2

The Field Team Leader will be responsible for maintaining centralized daily records of significant field events, observations, and measurements made during the performance of the field program. Additionally, members of the field team are responsible for maintaining complete records of their actions, observations, etc., in the field and sample log books and providing this information to the Field Team Leader at the end of each day. The specific procedures employed and field data to be recorded for the work plans are noted in the SOPs provided in Appendix A.

- 27 -

#### Chain-of-Custody Procedures 4.8.3

Chain of custody (COC) procedures have been established to confirm sample traceability from the time of collection through completion of analysis.

COC forms shall accompany all field samples submitted to the analytical laboratory for chemical analysis. The specific COC procedures that will be used during the performance of the proposed work are provided in the SOPs included in Appendix A. Laboratory COC procedures are provided in the Laboratory QAPP included in Appendix B.

# 4.9 Laboratory Methods and Procedures

Lancaster Laboratories (Lancaster) of Lancaster, PA has been selected as the analytical laboratory to perform the chemical analytical procedures identified in the work plans and this QAPP. All analytical work performed by Lancaster will be conducted in accordance with the Laboratory QAPP included in Appendix B, which is incorporated into this QAPP by reference.

The Laboratory QAPP includes the procedures that will be employed to achieve the following objectives:

- Data generated in the laboratory are within the acceptable limits of accuracy and precision;
- Appropriate quality control measures are performed; and
- Data accountability is performed through appropriate sample and data management procedures.

The Laboratory QAPP includes information related to project management, data measurement and acquisition (i.e., analytical method requirements, instrumentation calibration, testing, inspection and maintenance, quality control, etc.), laboratory SOPs and data management, assessment and validation procedures.

Lancaster holds a current NYSDOH ELAP Certification for the parameters included in the methods identified below. A copy of the certification is included in Appendix C.

Soil samples will be analyzed for VOCs following EPA Method 8260B. The target compound list of VOCs, and associated method detection limits, reporting limits, and precision and accuracy criteria, are identified in Tables 1, 7, 8, and 11. Select soil samples will also be analyzed for natural oxidant demand, grain size, and permeability following American Society for Testing and Materials (ASTM) methods noted in Table 12.

Groundwater and sewer water samples will be analyzed for VOCs following EPA Method 8260B. The target compound list for VOCs, and associated method detection limits, reporting limits, and precision and accuracy criteria, are identified in Tables 1, 9, 10, and 11. Additionally, groundwater and sewer water samples analyzed for metals and biogeochemical parameters will be prepared and analyzed following EPA Methods and Standard Methods identified in Table 13.

#### 5.0 HEALTH AND SAFETY PLAN

The Site-Specific Health and Safety Plan (HASP) for the performance of the field activities outlined in the work plans is included in Appendix D. This HASP presents the procedures that will be followed by Golder and its onsite subcontractors during the execution of the work. The HASP identifies the potential physical and chemical hazards that the field investigative team members may encounter and is designed to mitigate worker exposure through the use of personal protective equipment and safe work practices. Any visitors will be required to review the HASP and follow its procedures prior to observing or entering any work zones. The HASP will be reviewed and updated as warranted during the performance of the work in the event Site conditions and/or work activities changes.

May 2009 Ref: 083-87071

# 6.0 COMMUNITY RELATIONS PLAN

A Citizen Participation Plan was prepared and submitted to NYSDEC in April 1995, addressing the RCRA permit activities (GSC, 1995). In addition to providing background information, this Citizen Participation Plan provides a description of citizen participation activities; identified document repositories; and provides project contact lists.

As the work proposed by the RFIWPs and IWP are a continuation of the work required under the RCRA permit, no modifications or revisions to the 1995 Citizen Participation Plan are proposed at this time. Therefore, the procedures and requirements noted in the 1995 plan will be followed. Addenda to the plan will be provided as warranted.

#### 7.0 REFERENCES

- Groundwater Sciences Corporation, "Citizen Participation Plan Revised", Prepared for International Business Machines Corporation, Kingston, New York, April 28, 1995
- NYSDEC Division of Environmental Remediation, "Draft DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 2B, Guidance for the Development of Data Usability Summary Reports", December 25, 2002.
- U.S. Environmental Protection Agency, 1998. Guidance for Quality Assurance Project Plans (QA/G-5), EPA/600/R-98/018, Office of Research and Development.
- U.S. Environmental Protection Agency, 2000b. Guidance for the Data Quality Objectives Process (QA/G-4), EPA/600/R-96/055, Office of Environmental Information.
- U.S. Environmental Protection Agency, 2001. EPA Requirements for Quality Assurance Project Plans (QA/R-5), EPA/240/B-01/003, Office of Environmental Information.
- U.S. Environmental Protection Agency, 2009. Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, EPA 540-R-08-005, Office of Solid Waste and Emergency Response.

TABLES

TABLE 1
TARGET ORGANIC, INORGANIC AND AQUEOUS BIOGEOCHEMICAL ANALYTE LIST FORMER IBM KINGSTON FACILITY

TCL Volatile Organic Compounds	Biogeochemical Parameters
1,1,1,2-Tetrachloroethane	Groundwater
1.1,1-Trichloroethane	Alkalinity as CaCO <sub>3</sub>
	Ammonia as Nitrogen
1,1,2,2-Tetrachloroethane	Biochemical Oxygen Demand (BOD)
1,1,2-Trichloro-1,2,2-Trifluoroethane	Chemical Oxiygen Demand (COD)
1,1,2-Trichloroethane	Methane
1,1-Dichloroethane	Nitrate/Nitrite as N
1,1-Dichloroethylene	Phosphorous
1,2,3-Trichloropropane	Sulfate
1,2-Dichloro-1,2,2-Trifluoroethane	Sulfide
1,2-Dichlorobenzene	Total Dissolved Soilds (TDS)
1,2-Dichloroethane	Total Suspended Solids (TSS)
1,2-Dichloroethylene, Total	Total Organic Carbon (TOC)
1,2-Dichloropropane	Metals
1,3-Dichlorobenzene	Antimony
1,4-Dichlorobenzene	Arsenic
1-Chlorohexane	Barium
2-Chloroethylvinyl Ether	Cadmium
2-Chlorotoluene	Chromium
4-Chlorotoluene	Copper
Benzene	Iron
Benzyl Chloride	Lead
Bromobenzene	Manganese
Bromodichloromethane	Selenium
Bromoform	Major Cations
Bromomethane	Calcium
Carbon Tetrachloride	Magnesium
Chlorobenzene	Potassium
Chlorodibromomethane	Sodium
Chloroethane	Major Anions
Chloroform	Fluoride
Chloromethane	Chloride
Cis-1,3-Dichloropropylene	Field Parameters
Dibromomethane	Dissolved Oxygen (DO)
Dichlorodifluoromethane	Oxidation-Reduction Potential (ORP)
Ethylbenzene	pH
Methylene Chloride	Specific Conductance
Tetrachloroethylene	Temperature
Toluene	Water Level
Trans-1,3-Dichloropropene	Soil
Trichloroethylene	
Trichlorofluoromethane	Natural Oxidant Demand
Vinyl Chloride	Grain Size Analysis
Xylene, Total	Permeability

# SWMU-G: FORMER WASTE PCE TANK FORMER IBM KINGSTON FACILITY SAMPLING SCHEDULE TABLE 2

· ·	Number of Samples	Parameters of Interest	Frequency of Monitoring	Data Quality Objectives
Media				of the results of the
	12	VOCs (EnCore® or equivalent)	Once	Collect Colliniatory Communication Conductivity (MIP/EC) data.  Membrane Interface Probe/Electrical Conductivity (MIP/EC) data.
Soil				
	6	Biogeochemical Parameters	Once	Used for evaluating potential and an advantage of adjusting the state of adjusting the stat
				Grab Samples- Collect confirmatory VOC infolliation to verify the
Groundwater	60	NOCs	Once	results of the MIP/EC data.  Temporary Wells- Assessment of the extent of groundwater
				Impacts.
	c	Biogeochemical Parameters (not including	Once	Used for evaluating potential corrective measure technologies.
(Grab and Temporary Wells)	1	metals)		and the extent of anoundwater impacts.
	ď	VOCs	Ouce	Assessment of the extent of ground and an armst and armst and armst and armst
Groundwater	,			I lead for evaluating potential corrective measure technologies.
Colleges and the second	2	Biogeochemical Parameters	OUCE	

# Notes:

- The Parameters of Interest are provided in Table 1.
- QA/QC samples will be collected per matrix at the following frequency: 1 field duplicate per 20 primary samples; 1 MS/MSD pair per 20 primary + field duplicate samples (excluding groundwater grab samples will be collected per matrix at the following frequency: 1 field duplicate blank per day per type of decontamination event where non-dedicated equipment is used. 1 trip blank per day when aqueous VOC samples are collected.
   Field Parameters for groundwater monitoring include: pH, temperature, specific conductivity, dissolved oxygen, oxidation-reduction potential, and water levels.
  - Field parameters for soil screening include: VOC vapors and visual characteristics.
- During soil sampling, samples for biogeochemical parameters (natural oxidant demand, grain size determination, and permeability) will be collected.Number of samples is approximate. Actual number of samples will be based on MIP/EC investigation results.

# SWMU-V: PORTIONS of the B005 PLUME FORMER IBM KINGSTON FACILITY SAMPLING SCHEDULE TABLE 3

Media	Number of Samples	Parameters of Interest	Frequency of Monitoring	Data Quality Onlectives
Soll	21	VOCs (EnCore® or equivalent)	Once	Collect confirmatory VOC information to verify the results of the
	2	Biogeochowing Description		merriol arie interface Probe/Electrical Conductivity (MIP/EC) data.
		orgeochemical Parameters	Once	Used for evaluating potential corrective measure technologies
Groundwater	12	VOCs	Once	Grab Samples- Collect confirmatory VOC information to verify the results of the MIP/EC data.  Temporary Wells- Assessment of the extent of the colors of the
(Grab and Temporary Wells)	c	Biogeochemical Parameters (not includion		impacts.
Control of the contro	7	metals)	Once	Used for evaluating potential corrective measure technologies
Giodinawater	4	VOCs	Onco	September of the septem
(Existing Wells)	c		SIG	Assessment of the extent of groundwater impacts.
(c	7	Biogeochemical Parameters	Once	Used for evaluating notantial pages

# Notes:

- The Parameters of Interest are provided in Table 1.

- The methodologies that will be used for analysis are listed in Tables 7 and 9.
   QA/QC samples will be collected per matrix at the following frequency: 1 field duplicate per 20 primary samples; 1 MS/MSD pair per 20 primary + field duplicate samples (excluding groundwater samples); 1 rinsate blank per day per type of decontamination event where non-dedicated equipment is used. 1 trip blank per day when aqueous VOC samples are collected.
  4. Field Parameters for groundwater monitoring include: pH, temperature, specific conductivity, dissolved oxygen. oxidation-reduction potential, and water levels.

  - During soil sampling, samples for biogeochemical parameters (natural oxidant demand, grain size determination, and permeability) will be collected.Number of samples is approximate. Actual number of samples will be based on MIP/EC investigation results.

May 2009

Ref: 083-87071

SWMU-M: PORTIONS of the INDUSTRIAL WASTE SEWER LINES FORMER IBM KINGSTON FACILITY SAMPLING SCHEDULE TABLE 4

Media	Number of Samples	Parameters of Interest	Frequency of Monitoring	Data Quality Objectives
Soil	24	VOCs (EnCore® or equivalent)	Once	Collect confirmatory VOC information to verify the results of the Membrane Interface Probe/Electrical Conductivity (MIP/EC) data.
	2	Biogeochemical Parameters	Once	Used for evaluating potential corrective measure technologies.
Groundwater	13	VOCs	Once	Grab Samples- Collect confirmatory VOC information to verify the results of the MIP/EC data. <u>Temporary Wells</u> - Assessment of the extent of groundwater impacts.
(Grab and Temporary Wells)	2	Biogeochemical Parameters (not including metals)	Once	Used for evaluating potential corrective measure technologies.
Groundwater	60	VOCs	Once	Assessment of the extent of groundwater impacts.
(Existing Wells)	2	Biogeochemical Parameters	Once	Used for evaluating potential corrective measure technologies.

- The Parameters of Interest are provided in Table 1.
   The methodologies that will be used for analysis are listed in Tables 7 and 9.
- QA/QC samples will be collected per matrix at the following frequency: 1 field duplicate per 20 primary samples; 1 MS/MSD pair per 20 primary + field duplicate samples (excluding groundwater samples); 1 rinsate blank per day per type of decontamination event where non-dedicated equipment is used. 1 trip blank per day when aqueous VOC samples are collected.
   Field Parameters for groundwater monitoring include: pH, temperature, specific conductivity, dissolved oxygen, oxidation-reduction potential, and water levels.
  - - During soil sampling, samples for biogeochemical parameters (natural oxidant demand, grain size determination, and permeability) will be collected.Number of samples is approximate. Actual number of samples will be based on MIP/EC investigation results. Field parameters for soil screening include: VOC vapors and visual characteristics.

# SWMU-AB: FORMER B001 TCA RECOVERY UNIT FORMER IBM KINGSTON FACILITY SAMPLING SCHEDULE TABLE 5

	Number of	Parameters of Interest	Frequency of Monitoring	Data Quality Objectives
Media				of the results of the
	6	VOCs (EnCore® or equivalent)	Once	Collect Commission 9 Membrane Interface Probe/Electrical Conductivity (MIP/EC) data.
Soil				I have for evaluating notential corrective measure technologies.
	~	Biogeochemical Parameters	Once	Used tol evaluating post-
	,	2		Grab Samples - Collect contirmatory VCC Illionitiation to a company of the continuation of the continuatio
Groundwater	9	NOCs	Once	results of the MIP/EC data.  Temporary Wells- Assessment of the extent of groundwater
				Impacts.
(Mells)	-	Biogeochemical Parameters (not including	Once	Used for evaluating potential corrective measure recrimens
(Glab alla lembore)			(	Accessment of the extent of aroundwater impacts.
Groundwater (Existing Wells)	8	VOCs	Once	Popposition of the control of the co

- The Parameters of Interest are provided in Table 1.
   The methodologies that will be used for analysis are listed in Tables 7 and 9.
- QA/QC samples will be collected per matrix at the following frequency: 1 field duplicate per 20 primary samples; 1 MS/MSD pair per 20 primary + field duplicate samples (excluding groundwater samples): 1 rinsate blank per day when aqueous VOC samples are collected.
   Field Parameters for groundwater monitoring include: pH, temperature, specific conductivity, dissolved oxygen, oxidation-reduction potential, and water levels.
  - - Field parameters for soil screening include: VOC vapors and visual characteristics.
- During soil sampling, samples for biogeochemical parameters (natural oxidant demand, grain size determination, and permeability) will be collected.Number of samples is approximate. Actual number of samples will be based on MIP/EC investigation results.

# FORMER IBM KINGSTON FACILITY TRIANGLE PLUME AREA SAMPLING SCHEDULE TABLE 6

Media	Number of Samples (7)	Parameters of Interest	Frequency of Monitoring	Purpose/Objective of Activity
Soil	18	VOCs (EnCore® or equivalent)	Опсе	Collect confirmatory VOC information to verify the results of the Membrane Interface Probe/Electrical Conductivity (MIP/EC) data.
	2	Biogeochemical Parameters	Once	Used for evaluating potential corrective measure technologies.
Groundwater	12	VOCs	Once	Grab Samples Collect confirmatory VOC information to verify the results of the MIP/EC data. <u>Temporary Wells</u> Assessment of the extent of groundwater impacts.
(Grab and Temporary Wells)	2	Biogeochemical Parameters (not including metals)	Once	Used for evaluating potential corrective measure technologies.
Groundwater		VOCs	Once	Assessment of the extent of groundwater impacts.
(Existing Wells)	4	Biogeochemical Parameters	Once	Used for evaluating potential corrective measure technologies.
Sewer Water	4	VOCs	Once	Assess the extent of groundwater impact and verify the perimeter groundwater control system.

- 1. The Parameters of Interest are provided in Table 1.
- 2. The methodologies that will be used for analysis are listed in Tables 7 and 9.
- 3. QA/QC samples will be collected per matrix at the following frequency: 1 field duplicate per 20 primary samples; 1 MS/MSD pair per 20 primary + field duplicate samples (excluding groundwa samples); 1 rinsate blank per day per type of decontamination event where non-dedicated equipment is used. 1 trip blank per day when aqueous VOC samples are collected.
  - 4. Field Parameters for groundwater monitoring include: pH. temperature, specific conductivity, dissolved oxygen, oxidation-reduction potential, and water levels. Field parameters for soil screening include: VOC vapors and visual characteristics.
    - During soil sampling, samples for biogeochemical parameters (natural oxidant demand, grain size determination, and permeability) will be collected.Number of samples is approximate. Actual number of samples will be based on MIP/EC investigation results.

# PARCCS DATA FOR SOIL SAMPLES FORMER IBM KINGSTON FACILITY TABLE 7

MEASUREMENT	METHOD	LABORATORY	FIELD & LABORATORY	ACCURACY	COMPLETENESS
PARAMETER	REFERENCE	PRECISION	PRECISION		
Volatile Organics	SW846 8260B	see Table 8	100%	see Table 8	%06
Natural Oxidant Demand	ASTM D422	NA	AN	NA	%06
Grain Size Analysis	ASTM D422	NA	A'N	NA	%06
Permeability	ASTM D5084	NA	NA	NA	%06

# NOTES:

- 1. NA = Not applicable
- 2. The Parameters of Interest are provided in Table 1.
- Precision expressed as either percent relative standard deviation (%RSD) or relative percent difference (%RPD).
  - Accuracy expressed as percent recovery (%R) of matrix spike or laboratory control sample.
    - 5. Precision and accuracy for VOC parameters provided in Table 8.

Representativeness and Comparability are non-quantitative parameters.

TABLE 8

LABORATORY PRECISION AND ACCURACY CRITERIA FOR SOIL VOCs
FORMER IBM KINGSTON FACILITY

OLATILE ORGANICS:	QC LII	
Target Spike Compound	% Recovery	% RPD
.1.1,2-Tetrachloroethane	52-130	0-30%
,1,1-Trichloroethane	57-165	0-30%
1,2,2-Tetrachloroethane	40-152	0-30%
.1,2-Trichloroethane	54-139	0-30%
.1-Dichloroethane	63-142	0-30%
.1-Dichloroethene	61-149	0-30%
,2,3-Trichloropropane	38-155	0-30%
.2-Dichlorobenzene	36-133	0-30%
,2-Dichloroethane	53-143	0-30%
,2-Dichloropropane	62-135	0-30%
.3-Dichlorobenzene	34-134	0-30%
1.4-Dichlorobenzene	35-136	0-30%
2-Chlorotoluene	42-146	0-30%
4-Chlorotoluene	39-145	0-30%
Benzene	55-143	0-30%
Bromobenzene	43-139	0-30%
Bromodichloromethane	53-136	0-30%
Bromoform	38-124	0-30%
Bromomethane	32-153	0-30%
Carbon Tetrachloride	45-153	0-30%
	49-135	0-30%
Chlorobenzene	39-152	0-30%
Chloroethane	61-142	0-30%
Chloroform	51-163	0-30%
Chloromethane	51-128	0-30%
Dibromochloromethane	57-130	0-30%
Dibromomethane	38-191	0-30%
Dichlorodifluoromethane	44-141	0-30%
Ethylbenzene	47-145	0-30%
Methylene Chloride	42-149	0-30%
Tetrachloroethene	53-144	0-30%
Trichloroethene	47-163	0-30%
Trichlorofluoromethane	50-154	0-30%
Vinyl Chloride	59-139	0-30%
1,2-Dichloroethene (Total)	32-139	0-30%
2-Chloroethyl Vinyl Ether	56-156	0-30%
Freon 113	44-136	0-30%
Xylene (Total)	51-131	0-30%
cis-1,3-Dichloropropene	49-129	0-30%
trans-1,3-Dichloropropene	70-130	0-30%
Freon 123a	30-130	0-30%
Benzyl Chloride	00 100	
Surrogate Compound_		N. A. I.A.
Dibromofluoromethane	71 - 114	NA NA
1,2-Dichloroethane-d4	70 - 109	NA NA
Toluene-d8	70 - 123	NA NA
4-Bromofluorobenzene	70 - 111	NA

## NOTES:

- 1. NA- Not Applicable
- 2. Accuracy and precision criteria based upon Lancaster Laboratories established limits.

May 2009

PARCCS DATA FOR AQUEOUS SAMPLES FORMER IBM KINGSTON FACILITY TABLE 9

RAMETER         REFERENCE         PRECISION           SW846 8260B         See Table 10           SW846 8260B         See Table 10           SW846 6010B         20%           SPAZO 4500 NH3 B&C         20%           gen Demand (BOD)         EPA 410.4         20%           gen Demand (COD)         EPA 410.4         20%           EPA 300.0         EPA 300.0         20%           EPA 300.0         EPA 365.1         20%           EPA 360.1         EPA 365.1         20%           EPA 360.0         20%         20%           Soilds (TDS)         EPA 160.1         20%           EPA 160.1         20%         20%           EPA 160.2         20%         20%           SMZ0 4500 SZD         20%         20%           EPA 160.1         20%         20%           EPA 160.2         20%         20%           SMZ0 4500 SZD         20%         20%           SMZ0 5310C         NA         NA           SMZ0 5310C         NA         NA           SMZ0 5310C         NA         NA           SMZ0 5310C         NA         NA           SMZ0 5310C         NA         NA      <	MEASUREMENT	METHOD	LABORATORY	FIELD & LABORATORY PRECISION		
Sw846 8260B see Table 10 Sw846 6010B see Table 10 Sw846 6010B Swe Table 10 Sw846 6010B Swe Table 10 Sw820 2320B 20% EPA 410.4 20% EPA 300.0 EPA 300.0 Sw20 4500 NH3 B&C 20% EPA 300.0 20% EPA 365.1 20% EPA 360.1 20% Sw20 4500 S2D EPA 160.1 20% ICTOC) EPA 160.2 20% Electrode NA Electrode NA	PARAMETER	REFERENCE	PRECISION	200%	see Table 10	%06
Syn846 6010B         see Table 10           Syn20 2320B         20%           Spring Syn20 320B         20%           gen Demand (BOD)         EPA 410.4         20%           EPA 410.4         20%           EPA 300.0         20%           EPA 300.0         20%           EPA 300.0         20%           EPA 365.1         20%           EPA 365.1         20%           Soilds (TDS)         EPA 360.0         20%           Soilds (TDS)         EPA 160.1         20%           Shazo 4500 S2D         20%         20%           Station Potential         Electrode         NA           Electrode         NA         NA	Weletile Organice	SW846 8260B	see Table 10	7000	see Table 10	%06
SM20 2320B 20% SM20 4500 NH3 B&C 20% SM20 4500 NH3 B&C 20% EPA 410.4 20% EPA 300.0 EPA 300.0 20% EPA 365.1 EPA 365.1 EPA 365.1 EPA 360.0 SM20 4500 S2D EPA 160.1 20% Ich (TOC) EPA 160.2 20% Electrode NA Electrode NA Electrode NA	Volatile Cigarita	SW846 6010B	see Table 10	800	75%-125%	%06
SM20 4500 NH3 B&C 20%  SM20 5210B 20%  EPA 410.4 20%  EPA 300.0 EPA 300.0  RSKSOP-175 mod 20%  EPA 353.2 EPA 353.2  EPA 365.1 EPA 365.1  EPA 300.0 SM20 4500 S2D  EPA 160.1 20%  I(TOC) EPA 160.2 20%  Electrode NA  Electrode NA	Inorganics	SM20 2320B	20%	20%	75%-125%	%06
SM20 5210B 20%  EPA 410.4 20%  EPA 300.0 EPA 300.0  RSKSOP-175 mod 20%  EPA 353.2 20%  EPA 353.2 20%  EPA 365.1 20%  EPA 360.0 20%  SM20 4500 S2D 20%  EPA 160.1 20%  I (TOC) EPA 160.2 20%  Electrode NA Electrode NA Electrode  NA	Ammonia as Nifrogen	SM20 4500 NH3 B&C	20%	%00°	75%-125%	%06
EPA 410.4  EPA 300.0  EPA 300.0  RSKSOP-175 mod  EPA 353.2  EPA 365.1  EPA 365.1  EPA 360.0  SM20 4500 S2D  EPA 160.1  EPA 160.1  EPA 160.2  SM20 5310C  NA  Electrode  NA  Electrode  NA	Rischemical Oxygen Demand (BOD)	SM20 5210B	20%	% On u	75%-125%	%06
EPA 300.0 EPA 300.0 RSKSOP-175 mod EPA 353.2 EPA 353.2 EPA 365.1 EPA 365.1 EPA 300.0 SM20 4500 S2D EPA 160.1 EPA 160.1 EPA 160.2 SM20 5310C Electrode NA Electrode NA	Chemical Oxidant Demand (COD)	EPA 410.4	20%	2009	75%-125%	%06
FPA 300.0	Flioride	EPA 300.0	20%	8 800	75%-125%	%06
RSKSOP-175 mod         20%           EPA 353.2         20%           cosphorous         EPA 365.1         20%           ssolved Soilds (TDS)         EPA 160.1         20%           spended Soilds (TDS)         EPA 160.1         20%           ganic Carbon (TOC)         EPA 160.2         20%           rn-Reduction Potential         Electrode         NA           ed Oxygen         Electrode         NA           Electrode         NA	Chloride	EPA 300.0	20%	200	75%-125%	%06
trite as Nitrogen	Methode	RSKSOP-175 mod	20%	% On 4	75%-125%	%06
EPA 365.1 20% EPA 300.0 20% SM20 4500 S2D 20% TSS) EPA 160.1 20% TSS) SM20 5310C 20% OC) Electrode NA Electrode NA Electrode NA	Nitrate/Nitrite as Nitroden	EPA 353.2	20%	%Co4	75%-125%	%06
SM20 4500.0	Total Phosphorous	EPA 365.1	20%	200	75%-125%	%06
issolved Soilds (TDS)	Sulfate	EPA 300.0	20%	% OF 4	75%-125%	%06
issolved Soilds (TDS) EPA 160.1 20% Uspended Solids (TSS) EPA 160.2 20% Irganic Carbon (TOC) Electrode NA Electrode NA Electrode NA Electrode NA Electrode NA	Sulfide	SM20 4500 S2D	20%	200	75%-125%	%06
EPA 160.2 20%  SM20 5310C 20%  Electrode NA  Electrode NA	Total Dissolved Soilds (TDS)	EPA 160.1	20%	% of 4	75%-125%	%06
SM20 5310C 20%  Electrode NA  Electrode NA	Total Suspended Solids (TSS)	EPA 160.2	20%	300	75%-125%	%06
Electrode NA Electrode NA Electrode NA	Total Organic Carbon (TOC)	SM20 5310C	20%	3000	AN	%06
Electrode NA Electrode NA	Oxidation Reduction Potential	Electrode	AZ Z	2000	AN	%06
Electrode	Dissalved Ovedan	Electrode	AN N	70,00	AN	%06
	Condition Condition	Electrode	AN	Story House	AN	%06
Electrode	Ho	Electrode	Y S	+0.5 sta pri ums	AN	%06

# NOTES:

- 1. NA = Not applicable
- 2. The Parameters of Interst are provided in Table 1.
- 3. Precision expressed as either percent relative standard deviation (%RSD) or relative percent difference (%RPD).

  - Accuracy expressed as percent recovery (%R) of matrix spike or laboratory control sample.
- 5. Precision and accuracy for VOC/Inorganic parameters provided in Table 10.
- 6. Accuracy and precision criteria for laboratory measurements will be consistent with the criteria cited in the individual methodologies for the natural attenuation parameters.
  - 7. Field parameters are only sampled for temporary and existing monitoring wells.

TABLE 10 LABORATORY PRECISION AND ACCURACY CRITERIA FOR AQUEOUS VOCs AND METALS FORMER IBM KINGSTON FACILITY

DLATILE ORGANICS:	QC LIN	
Target Spike Compound	% Recovery	% RPD
1.1,2-Tetrachloroethane	82-119	0-30%
1,1-Trichloroethane	85-151	0-30%
1,2,2-Tetrachloroethane	73-119	0-30%
1,2-Trichloroethane	77-124	0-30%
1-Dichloroethane	84-129	0-30%
1-Dichloroethene	87-134	0-30%
2,3-Trichloropropane	76-118	0-30%
2-Dichlorobenzene	83-113	0-30%
2-Dichloroethane	66-141	0-30%
2-Dichloropropane	83-124	0-30%
3-Dichlorobenzene	82-115	0-30%
,4-Dichlorobenzene	83-113	0-30%
-Chlorotoluene	82-118	0-30%
-Chlorotoluene	76-124	0-30%
Benzene	80-126	0-30%
Bromobenzene	82-115	0-30%
Bromodichloromethane	78-125	0-30%
Bromoform	62-113	0-30%
Bromomethane	48-136	0-30%
Carbon Tetrachloride	81-138	0-30%
Chlorobenzene	86-118	0-30%
Chloroethane	58-134	0-30%
Chloroform	81-134	0-30%
Chloromethane	67-154	0-30%
Dibromochloromethane	74-116	0-30%
Dibromomethane	83-119	0-30%
Dichlorodifluoromethane	63-187	0-30%
Ethylbenzene	77-125	0-30%
Methylene Chloride	79-120	0-30%
Tetrachloroethene	80-128	0-30%
Toluene	80-125	0-30%
Trichloroethene	88-125	0-30%
Trichlorofluoromethane	73-152	0-30%
1,2-Dichloroethene (Total)	85-125	0-30%
2-Chloroethyl Vinyl Ether	10-151	0-30%
Freon 113	89-148	0-30%
Xylene (Total)	79-125	0-30%
cis-1,3-Dichloropropene	77-117	0-30%
trans-1,3-Dichloropropene	74-119	0-30%
Benzyl Chloride	62-120	0-30%
Freon 123a	70-130	0-30%
Surrogate Compounds	80 - 116	NA
Dibromofluoromethane	77 - 113	NA
1,2-Dichloroethane-d4	80 - 113	NA
Toluene-d8	78 - 113	NA
4-Bromofluorobenzene		
TARGET ANALYTE LIST.	QC	LIMITS
TARGET ANALYTE LIST:	% Recovery	% RPD
Target Spike Compound	75%-125%	20%

#### NOTES:

- 1. NA Not Applicable
- Accuracy and precision criteria based upon Lancaster Laboratories established limits.
- Precision criteria for metals is ±CRDL (reporting limit) for results less than 5xCRDL.

# TABLE 11 TARGET ANALYTE SENSITIVITY LIMITS FORMER IBM KINGSTON FACILITY

	MDL	PQL	MDL	PQL
TARGET PARAMETERS	AQUEOUS DETECTION LIMITS	AQUEOUS REPORTING LIMITS	SOIL DETECTION LIMITS	SOIL REPORTING
Volatile Organic Compounds	[ug/l]	[ug/l]	[ug/kg]	[ug/kg]
1.1.1.2-Tetrachloroethane	1	5	1	5
1.1.1-Trichloroethane	0.8	5	1	5
1,1,2,2-Tetrachloroethane	1	5	1	5
Freon 113	2	10	2	10
1,1,2-Trichloroethane	0.8	5	1	5
1,1-Dichloroethane	1	5	1	5
1,1-Dichloroethene	0.8	5	1	5
1,2,3-Trichloropropane	1	5	1	5
Freon 123A	2	5	2	5
1,2-Dichlorobenzene	1	5	1	5
1,2-Dichloroethane	1	5	1	5
1,2-Dichloroethene (Total)	0.8	5	1	5
1,2-Dichloropropane	1	5	1	5
1,3-Dichlorobenzene	1	5	1	5
1.4-Dichlorobenzene	1	5	1	5
1-Chlorohexane	NA	NA	NA	NA
2-Chloroethyl Vinyl Ether	2	10	2	10
2-Chlorotoluene	1	5	1	5
4-Chlorotoluene	1	5	1	5
Benzene	0.5	5	0.5	5
Benzyl Chloride	1	5	1	4
Bromobenzene	1	5	1	5
Bromodichloromethane	1	5	1	5
Bromoform	1	5	1	5
Bromomethane	1	5	2	5
Carbon Tetrachloride	1	5	1	5
Chlorobenzene	0.8	5	1	5
Dibromochloromethane	1	5	1	5
Chloroethane	1	5	2	5
Chloroform	0.8	5	1	5
Chloromethane	1	5	2	5
cis-1,3-Dichloropropene	1	5	1	5
Dibromomethane	1	5	1	5
Dichlorodifluoromethane	2	5	2	5
Ethylbenzene	0.8	5	1	5
Methylene Chloride	2	5	2	5
Tetrachloroethene	0.8	5	1	5
Toluene	0.7	5	1	5
trans-1,3-Dichloropropene	1	5	1	5
Trichloroethene	1	5	1	5
Trichlorofluoromethane	2	5	2	5
Vinyl Chloride	1	5	1	5
Xylene (Total)	0.8	5	1	5

## TABLE 11 TARGET ANALYTE SENSITIVITY LIMITS FORMER IBM KINGSTON FACILITY

State of the state	MDL	PQL	MDL	PQL
TARGET PARAMETERS	AQUEOUS DETECTION LIMITS	AQUEOUS REPORTING LIMITS	SOIL DETECTION LIMITS	SOIL REPORTING
Volatile Organic Compounds	[ug/l]	[ug/l]	[ug/kg]	[ug/kg]
Inorganics List	[mg/l]	[mg/l]	[mg/kg]	[mg/kg]
Antimony	0.0097	0.02	NA	NA
Arsenic	0.0102	0.02	NA	NA
Barium	0.00062	0.005	NA	NA
Cadmium	0.002	0.005	NA	NA
Calcium	0.0702	0.2	NA	NA
Chromium	0.003	0.015	NA	NA
Copper	0.0027	0.01	NA	NA
Iron	0.0522	0.2	NA	NA
Lead	0.0069	0.015	NA	NA
Magnesium	0.0322	0.1	NA	NA
Manganese	0.00084	0.005	NA	NA
Potassium	0.0503	0.5	NA	NA
Selenium	0.0107	0.02	NA	NA
Sodium	0.433	1	NA	NA

- 1. NA Not Applicable
- 2. The Parameters of Interest are provided in Table 1.
- 3. VOC and Inorganic reporting limits are from Lancaster Laboratories established lists.
- Reporting Limits will be modified on an individual sample basis depending upon dilution, percent solids, and sample matrix considerations.
- 5. MDL Method Detection Limit
- 6. PQL Practical Quantitation Limit

May 2009

Ref. 083-87071

ANALYTICAL METHODS, SAMPLE CONTAINERS, PRESERVATION AND HOLDING TIMES FOR SOIL SAMPLES FORMER IBM KINGSTON FACILITY TABLE 12

			MINIMOM		
PARAMETER	METHODOLOGY	CONTAINER	SAMPLE	PRESERVATION	HOLD TIME
Volatile Organics	SW846 8260B	4 EnCore® samplers	20 gm	Cool 4 °C	14 days
Natural Oxidant Demand	ASTM D422	16 oz glass	1000 gm	None	None
Grain Size Analysis	ASTM D422	16 oz glass	1000 gm	None	None
Permeability	ASTM D5084	Shelby tube sample	N/A	None	None

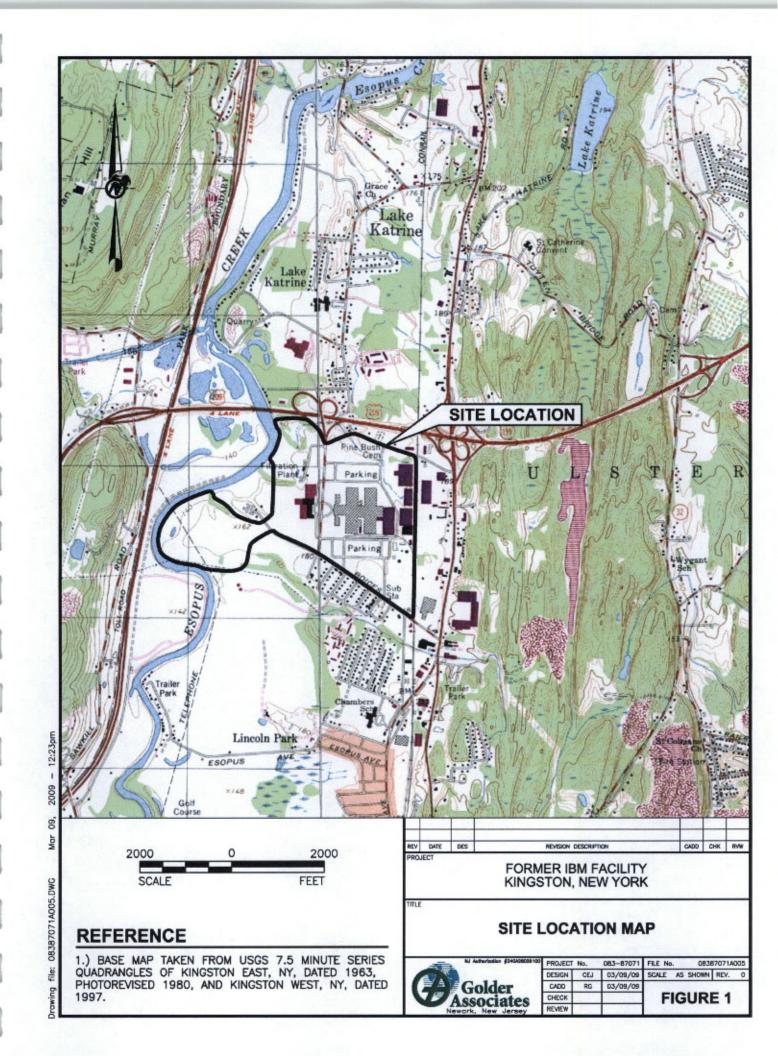
- 1. Sample Preservation is performed by sampler immediately upon sample collection except for VOCs which is performed by laboratory upon receipt.
- 2. Hold time based upon day of sample collection not verified time of sample receipt. 3. Hold time is 48 hours for preservation using Encores  $^\circ$  and 14 days to analysis.

ANALYTICAL METHODS, SAMPLE CONTAINERS, PRESERVATION AND HOLDING TIMES FOR AQUEOUS SAMPLES FORALES TABLE 13

			MINIMOM		
BABAMETER	METHODOLOGY	CONTAINER	SAMPLE	PRESERVATION	HOLD TIME
FANAMETER	SIMOAG BORDE	3-40 ml class	3-40 ml	Cool 4 °C;HCI,pH<2	14 days
Volatile Organics	200000000000000000000000000000000000000	citation and a	250 ml	Cool 4° C; HNOs, pH<2	180 days
Inorganics	SW846 5010B	1-500mi piasuc	1007		14 days
	SM2320B	round plastic	250 ml	None	n foot
Alkalinity	SMARON	cound alass	750 ml	H2SO4	28 days
Ammonia as Nitrogen	0000000	citacle benea	500 ml	None	48 hours
Biochemical Oxygen Demand (BOD)	SMSZ10	could plastic	400 ml	H2SO4	28 days
Chemical Oxidant Demand (COD)	SM5220	round glass	1100	000	28 days
Flippide	SM4500	glass vial	40 ml	None	O 200
and a	SMASOO	glass vial	40 ml	None	ze days
Chloride	CONTROL OF COUNTY	2.40ml alace	3-40ml	Cool 4°C	7 days
Methane	SW846 8015M	Section Signs	10 20	None	28 days
Nitrate/Nitrite as Nitrogen	EPA 353	glass vial	= 0+	000	28 days
Total Chosohorous	EPA 365.1	round glass	100 ml	HZ504	260007
an Linearing one	CHARDO	selp pulo	200 ml	NaOH/ZnAc	/ days
Sulfate	OWHEND	7	300 m	NaOH/ZnAc	7 days
Sulfide	SM4500-S2	round glass	200 1111		7 days
Tatal Dissolved Collde (TDS)	SM2540	round plastic	350 ml	None	060
(OCI) COMO DAMOS (I	CANDEAD	round plastic	350 ml	None	/ days
Total Suspended Solids (155)	OFCZINIO	O TOTAL DE LA CONTRACTOR DE LA CONTRACTO	250 m	None	7 days
Total Organic Carbon (TOC)	SM5310	round plastic	2000	000	Field Measurement
Calabian Doduction Dotantial	Electrode	AN	NA NA	DION	
dation - reduced in ordinar	C Control II	AN	AZ.	None	Field Measurement
Dissolved Oxygen	Elections	2	AN	None	Field Measurement
Specific Conductance	Electrode	C :		Popo	Field Measurement
H	Electrode	₹Z	Ź		Field Measurement
	Flectrode	AN	NA	None	Light Wedge Charles

- 1. NA Not Applicable
- Sample preservation is performed by sampler immediately upon sample collection.
- Hold time based upon day of sample collection not verified time of sample receipt.
- If sample cannot be preserved due to foaming, unpreserved sample will be collected and analyzed within 7 days.
- 5. Field measurements will be collected using a flow-through cell equipped with a field meter and parameter specific electrodes.

FIGURES



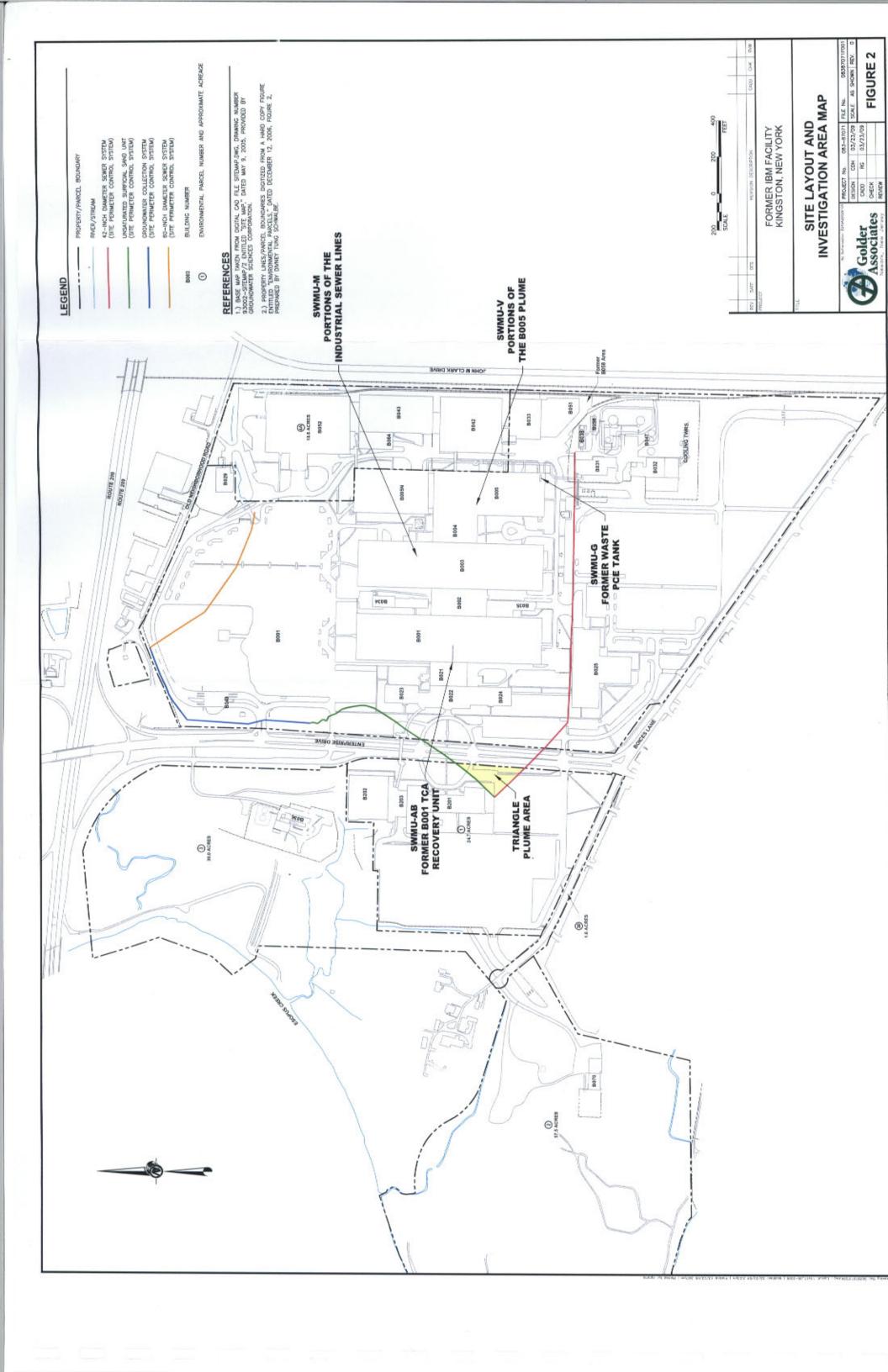
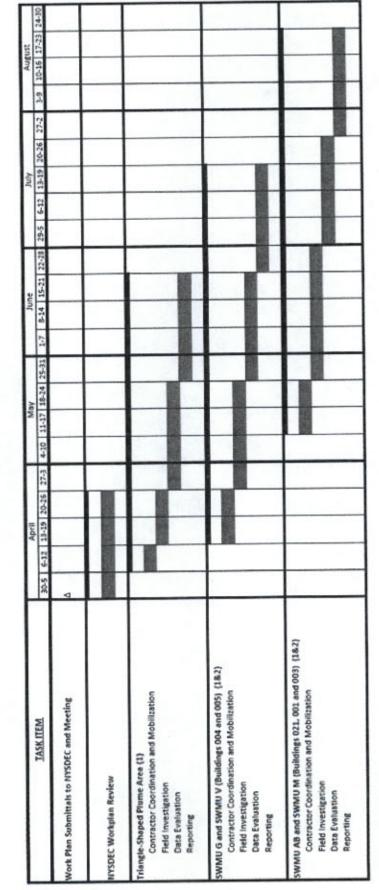


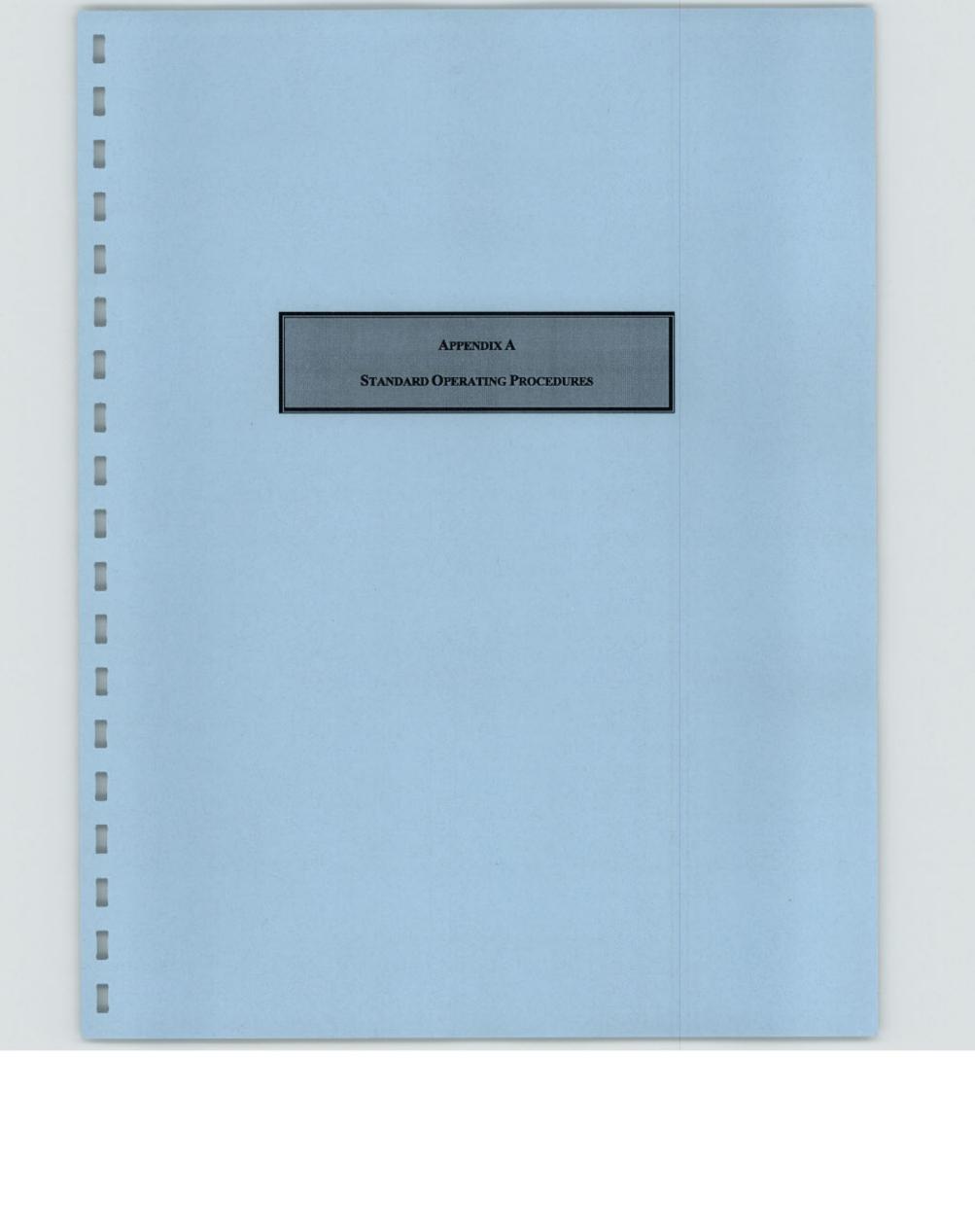
Figure 3 Project Organization Chart Former IBM Kingston Facility NYSDEC Project Manager Gary Casper IBM Project Coordinator Michael Kominek Golder Project Director Alistair Macdonald, P.G. Golder Health and Safety Coordinator James Valenti, P.G. Golder Project Manager Anthony Savino Golder Senior Hydrogeologist Chris Hemingway, P.G. Golder Field Team Golder Data Manager Leader Daniel Gorman Cindi Lucas Subcontractors MIP/EC – Peak Investigations
 Analytical Services – Lancaster Laboratories
 Soil Physical Properties Analytical Services – Oxidation Systems, Inc.
 Drilling – Environmental Probing Investigations Inc.
 Surveyor – Brinner & Larios PC **Golder Associates** 

# FIGURE 4

# SWMU INVESTIGATION SCHEDULE Former IBM Kingston Facility



- Motes
  (1) Assumes general concurrence with NYSDEC
  (2) Assumes TechCity provides unencumbered access
  SWMU G Former Waste PCE Tank
  SWMU V Portions of 8005 Plume Beneath Building 8005
  SWMU AB Former Waste TCA Recovery Unik
  SWMU M Portions of Industrial Waste Sewer Lines



Title: Utility Clearance Procedures

Page 1 of 2

## 1.0 GENERAL APPLICABILITY

The purpose of this Standard Operating Procedure (SOP) is to describe the methods for clearing utility locations on Site. The scope of this document is limited to field operations and protocols applicable during advancement of soil borings, temporary well installation, or Membrane Interface Probes (MIP). Based on a review of utility maps for the Site, Golder anticipates that buried water, sewer, stormwater, natural gas, electrical, and communication lines may exist in the proposed investigation areas.

## 2.0 RESPONSIBILITIES

The Field Team Leader is responsible to oversee the utility clearance procedures to reduce the potential for encountering a utility during the subsurface assessment activities. Field personnel are required to follow this SOP and adhere to utility mark out locations.

#### 3.0 PROCEDURES

The utility locating procedures will include:

- Contact DigSafely to clear utilities within the public right-of-ways. The Field Team Leader
  will use the DigSafely clearance field form (attached) to record the DigSafely number and list
  the utilities contacted by DigSafely. DigSafely does not contact local utilities including
  municipal water and sewer companies. The field team leader or his/her designee will be
  responsible to contact the local utility companies. Utility color coding for DigSafely
  companies include:
  - 1. Red = Electric lines;
  - 2. Yellow = Gas-oil-steam;
  - Orange = Communication Cable TV;
  - Blue = Potable water;
  - Violet = Reclaimed water; and
  - 6. Green = Sewer and drainage.
- Review existing Site utility maps;
- Conduct interviews with Site personnel knowledgeable about the subsurface utilities, if available;

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Title: Utility Clearance Procedures

Page 2 of 2

- Advance the boring outside the area of a marked utility; and
- Prior to advancing the GeoProbe® boring, the boring location will be further "cleared" using hand-auger or soft dig techniques (i.e., vacuum extraction) to a depth of approximately five feet below ground surface (bgs). Soil cuttings generated during the utility clearance procedures will be placed with the soil cuttings generated during the subsurface assessment activities (see SOP-8).

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## **DIGSAFELY Contact Record**

1-888-344-7233



A copy of this completed form should be kept onsite during the field activities for which DIGSAFELY was contacted, and a copy of this competed form should be placed in the project file.

et Number: et Manager Name: eg DIGSAFELY.
SPECIAL SECTION CONTRACTOR SECTION SEC
g DIGSAFELY.
tate):
h of excavation/boring:
paint? Yes \( \sum \) No \( \sum \):
Dates work to be completed:
by DIGSAFELY):
e Contacted: Contacted by: Contacted by:
e Contacted: Contacted by:
h pa

Title: Temporary Well Installation and Groundwater Sample Collection

Page 1 of 5

#### 1.0 GENERAL APPLICABILITY

The purpose of this Standard Operating Procedure (SOP) is to describe the methods to be used in the collection of groundwater quality samples. The scope of this document is limited to field operations and protocols applicable during groundwater sample collection. The intent of this investigation is to collect groundwater data for screening and assessment purposes. Groundwater samples obtained during this investigation will be collected in existing wells, temporary wells and/or directly through the direct push technology (DPT) rig.

As described in the Work Plans, three (3) types of groundwater samples will be collected as follows:

- Groundwater grab samples collected using GeoProbe® techniques (i.e., SP-15-Sampler or DT-21-Profiler) to confirm MIP readings from specific zones in the boreholes advanced to collect the soil samples. These samples will be analyzed for VOCs using EPA Method 8260B. No purging or field parameter sampling will be performed prior to collecting these groundwater samples.
- Groundwater samples collected from temporary wells constructed of dedicated PVC screen and casing and natural or pre-packed filter materials. Groundwater from these wells will be sampled using low-flow purging techniques and analyzed for VOCs. Groundwater samples for biogeochemical parameters will also be collected from selected temporary well locations.
- Groundwater samples collected from existing Site monitoring wells for analysis of VOCs and biogeochemical parameters via EPA Method 8260B.

### 2.0 RESPONSIBILITIES

The Field Team Leader and field sampling personnel have the shared responsibility to oversee and ensure that groundwater sampling is performed in accordance with the project-specific sampling program and this SOP. The Field Team Leader shall ensure that field sampling personnel understand and comply with this SOP.

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Title: Temporary Well Installation and Groundwater Sample Collection

Page 2 of 5

## 3.0 SAMPLING EQUIPMENT DESCRIPTION

Reusable and expendable equipment and materials required for groundwater sampling includes, but may not be limited to:

### Reusable:

- · Peristaltic pump;
- YSI 600XL flow-through cell or equivalent field water quality meter;
- Dissolved oxygen (DO) meter;
- Electric groundwater level monitoring meter graduated in increments of 0.01 feet;
- Groundwater Collection Form an example of this form is included as Attachment 1;
- First-aid kit present on-Site at all times;
- Fire extinguisher present on-Site at all times;
- Monitoring well keys provided by the client; and
- Calculator.

## Expendable:

- Sample containers three 40-milliliter (mL) glass sample containers (vials) for each VOC sample. The sample bottles will either be newly purchased or pre-cleaned and certified by the laboratory and pre-preserved with hydrochloric acid (HCl);
- Sample containers for the biogeochemical analysis. The sample bottles will either be newly purchased or pre-cleaned and certified by the laboratory and pre-preserved as required for the analytical method;
- Coolers and ice coolers are provided by the laboratory. The sampler will purchase
  ice as necessary to maintain sample temperatures less than 4°C;
- Latex or Nitrile gloves as appropriate purchased by the sampler as needed;
- Alconox<sup>®</sup>/Liquinox<sup>®</sup> (mild detergent) purchased by the sampler as needed;
- Distilled water purchased by the sampler as needed; and

Golder Associates

Title: Temporary Well Installation and Groundwater Sample Collection

Page 3 of 5

Dedicated Teflon-lined polyethylene and silicon tubing.

## 4.0 PURGING AND SAMPLING PROCEDURES

Groundwater samples will be collected as follows:

- Calibrate the YSI 600XL or equivalent field water quality meter in accordance with the manufacturer's recommendations each day prior to collecting groundwater samples and check the meter calibration at the end of each sampling day;
- Place dedicated Teflon-lined polyethylene tubing into the sampling point to the approximate center point of the screened interval;
- Connect the Teflon-lined polyethylene tubing into the silicon tubing running through the peristaltic pump;
- Connect the discharge end of the silicon tubing to a second piece of Teflon-lined polyethylene tubing (water discharge tubing);
- To remove sediment materials from the screened interval and assure representative formational groundwater is sampled, the sampling point will be purged under low flow conditions for approximately two minutes, or until a minimum of three well volumes are removed. Collect the purge water in a five-gallon bucket and manage in accordance with SOP-8-IDW Management;
- After removing sediment from the sample point, connect the discharge end of the Teflonlined polyethylene tubing to the YSI 600XL or equivalent field water quality meter and measure and record pH, specific conductance, Eh, and temperature of the purge water. Field personnel will record the field water quality parameters once the flow-through cell is completely full. Do not wait for stabilization of the field water quality parameters before recording the readings from the field water quality meter;
- Fill the dissolved oxygen (DO) field water quality sample bottle and measure and record the DO concentration on the groundwater sample collection form;
- Following measurement of the field water quality parameters, cut the discharge end of the silicon tubing (just in front of the discharge end of the Teflon-lined polyethylene tubing) and collect groundwater samples for analysis of major cations and biogeochemical parameters specified in the Work Plan (except for VOCs) using pre-preserved sample containers;
- After collecting the non-volatile groundwater samples, turn off the peristaltic pump, remove
  the tubing from the sample point making sure that the influent end of the tubing does not
  contact the ground and that the effluent (pump) end remains attached to the pump to prevent
  loss of sample water from the tubing. Remove the tubing from the pump and collect the
  groundwater sample directly from the influent end of the tubing by allowing water to slowly
  drain by gravity into the pre-preserved laboratory VOC sample vials. Alternatively,
  disposable bailers may be used to collect groundwater for VOC samples following
  completion of purging;

Golder Associates

Title: Temporary Well Installation and Groundwater Sample Collection

Page 4 of 5

- Continue to fill the VOC sample vials until a meniscus forms on the lip of the container;
- Quickly place the plastic cap (containing a Teflon septum) on the container and screw the cap
  on the container;
- The filled bottle shall be turned upside down and tapped several times to ensure that no air bubbles are present in the sample container;
- If air bubbles are present, reopen the container and add additional sample volume to again achieve a meniscus on the lip of the VOC vial;
- Repeat these steps described above until no bubbles remain in any of the VOC sample vials;
- Following sample collection, the groundwater sample will be placed in a cooler on ice for preservation during shipment to a laboratory for analysis in accordance with Chain-of-Custody procedures in accordance with SOP-3; and
- Following sample collection, equipment shall be properly discarded in accordance with SOP-8-IDW Management.

## 5.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) REQUIREMENTS

Various quality assurance/quality control (QA/QC) samples shall be collected in accordance with the QAPP. QC samples are used to monitor sampling and laboratory performance and include trip blanks and field replicates. Each of these QA/QC samples is described in the QAPP and summarized below.

#### Trip Blanks

Trip blanks are used to verify that the VOC bottles and samples are not contaminated in transit between the lab to the Site, while on-Site, and from the Site back to the lab. The lab will supply prepreserved and pre-prepared trip blanks. Trip blanks shall accompany the VOC samples throughout the event from collection through shipment to the laboratory and are recorded on the Chain-of-Custody along with the primary samples. A trip blank shall be shipped with each cooler that contains VOC samples.

### Field Replicates

Field replicates are collected to assess the laboratory equipment accuracy. Field replicates are collected for all required analyses at a frequency of not less than 20% of the total number of primary

Golder Associates

Title: Temporary Well Installation and Groundwater Sample Collection

Page 5 of 5

samples collected. Field replicates are collected by sampling the same location twice. However, the field replicate is assigned a unique sample identification number which does not identify the sample location. Field replicate samples shall be collected by alternating primary and field replicate sample bottles during sample collection. Field replicates are recorded on the Chain-of-Custody along with the primary samples.

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#### GROUNDWATER SAMPLE COLLECTION FORM



SITE DESCRIPTION		SAM	MPLE DESC	RIPTION		
Product Aleman IRM/Kingson				Sample ID		
Project Number: 083-87071 Location: Kingston, NY			Time	Wal Site		
Location: Kingston, NY		*	ne of Sample	Collection:		
		Tir	ne or Sample	contections_		
WEATHER CONDITIONS			Compli	ampled by	Peristaltio	Pump
Temperature:	Sampled by Sampling Method Type of Sampling Equipment			Palv & Silicon tubing		
Wind:		Type	of Sampling	Equipment	roly or only	
Precipitation:						
ried pitters.						
				TER TO BE	DURGED	
FIELD BLANK NOTES		VOLU	JME OF WA	TER TO BE	PURGED	inches
Field Blank Name:			Casing Insid		gal/ft	
Field Diark Name.			Casi	ng Volume:		<u> </u>
Field Blank /Rinse Water type:			Column of Wa	ater in Well:	feet	
		Volume of Water in Well:			gallons	
Lot Number:			Well Volum	es to Purge:		
Analyses:		. N	in. Volumet	be Purged:	gallons	
	EEODE DI IDGE		Mathan	of Duraina		
COLUMN OF WATER IN WELL B	A TOC		Well F	Purged Dry?:	Yes No	
Total Depth of Well:  Depth to Water:	# TOC					
Depth to Water:	1100					
Column of Water in Well.						
Depth to Water after Purger	ft TOC					
Appearance of Sample:	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
WELL PURGE CONTROL	Time:	Turgez				
Volume Removed			V			
Volume Randved	pH:					
Specific Conductance (				/		
Temperature (Deg	ross C):					
Temperature (Deg	(NITU):					
Turbidity						
	llivolts):					
DO	(mg/l) :				151-1	201931
S 41 - D -	- Time		Avera	ge Purge Rate	9:	_ml/min
Starting Pur	ge Time:		Total V	olume Purgeo	d:	liters
Ending Pur	ge Time:		17			
SAMPLE CONTAINERS REQUIR	KED	sher Type and	4 979	Filter	Preservati	ve and Sour
Analysis	Container Nuri	Ombidde		T NA		HCL
Volatiles (8260B)	(2) 4	omiviais		1		
				-		
				_		
			DEMARK	D 21 0 463	gal/ft 1" -	0.014 nal/f
Chain of Custody #:			KEMARK	3. 2 - 0.163	gant	Old L. Sept.
Trin Blank ID:		-12		-		
Lab Name:						
Air Dill #		Fiel	d Team Lead	er:		

Title: Chain-of-Custody Procedures

Page 1 of 2

### 1.0 GENERAL APPLICABILITY

The chain-of-custody form provides evidence and documentation of sample collection, shipment, laboratory receipt, and laboratory custody until disposal of the sample. The chain-of-custody form identifies each sample collected and the individuals responsible for sample collection, shipment, and receipt. The intent of the Chain-of-Custody Procedure is to provide guidance to maintain sample integrity.

#### 2.0 RESPONSIBILITIES

It is the responsibility of the field personnel who collect the samples to initiate the chain-of-custody protocol. Upon sample collection, but prior to storage, shipment, or transportation, the field personnel shall properly and completely fill out the chain-of-custody form with a waterproof ink pen. The field team leader shall review the form prior to sample storage, shipment, or transportation. If an error is made during the completion of the chain-of-custody form, a line shall be drawn through the error and the correction entered. The field personnel completing the form shall initial and date the error. Under no circumstances is white-out or erasing acceptable. The field sampling personnel are responsible for making a copy of the completed chain-of-custody form and giving the form to the Project Manager. The Project Manager or designee shall review the form and place it in the project file with the field sampling forms. Upon receipt by the laboratory, the laboratory sample custodian shall assume responsibility for completing the chain-of-custody procedures. Upon completion of analysis, the laboratory shall submit a copy of the completed chain-of-custody form with the analytical data to the Project Manager who will place it in the project file.

#### 3.0 EQUIPMENT DESCRIPTION

- · Chain-of-custody forms; and
- · A waterproof ink pen.

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Title: Chain-of-Custody Procedures

Page 2 of 2

#### 4.0 PROCEDURES

The chain-of-custody forms shall be completed with a waterproof ink pen. Preparation of the chain-of-custody form shall be as follows:

- Complete the chain-of-custody form. The project name, client name, laboratory name and address, the person to whom the chemical analyses results shall be reported, and invoicing information shall be identified at the top of the form;
- Sample-specific information shall include the field identification number (in accordance with
  the QAPP), the date and time the sample is collected, the depth at which the sample was taken,
  the type of sample (e.g., groundwater, soil, etc), the type of analyses requested, and
  preservatives used. Samples shall be grouped for shipment with other samples for the same
  analysis and a common form used. More than one chain-of-custody form shall be used if the
  number of samples that are to be included in a cooler is greater than the number of entry
  spaces on the chain-of-custody form;
- Each person taking possession of the sample shall sign and date the chain-of-custody both as a
  recipient and as a relinquisher of the samples. When the samples have been delivered to the
  laboratory, the laboratory sample custodian will sign the chain-of-custody as the last recipient
  of the samples;
- If the samples are directly transported to the laboratory, the chain-of-custody shall be kept in
  the possession of the person delivering the samples. Upon receipt by the laboratory, the
  sample receiver(s) shall open the shipping containers, compare the contents with the chain-ofcustody form, assign laboratory sample identification number(s), record the laboratory sample
  identification number on the chain of custody, and sign and date the form. Any discrepancies
  shall be noted on the chain-of-custody form and the Project Manager notified immediately;
- Prior to shipment by a commercial carrier, make a copy of the chain-of-custody form. If the samples are delivered directly to the laboratory by field personnel, a copy of the form shall be made after the laboratory representative signs and dates the chain-of-custody form; and
- Chain-of-custody forms shall be maintained with the analytical data.

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Title: Log Book and Field Form Procedures

Page 1 of 5

## 1.0 GENERAL APPLICABILITY

The log book provides a means to record daily significant events, observations, and measurements during sampling and monitoring activities. Sufficient data and observations shall be recorded in the log book and/or field forms to enable reconstruction of field events.

## 2.0 RESPONSIBILITIES

It is the responsibility of the Field Team Leader to maintain centralized daily records of all significant field events, observations, and measurements during field investigations. Members of the field team are responsible for maintaining complete records of their actions, observations, etc., in the field log books and providing this information to the Field Team Leader at the end of each day. If observations and measurements are taken in an area where the field log book may become contaminated or if the field personnel are spread over a large area, separate waterproof bound and numbered field log books may be maintained. The Field Team Leader will make photocopies of all field data entries on a regular basis (preferably at the end of each day but at least on a weekly basis) and submit the copies to the Project Manager for inclusion with the project file. The entries shall be signed and dated at the completion of each task or at the end of each day. The field team members will retain the individual field log books until the logbook is filled or the completion of the project, at which time possession of the log books is transferred to the Project Manager. The Project Manager and/or Field Team Leader are responsible for collecting the forms and entering them into the project file. Field personnel are responsible for assuring that forms are completed in waterproof ink.

Errant field entries shall have a single line drawn through them and the correct information entered above it. Corrections shall be initialed and dated by the appropriate field personnel. Individual pages shall not be removed from bound log books.

## 3.0 EQUIPMENT DESCRIPTION

- A waterproof, bound field log book;
- A waterproof, bound sample log book; and

Golder Associates

Title: Log Book and Field Form Procedures

Page 2 of 5

A waterproof ink pen.

#### 4.0 PROCEDURES

#### Field Log Book

The Field Team Leader and field staff are responsible for logging dates, times, subcontractors, field personnel, field activities, and any other pertinent information during field activities. Field log book entries shall be legible and include, at a minimum, the following information:

- · Date;
- · Project name and number;
- · Weather and temperature;
- List of personnel present including subcontractors and visitors. The time of arrival and departure shall be noted next to each name;
- · Name and times of visit by unauthorized personnel to the site;
- Business phone calls along with the name of the field personnel making the call and the phone call recipient, time, and a brief description of the topic of conversation;
- A description of the activities of subcontractors (e.g., drillers, backhoe contractor, survey contractor, etc.) and subcontractor down-time. Next to the entry, note the reason for the down-time. Log information or observations regarding the subcontractor's performance in the field log book;
- Description of all field activities completed including soil boring advancement, monitoring well installation and sampling activities, sewer sampling, MIP assessment including all measurements; and
- The time of any photographs taken along with the direction and descriptions of the photographs and weather conditions.

If page numbers are not pre-printed in the field log book, sequential page numbers shall be written at the top of each page.

Golder Associates

Title: Log Book and Field Form Procedures

Page 3 of 5

## Calibration Forms

Equipment calibration forms are required to record and track daily calibration of each instrument. Instructions on the proper calibration procedure are found in the equipment manual and/or may be provided separately. Calibration Forms should generally include the following:

- Date and time of calibration;
- Equipment calibrated with model number and/or identification number;
- · Media used to calibrate instrument (e.g., solutions or gas);
- Calibration media information, lot numbers, and concentration; and
- Pre and post calibration readings.

Follow the provided instructions and record the necessary information on the calibration field form (attached). The original Calibration Forms should be provided to the Project Manager and placed in the office project files.

## Groundwater Sample Collection Field Forms

Use groundwater sample collection field forms in addition to field log books. The groundwater sample collection field form provides a record of the sampling methods and equipment, site and decontamination procedures, and chemical analyses performed. These field sampling records are intended to provide accurate descriptions of sampling procedures to ensure the integrity of the samples. The sampling procedure may alter the chemical results; therefore, documenting sampling steps is important. Each groundwater sample collection form will include the following information:

- Date and time of purging and sampling;
- · Sampling location designations;
- · Depth to water;
- · Total depth of well;

Golder Associates

Title: Log Book and Field Form Procedures

Page 4 of 5

- · Standing water column;
- · Well inside diameter;
- Volume of standing water in well;
- Purging and sampling device;
- Pump capacity;
- · Decontamination procedure;
- · Purge volume;
- · Sample depth interval;
- Sample time;
- Field observations such as odor, color, and apparent turbidity;
- Field water quality data including pH, Eh, specific conductivity, temperature, and dissolved oxygen;
- · Chemical analyses requested; and
- Number of samples provided for each laboratory analysis.

The groundwater sample collection field forms shall be legible, dated, and signed by the person making the entry. The Field Team Leader will collect all the groundwater collection field forms and place these forms into the project file (attached).

#### Soil Boring Logs

Use soil boring logs in addition to field log books. Soil boring logs provide a record of the boring advancement methods and equipment, lithology, site and decontamination procedures, field screening readings, and chemical analyses performed. These boring logs are intended to provide accurate descriptions of the lithology and sampling procedures to ensure the integrity of the samples. The soil boring logs will include the following information:

· Date and start/end time of boring advancement;

Golder Associates

Title: Log Book and Field Form Procedures

Page 5 of 5

- Type of equipment used and drillers name and company information;
- Lithologic descriptions including lithology (i.e., Unified Soil Classification System), color, texture, moisture, and weathering;
- · Field screening readings;
- · Sampling depth and designations;
- Depth to water;
- · Total depth of boring;
- · Well installation methods, if required; and
- Well inside diameter.

The soil boring logs shall be legible, dated, and signed by the person making the entry. The Field Team Leader will collect the soil boring logs and place these logs into the project file. A sample soil boring log is provided is attached. Well installation information will be included on the soil boring log as appropriate.

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# GROUNDWATER SAMPLE COLLECTION FORM



SAMPLE DESCRIPTION

SITE DESCRIPTION		SAI	MPLE DESC	RIPTION			
Project Name: IBM/Kingston				Sample ID:			
Project Number: 083-87071				t Well Site:			
Location: Kingston, NY		-	Time a	Collection:			
19 Mar 10 (20 Mar)		TH	me of Sample	Sampled by:			
WEATHER CONDITIONS			Sampli	on Method:	Peristaltio	c Pump	
Temperature:	Sampling Method: Peris Type of Sampling Equipment: Poly &			Poly & Silin	con tubing		
Wind:	турс	or camping					
Precipitation:							
		VOLU	JME OF WA	TER TO BE	PURGED		
FIELD BLANK NOTES				inches			
Field Blank Name:			Cas	gal/ft feet			
Field Blank /Rinse Water type:			Column of W				
Lat Nombre				ater in Well:		gailons	
Lot Number:			Well Volun	nes to Purge:			
Analyses:		N.	fin. Volumet	o be Purged:	gallons		
COLUMN OF WATER IN WELL BEFORE	PURGE		Method	of Purging:			
Total Don'th of Well!	H IOC		Well	Purged Dry?:	Yes No		
Depth to Water:  Column of Water in Well:	ft TOC						
Column of Water in Well:	ft						
Depth to Water after Purge:	ft TOC						
WELL PURGE CONTROL Time: Volume Removed (liters): pH: Specific Conductance (uS/cm):		Purge 2	Purge 3	Purge 4	Purge 5	Purge 6	
Temperature (Degrees C):							
Turbidity (NTU):							
Eh (millivolts):							
DO (mg/l):						100 / 100 = 1	
Starting Purge Time: Ending Purge Time:			Avera Total V	ge Purge Rate olume Purged		_ml/min _liters	
SAMPLE CONTAINERS REQUIRED	ontainer Num	ber, Type and	Size	Filter	Preservati	ve and Sour	
P. C. Land	(2) 40	ml vials	72.00.00	NA		HCL	
Volatiles (8260B)	(20) 100						
		4		-	-		
					-		
Chain of Custody #		***	REMARKS	3			
Shuttle ID:		_					
Trip Blank ID:		4.0					
Lab Name:		- 50	d Team Leade	-			
A in DIII #		riei	O LEGILL L'OSUE				

## CALIBRATION FORM



Personnel Pres							
Date:							
Meter Type: _	YSI 600XL(M)						
lodel Number: _			600XL(N	n)			
S/N							
				Expire	Date:		
	Specific Con	ductivity	Lot#:	Ехріго	Time		
Standard	Unit	1	Meter reading		11115	Initial	
1.413	mS/cm					Check	
						Check	
		l					
cceptable Range	1.342-1.484						
			ssolved Oxygen	D.O. Charge	Time		
Baro Pressure	Temp °C	% D.O.	mg / L D.O.	D.O. Charge	11110	Initial	
						Check	
						Check	
			-11				
		CA CONTRACTOR	pH 7.01 Buffe	v. Lot#	Exp. Date:		
4.01 Buffer: L	ot #.	Exp. Date:		F. LOC W.	Meter reading		
Standard	Meter reading		Meter reading	1	Check		
	Initial		Check	+	Oncon		
Time		Acceptable Range		-			
4.01		3.81-4.21		-			
7.01		6.75-7.36		-			
10.00		9.50-10.50					
	10.00 B	uffer: Lot #:	Exp. Da				
		ORP Lots		xpire Date:	Meter reading		
Standard	Meter reading		Meter reading	-	Check		
	Initial	1000	Check	-	Crieck		
Time		Acceptable Range	0	-			
240.0		228-252					
			Turbidity				
Meter Type:	(4)			lotte			
Model Number:	Plane and a second		20	/20			
S/N	-,1				Meter reading		
Standard	Meter reading		Meter reading	-	Check		
	Initial		Check	-	CHECK		
Time		Acceptable Rang	ge	-			
1.00		0.95-1.05		-			
10.00		9.50-10.5		-			
				_		1	
		165					
Comments:							

GOLDER ASSOCIATES

Page 1

#### GOLDER ASSOCIATES GAS CALIBRATION FORM



Project Number:

083-87071

GAI Project !	Name:	IBM/Kingston, N	IY	Project N	lumber:	083-87071
Golder Personne	Present:					
Date:		=				
Meter Type:						
Model Number:						
S/N						
Meter Type:						
Model Number:						
S/N						
		Manufacture Date			Expire Date:	
vt #		Manufacture Date	Allowable Range	Reading	Time	
H₂S	25 ppm		23.75-26.25	, , , , , , , , , , , , , , , , , , , ,		
CH₄	2.5%	50% LEL	2.4-2.6			
CH <sub>4</sub>	5.0%	100% LEL	4.75-5.25			
CH <sub>4</sub>	15%	>100% LEL	14.25-15.75			
		Manufacture Dat	ø		Expire Date:	
ot#		Was ciractore Day	Allowable Range	Reading	Time	
CH <sub>4</sub>	50%	>100% LEL	47.5-52.5		3777	
CO	50 ppm	AND THE PERSON	47.5-52.5			
CO <sub>2</sub>	15%		33.25-36.75			
N <sub>2</sub>	Balance					
O <sub>2</sub>	20.90%		19.86-21.94			
		Manufacture Da	to:		Expire Date:	
ot#		Waldada Da	Allowable Range	Reading	Time	
Isobutylene	100 ppm		95-105			-
Weather Conditions:						
Note:		Red	cylinders valid for 3 year	rs after manufactu	re date	
NO.C.			m cylinders valid for 13 n			44-2
ampler Signature:			Date:			

GOLDER ASSOCIATES

Page 1

### FIELD BORING LOG



				MANCHESTER, NEW HAMPSHIRE
DEPTH HOLE	JOB NO. 083-87071	PROJECT_IBM/KINGSTON		BORING NO.
DEPTH SOIL DRILL	_ GA INSP	DRILLING METHOD		SHEET
DEPTH ROCK CORE	WEATHER	DRILLING COMPANY		SURFACE ELEV.
NO. DIST. SA. UD. SA.	TEMP.	DRILL RIG	DRILLER	DATUM
DEPTH WL	HRSPROD	WT. SAMPLER HAMMER	DROP	STARTED
TIME WL	HRS. DELAYED	WT. CASING HAMMER	DROP	COMPLETED

SAMPLE TYPES	ABBREVIATIONS					CONSISTENCY - BLOWS/F
AS. AUGER SAMPLE C.S. CHAIN SAMPLE D.O. DEWYL OPEN (SPLIT SPOON) D.S. DEMSON SAMPLE P.S. PITCHER SAMPLE R.C. BOCK CORE S.T. SLOTTED TURE T.T. THAN-MALLED OPEN T.F. THAN-MALLED OPEN W.S. WIGH SAMPLE W.S. WIGH SAMPLE	BL BLACK BR BROWN C COARSE CA CASNO CL CLAYEY CLY CLAYEY FRAG FRAGNIENTS CLYD LAYDRID U LITTLE	M MEDIAN MC MICACOUS MOT NOTITLED MP NON-PLASTIC OC GENNOE ORG ORGONICE—HYDRAULIC PH PRESSURE—HYDRAULIC RS RESDUAL RX ROCK	SAT SAT SAT SAT SAT SAT SAT SAT SAT SAT	SAMPLE SATURATED SAND SLIT SLIT SCORE TRACE TRACE WEEKHT OF HAMMER YELLOW	SOIL DESCRIPTION RANGE OF PROPORTITION "TRACE" 10% - 20% SOME" 10% - 20% SOME" 35% - 50% (e.g. "SLIV", "SANO") 50%	NON-COHESIVE SOILS VL VERY LOOSE 0-4 LIS LOOSE 0-1 LIS LOOSE 0-2 LIS LOOSE 0-1 LIS LOO

DEPTH	WELL CONSTRUCTION	PID (ppm)	NO.	TYPE	SAMPLES HAMMER BLOWS REC. PER 6" (FORCE) ATT.	ничэо	SAMPLE DESCRIPTION AND BORING NOTES
			1				
			3			-	
			1				
			3			-	
			1			-	
			-			-	
			3				
			1			-	
			3			1	
			1			7	
			4				
			-				
			3			7	
			-			1	
			1				
			-			7	
			3			1	
			-			1	
			=			1	
8			-			-	
			-			-	
			-			1	
			1			1	
			4			-	
			1			- 1	
			4			-	
			3			1	
						-	
			3				
			-			-	
			-			+	
						-	
			3				
					100		
			=				
			=				
			3			-	
			=				
			-			-	
			=				
			-			-	
			-				
3			-			-	
			-	1			

Title: Equipment Decontamination Page 1 of 3

#### 1.0 GENERAL APPLICABILITY

The purpose of this Standard Operating Procedure (SOP) is to describe the methods for decontaminating equipment and tools used during the investigation. The scope of this document is limited to field operations and protocols applicable during advancement of soil borings, temporary well installation, or Membrane Interface Probes (MIP), and sampling equipment.

### 2.0 DECONTAMINATION EQUIPMENT AND SOLUTIONS

Cleaning procedures in this section are intended for cleaning sampling and other equipment in the field. Deviations from these procedures should be documented in the field records and investigative reports. Specifications for standard cleaning materials are as follows:

- Soap shall be a phosphate-free laboratory detergent such as Liquinox® or Alconox.® Use of other
  detergent must be justified and documented in the field logbooks and investigative reports.
- <u>Solvent</u> shall be pesticide-analysis grade isopropanol. Use of a solvent other than pesticide-analysis
  grade isopropanol for equipment cleaning purposes must be justified and documented in field
  logbooks and investigation reports.
- <u>Tap water</u> may be used from any municipal water treatment system. Use of an untreated potable water supply is not an acceptable substitute for tap water.
- Analyte free water (deionized water) is tap water that has been treated with activated carbon and a
  standard deionizing resin column. At a minimum, the finished water should contain no detectable
  heavy metals or other organic or inorganic compounds (i.e., at or above analytical detection limits).
  This water is usually provided along with sample bottles by the analytical laboratory for the project.
- <u>Nitric Acid</u> shall be trace-metal analysis grade or better. Nitric acid used to decontaminate nondedicated and soil sampling equipment, shall be a one percent solution.
- Other solvents may be substituted for a particular purpose if required. For example, removal of
  concentrated waste materials may require the use of either pesticide-grade hexane or petroleum
  ether. After the waste material is removed, the equipment must be subjected to the standard
  cleaning procedure. Because these solvents are not miscible with water, the equipment must be
  completely dry prior to use.

Solvents, laboratory detergent, and rinse waters used to clean equipment shall not be reused during field decontamination and shall be collected and stored in DOT-approved 55-gallon drums for proper off-Site disposal unless directed otherwise (see SOP-8 Investigation Derived Waste).

Title: Equipment Decontamination

Page 2 of 3

### 3.0 SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES

Use the procedures in this section to decontaminate all non-dedicated sampling equipment (e.g., stainless steel bowls and spoons) used to collect and/or homogenize soil samples and include:

- 1. Clean with tap water and soap using a brush to remove particulate matter and surface films;
- 2. Rinse thoroughly with tap water;
- 3. Rinse thoroughly with distilled and analyte free water;
- 4. Rinse with dilute (one percent) trace-metal analysis nitric acid if metal analysis will be performed;
- 5. Rinse with analyte free water;
- 6. Allow to air dry; and
- 7. Wrap equipment in aluminum foil until needed for sampling.

# 4.0 FIELD WATER QUALITY METER AND WATER LEVEL METER DECONTAMINATION PROCEDURES

Use the procedures in this section to decontaminate all non-dedicated monitoring equipment (e.g., field water quality meter and water level meter) used to collect field water quality measurements and include:

1. Rinse thoroughly with distilled or deionized water prior to each use.

### 5.0 SEWER WATER SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES

Use the procedures in this section to decontaminate all non-dedicated monitoring equipment used during the sewer sampling activities and include:

- Scrub the dipper with a brush and deionized water and Alconox mixture followed by a deionized water rinse;
- 2. Spray the dipper with isopropyl alcohol; and
- 3. Complete a final deionized water rinse.

Alternatively, disposal bailers may be used to obtain the sewer water samples.

Title: Equipment Decontamination

Page 3 of 3

# 6.0 DRILL RIG, TOOL, AND WELL MATERIAL DECONTAMINATION PROCEDURES

The procedures in this section are to be used by the drilling contractor to decontaminate the drill rig and drilling tools used to advance the soil borings and include:

- The driller shall construct a decontamination pad to collect solids and liquids generated during the
  decontamination process. Thoroughly pressure steam-clean the drill rig and tools
  (e.g., macrocore tubes) upon arrival on Site over a dedicated decontamination pad. Downhole tools will be
  decontaminated between each boring location.
- During temporary well installation, the driller must use a new pair of disposal vinyl or latex gloves while handling the well materials; and
- 3. Well materials used on Site must be new, decontaminated, and wrapped in plastic.

Title: Soil Boring and Soil Sampling Procedures

Page 1 of 2

#### 1.0 SOIL BORING AND INSTALLATION PROCEDURES

#### 1.1 Soil Boring Area Preparation

Prior to any sub-grade soil sampling, the Field Team Leader or his/her designee will be responsible to contact DigSafely to locate any subsurface utilities within the public right-of-ways. The utility clearance will be conducted in accordance with the Utility Clearance Procedures (SOP-1).

#### 1.2 Soil Borings

Confirmatory soil borings will be advanced near the Membrane Interface Probes (MIP) locations to compare contaminant soil concentrations with the MIP results. At each soil boring location, a track-mounted Geoprobe® Direct Push Technology (DPT) rig will push and pneumatically hammer a soil boring to the target depth. The driller will collect continuous five-foot long soil samples from the ground surface (or approximate base of the asphalt or concrete pavement) to the bottom of the boring using a Geoprobe® steel macro-core sampler with dedicated inner polyethylene sleeves. After removal of the macro-core sampler from the ground, the driller will extract the dedicated inner polyethylene sleeve with the soil core from the steel sampler and cut the polyethylene tube lengthwise to expose the soil core for lithologic description (i.e., Unified Soil Classification System [USCS]) and collection of field screening or laboratory samples. A soil boring log template is attached.

Field personnel will screen the soil samples for the presence of volatile organic compounds (VOCs) in the field with a Photovac MiniRae 2000 organic vapor analyzer (OVA) or equivalent equipped with a photoionization detector (PID). Subsequent to the soil OVA screening results, field personnel will collect soil samples for laboratory analyses at the interval with the highest OVA reading, or from the interval with visual or olfactory indication of a release or from the interval identified by the MIP assessment as having impacted soil. Field personnel will record the field OVA readings and lithologic descriptions in the boring logs.

Title: Soil Boring and Soil Sampling Procedures

Page 2 of 2

#### 1.3 Soil Sampling Procedures

Depending on the parameters being analyzed the soil sample may be obtained in three different ways:

- Undisturbed sample via Encore® or equivalent;
- · Homogeneous sample using stainless steel bowls and spoons; or
- Undisturbed samples in accordance with the appropriate method requirements (i.e., laboratory permeability).

Sample the soils for VOCs using laboratory-provided Encore® samplers. Upon determination of sample location, collect three (3) Encores® within a six inch interval along with a moisture bottle for laboratory analysis. The QAPP provides guidance on soil sample labeling. Following sample collection, sample containers will be placed on ice and maintained at approximately 4° Celsius (C) and transported by overnight courier to the laboratory. Samples must be logged on a chain-of-custody form which is kept with the samples (see SOP-3). Maintain chain-of-custody procedures throughout the sampling and transportation process.

Other non-VOC soil samples will be collected using stainless steel bowls and spoons or dedicated sample containers per the appropriate method requirements. All non-dedicated sampling equipment will be decontaminated prior to sampling activities and before each subsequent sample location in accordance with the decontamination procedures provided in SOP-5. Decontamination water and solids will be containerized and managed as described in SOP-8.

### FIELD BORING LOG



				MANCHESTER, NEW HAMPSHIRE
DEPTH HOLE	JOB NO. 083-87071	PROJECT_IBM/KINGSTON		BORING NO
DEPTH SOIL DRILL	GA INSP.	DRILLING METHOD		SHEET
DEPTH ROCK CORE	WEATHER	DRILLING COMPANY		SURFACE ELEV
NO. DIST. SA. UD. SA.	_TEMP	DRILL RIG	DRILLER	DATUM
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER	DROP.	STARTED
TIME WL	_ HRS. DELAYED	WT. CASING HAMMER	DROP	COMPLETED

SAMPLE TYPES	ABBREVIATIONS					CONSISTENCY - BLOWS/F
AS. AUGER SAMPLE C.S. CHUNK SAMPLE D.O. DENYE OPEN (SPLIT SPOON) D.S. DENEON SAMPLE P.S. PITCHER SAMPLE R.C. ROCK CORE S.T. SLOTTED TUBE	BL BLACK BR BROWN C COARSE CA CASING CL CLAY CLY CLAYEY F FINE	M MEDIUM MICA EBOUS MOT MOTTLED MP MON-PLASTIC OG ORANGE ORG ORP PRESSURE—HYDRAUJIC	SAT SAT SID SIY SIM TR	SAMPLE SATURATED SAND SLTY SUTY SOME TRACE	SOIL DESCRIPTION RANGE OF PROPORTITION TRACE* 0-10K	NON-COHESIVE SOILS  VI. VERY LOOSE 0-4 LS LOOSE 0-4 LO COMPACT 10-30 DN DEVSE 30-50 VD VERY DEVSE >50
T.O. THIN-WALLED OPEN T.P. THIN-WALLED PISTON W.S. WASH SAMPLE	FRAG FRAGMENTS GL GRAVEL LYD LAYERED U LITTLE	PM PRESSURE-MANUAL R RED RES RESIDUAL RX ROCK	WL WH Y	WATER LEVEL WEIGHT OF HAMMER YELLOW	"TRACE" 0-10% "UTTLE" 10%-20% "SOME" 20%-35% "ADECTIVE" 35%-50% (**	COHESIVE SOILS VS VERY SOFT 0-2 S SOFT 2-4 FM FIRM 4-8 ST STIFF 8-30 H HWRD >30

LEV. EPTH	WELL CONSTRUCTION	PID (ppm)	NO.	TYPE H	AMPLES  WHER BLOWS  PER 6"  (FORCE)	REC.	DEPTH	SAMPLE DESCRIPTION AND BORING NO	ITES
			1						
			-				-		
			-			- 1			
			-						
			7				-		
							-		
			7				-		
			1						
			-				23		
			-				25		
			-						
			1						
			-				-		
			-						
			-						
			-						
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			-				1		
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			1						
							-		
			7						
							-		
			7						
							-		
							- 1		
			-						
			-						
			7						
			4						
			-						
			-						
			1				-		
			1						40:
			3						22
							-		
			1						
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			7						
		1 1							

Title: Storm Sewer Sampling Procedures

Page 1 of 3

### 1.0 GENERAL APPLICABILITY

The purpose of this Standard Operating Procedure (SOP) is to describe the methods used in the collection of representative water quality samples from the Site's exiting sewer system. The scope of this document is limited to field operations and protocols applicable during sewer water sample collection.

### 2.0 SAMPLE AREA PREPARATION

Field personnel will conduct a visual inspection of the area surrounding the catch basin and sewer manholes prior to sampling to identify potential hazards. The catch basins and sewer manholes shall be considered confined spaces. Field personnel shall not enter the catch basin or sewer line for any reason. Sampling should be engineered to allow access without entry to confined spaces. Field personnel will perform air monitoring around the catch basin and sewer opening while opening and sampling water using a Photo Ionization Detector (PID) and multi-gas meter. Sensors on the multi-gas meter will include hydrogen sulfide, oxygen, lower explosive limit (LEL), and carbon dioxide. The meter calibration field form is attached.

### 3.0 EQUIPMENT REQUIREMENTS

Field personnel will use the following sewer water sampling equipment:

- Decontaminated polyethylene hand dipper to collect a grab sample, or;
- Disposable Teflon bailer and twine;
- Air monitoring equipment (e.g., PID, Multi-gas meter);
- · Fire extinguisher;
- · First Aid kit;
- Laboratory pre-preserved bottles;
- Latex or Nitrile disposable gloves; and
- Field book and meter calibration form.

Title: Storm Sewer Sampling Procedures

Page 2 of 3

### 4.0 WATER SAMPLE COLLECTION PROCEDURES

The water sample collection procedures include:

- Calibrate the PID, multi-gas meter, and field water quality meters in accordance with the manufacturer's recommended procedures and record the calibration information on the Calibration Forms;
- Place orange traffic cones and caution tape around the catch basin and/or sewer manhole to restrict access to the sampling area;
- Use a crow bar or similar piece of equipment to carefully open the catch basin grate or sewer manhole. Follow safe lifting practices to reduce the potential for back injury and wear steel-toed boots to reduce the potential for injury to their feet;
- Screen the air surrounding the catch basin and/or manhole using the PID and multi-gas
  meter. Log the meter readings into the log book in accordance with SOP-4. Also note if
  water is flowing in the sewer pipe, odors emanating from the sewer pipe, and the condition
  of the sewer pipe;
- Lower the decontaminated polyethylene hand dipper or disposable Teflon bailer into the
  catch basin and/or manhole opening to the water surface. The sampling equipment should
  be lowered into the sewer opening so that field personnel are not required to lean over the
  catch basin and/or sewer manhole;
- Slowly allow the dipper and/or bailer to fill with water while not stirring up the sediment on the bottom of the pipe;
- If sampling with a Teflon bailer, slowly lower the bailer into the water without contacting
  the sediments on the bottom. Pour the water sample into laboratory-prepared sample
  containers and placed on ice;
- For VOC samples, continue to fill the VOC sample vials until a meniscus forms on the lip
  of the container;
- Quickly place the plastic cap (containing a Teflon septum) on the container and screw the cap on the container;
- The filled bottle shall be turned upside down and tapped several times to ensure that no air bubbles are present in the sample container;
- If air bubbles are present, reopen the container and add additional sample volume to again achieve a meniscus on the lip of the VOC vial;

Title: Storm Sewer Sampling Procedures

Page 3 of 3

- Repeat these steps described above until no bubbles remain in any of the VOC sample vials;
- Following sample collection, the groundwater sample will be placed in a cooler on ice for preservation during shipment to a laboratory for analysis in accordance with Chain-of-Custody procedures (see SOP-3);
- Following sample collection, the sampling equipment shall be properly discarded (see SOP-8 for IDW procedures); and
- Replace the catch basin and/or manhole cover securely over the opening. Do not leave the sampling area until the covers are securely placed over the opening.

### CALIBRATION FORM



Date:										
			YSI							
Meter Type: Model Number:			600XL(F	M)						
S/N										
314										
	Specific Cor	ductivity L	ot#:	Expire	Date:					
Standard	Unit		Meter reading		Time					
1.413	mS/cm					Initial				
						Check				
						Check				
cceptable Range	1.342-1.484	1000			3000					
			olved Oxygen		Ti					
Baro Pressure	Temp°C	% D.O.	mg/L D.O.	D.O. Charge	Time	Initial				
						Check				
						Check				
			pH			-				
A DA D. Ware I	-1.46	Exp. Date:	7.01 Buffe	r: Lot#	Exp. Date:					
4.01 Buffer: L	Meter reading	EXP. Date.	Meter reading		Meter reading					
Standard	Initial		Check		Check					
Time	ITELICE	Acceptable Range	0.1001	1						
4,01		3.81-4.21								
7.01		6.75-7.36								
10.00		9.50-10.50								
10.00	10.00 B	luffer: Lot #.	Exp. Da	tec						
		ORP Lot#.	E	xpire Date:						
Standard	Meter reading		Meter reading		Meter reading					
11000170101	Initial		Check		Check					
Time		Acceptable Range								
240.0		228-252								
		or mail and a few								
			Turbidity							
Meter Type:			LaMo	7						
Model Number:			20/2	20						
S/N	1		Meter reading		Meter reading					
Standard	Meter reading				Check					
	Initial	A secretable Papas	Check	1	Onton					
Time		Acceptable Range 0.95-1.05		1						
1.00		9.50-10.5		1						
10.00	-			1						
				_						
Comments:										

GOLDER ASSOCIATES

Page 1

Title: Investigation Derived Waste Procedures

Page 1 of 1

#### 1.0 INVESTIGATION DERIVED WASTE PROCEDURE

The purpose of this SOP is to provide guidance on proper management of investigation-derived waste (IDW) generated during investigations.

#### 1.1 Soil Cuttings and Decontamination Solids Management

Soil generated during the advancement of the soil borings and solids generated during the decontamination process (e.g., soils from the drill rig) will be placed in 55-gallon, Department of Transportation (DOT)-approved drums prior to characterization and proper off-Site disposal in accordance with local, state, and federal regulations. Field personnel will label each drum with a weather-proof marker (e.g., permanent paint marker or equivalent) identifying the contents of the drum (e.g., soil boring location), date of generation, and IBM Site information. The driller will place the 55-gallon drums in an area near the generation point designated by IBM.

#### 1.2 Purge and Decontamination Water Management

Purge water from monitoring points and water generated during the decontamination steam-cleaning process shall be placed in 55-gallon, DOT-approved drums prior to characterization. The water placed inside these drums will be either treated on-Site in the IBM groundwater treatment system or characterized and transported off-Site for disposal in accordance with local, state, and federal regulations.

#### 1.3 Personal Protective Equipment and Investigation Equipment Waste Management

Personal protective equipment (e.g., latex gloves) and investigation equipment (e.g., used plastic macro-core sample tubes and temporary monitoring well materials) will be containerized in a separate 55-gallon drum prior to off-Site disposal.

**Golder Associates** 

03/09

Title: Membrane Interface Probe Procedures

Page 1 of 2

### 1.0 MEMBRANE INTERFACE PROBE PROCEDURES

### 1.1 Membrane Interface Probe Area Preparation

Prior to any sub-grade soil assessment activities, the field team leader or his/her designee will be responsible to contact DigSafe to locate any subsurface utilities within the public right-of-ways. The utility clearance will be conducted in accordance with the Utility Clearance Procedures detailed in SOP-1.

### 1.2 Membrane Interface Probe Installation

A membrane interface probe/electrical conductivity (MIP/EC) investigation will be conducted to better define the stratigraphy and distribution of VOCs in the subsurface. MIP/EC is a direct-sensing tool that is advanced into the subsurface using direct-push equipment (e.g., GeoProbe®). The MIP detects the presence of total VOCs in the vapor, sorbed, and dissolved phases using a series of two separate gas detectors located at the surface including a photo-ionization detector (PID) and an electron capture detector (ECD). The EC element measures soil conductivity with depth as the probe is driven into the ground. Conductivity data can be used to identify changes in lithology, the presence of contaminants, and/or other subsurface conditions (e.g. soil moisture) that change subsurface conductivity. The conductivity data are electronically logged along with depth and rate of penetration.

Because the MIP and EC tools are combined into one probe, simultaneous collection of both MIP and EC data are achieved in a single push and permit the field team to correlate stratigraphy and chemistry data. In addition, the real-time analysis of data allows the field team to modify and expand the depth and location of boreholes as needed to allow for a more rapid and complete assessment of the nature and extent of soil and groundwater impacts.

MIP/EC points will generally extend to the base of the surficial sand aquifer through the silty sand transition zone to the top of the varved silt and clay unit. Borings will be advanced approximately one (1) to two (2) feet into the upper portion of the varved clay unit to further evaluate the transition

Title: Membrane Interface Probe Procedures

Page 2 of 2

zone between the two units. Field personnel will evaluate the MIP/EC data daily and modify the probe locations and depths as appropriate based on the findings.

The DPT operator will conduct the MIP/EC investigation in general accordance with American Society for Testing and Materials (ASTM) Standard Practice for Direct Push Technology for Volatile Contaminant Logging with the Membrane Interface Probe (MIP) –D7532-07 and this SOP. The field personnel will record the MIP information on a field (attached).

Given the nature of the surficial sand unit, it is anticipated that the boreholes will collapse upon removal of the probe. In the event the resultant boreholes remain open, the borehole will be grouted with a cement-bentonite slurry following completion in accordance with SOP-10. The majority of these borings are anticipated to be advanced through concrete or an asphalt parking lot. These areas will be patched with concrete or asphalt upon completion.

Decontamination of the down-hole direct push tools will be performed between boring locations in accordance with SOP-5. Investigation-derived waste (IDW) generated, during the MIP/EC investigation will be managed in accordance with SOP-8.

# MIP FIELD INFORMATION FORM

SITE DESCRIPTION

Adopted from ASTM D 7352-07



BORING DESCRIPTION

Date:  Date:  MIP Contractor:  MIP Operator:  INSTRUMENT I  Detectors Used:  Probe Type:  Probe S/N:	MP4510	Start Time: End Time:  MP6510
MIP Contractor: MIP Operator:  INSTRUMENT I  Detectors Used: Probe Type: Probe S/N:	MP4510	MP6510
MIP Contractor: MIP Operator:  INSTRUMENT I  Detectors Used: Probe Type: Probe S/N:	MP4510	
MIP Operator:  INSTRUMENT I  Detectors Used:  Probe Type:  Probe S/N:	MP4510	
INSTRUMENT I Detectors Used: Probe Type: Probe S/N:	MP4510	
Detectors Used: Probe Type: Probe S/N:	MP4510	
Probe Type:	-	
Probe Type:	-	
Probe S/N:	— Canada	tration
	— Canada	tration
	— Canada	tration
	— Canada	tration:
	Concent	tration:
	_	u au ou
	_	
		2334994
	Concen	ntration:
	_	
		Concer

Title: Borehole and Temporary Well Decommissioning Procedures

Page 1 of 1

#### 1.0 GENERAL APPLICABILITY

The purpose of this Standard Operating Procedure (SOP) is to describe the methods for decommissioning membrane interface probe/ electric conductivity (MIP/EC) borings and temporary monitoring wells following the subsurface assessment activities. The scope of this document is limited to field operations and protocols applicable during advancement of the MIP/EC investigation activities.

#### 2.0 RESPONSIBILITIES

Field personnel are responsible to oversee the MIP/EC and temporary well decommissioning procedures such that these borings are decommissioned in accordance with New York State Department of Environmental Conservation (NYSDEC) procedures<sup>1</sup>, or recognized industry practice.

#### 3.0 PROCEDURES

The MIP and temporary monitoring well decommissioning procedures will be completed as follows:

- Remove the temporary monitoring well or MIP equipment from the borehole;
- Use tremie well decommissioning methods by placing the tremie pipe to the bottom of the
  borehole and pouring/pumping a cement/bentonite slurry through the tremie pipe while
  slowly extracting the tremie pipe from the borehole to allow the slurry to fill the borehole to
  approximately three inches from the ground surface or pavement. If the borehole collapses
  ten a depth of less than 10 feet below ground surface, the cement/bentonite slurry may be
  poured from the ground surface;
- Cover the borehole with an orange traffic cone and allow the slurry to settle/harden for approximately one hour;
- Add slurry to the borehole if the grout level dropped in the borehole due to settling;
- Seal the upper three inches of the borehole with Portland cement or asphalt patch, as needed;
- Place the temporary monitoring well materials in a 55-gallon drum for off-Site disposal in accordance with SOP-8-IDW Management.

**Golder Associates** 

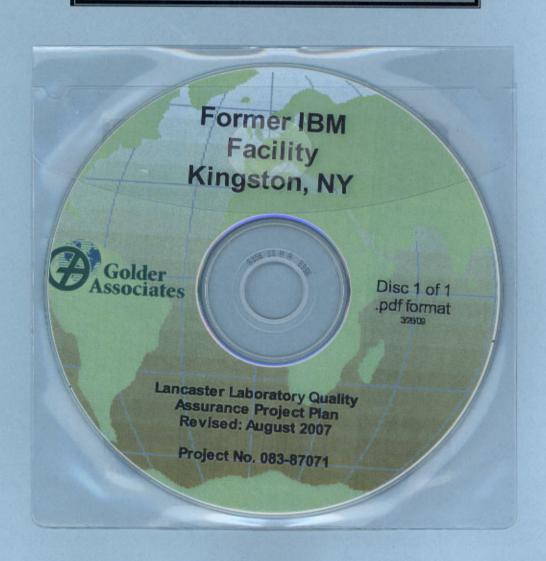
03/09

New York State Department of Environmental Conservation, Division of Environmental Remediation,

<sup>&</sup>quot;Groundwater Monitoring Well Decommissioning Procedures," October 1996.

#### APPENDIX B

LANCASTER LABORATORY QUALITY ASSURANCE PROJECT PLAN



### APPENDIX C

LANCASTER NYSDOH ELAP CERTIFICATION

RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2010 Issued April 21, 2009

#### CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

DR. TIMOTHY S. OOSTDYK LANCASTER LABORATORIES INC 2425 NEW HOLLAND PIKE LANCASTER, PA 17601-5994

NY Lab Id No: 10670 EPA Lab Code: PA00009

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES POTABLE WATER All approved analytes are listed below:

D. W. Methylcarbamate Pesticide	es	Drinking Water Metals I		
3-Hydroxy Carbofuran	EPA 531.1	Mercury, Total	EPA 245.1 Rev. 3.0	
Aldicarb	EPA 531.1	Selenium, Total	EPA 200.8 Rev. 5.4	
Aldicarb Sulfone	EPA 531.1	Silver, Total	EPA 200.7 Rev. 4.4	
Aldicarb Sulfoxide	EPA 531.1	Zinc, Total	EPA 200.7 Rev. 4.4	
Carbaryl	EPA 531.1	Drinking Water Metals II		
Carbofuran	EPA 531.1		EDA 000 7 D	
Methomyl	EPA 531.1	Aluminum, Total	EPA 200.7 Rev. 4.4	
Oxamyl	EPA 531.1	Antimony, Total	EPA 200.8 Rev. 5.4	
Drinking Water Chlorinated Acids		Beryllium, Total	EPA 200.7 Rev. 4.4	
			EPA 200.8 Rev. 5.4	
2,4,5-TP (Silvex)	EPA 515.1	Nickel, Total	EPA 200.7 Rev. 4.4	
2,4-D	EPA 515.1		EPA 200.8 Rev. 5.4	
Dalapon	EPA 515.1	Drinking Water Metals III		
Dicamba	EPA 515.1	Calcium, Total	EPA 200.7 Rev. 4.4	
Dinoseb	EPA 515.1	Sodium, Total	EPA 200.7 Rev. 4.4	
Pentachlorophenol	EPA 515.1		E1 /1 200.1 1007. 4.4	
Picloram	EPA 515.1	Drinking Water Miscellaneous		
Drinking Water Metals I		Benzo(a)pyrene	EPA 525.2	
Arsenic, Total	EPA 200.8 Rev. 5.4	Bis(2-ethylhexyl) phthalate	EPA 525.2	
Barium, Total	EPA 200.7 Rev. 4.4	Butachlor	EPA 525.2	
Cadmium, Total	EPA 200.7 Rev. 4.4	Hexachlorobenzene	EPA 508	
	EPA 200.8 Rev. 5.4		EPA 525.2	
Chromium, Total	EPA 200.7 Rev. 4.4	Hexachlorocyclopentadiene	EPA 508	
Copper, Total	EPA 200.7 Rev. 4.4		EPA 525.2	
	EPA 200.8 Rev. 5.4	Methyl tert-butyl ether	EPA 524.2	
Iron, Total	EPA 200.7 Rev. 4.4	Propachlor	EPA 525.2	
Lead, Total	EPA 200.8 Rev. 5.4	Temperature	SM 18-21 2550B (00)	
Manganese, Total				

Serial No.: 40039

Property of the New York State Department of Health. Valid only at the address shown. Must be conspicuously posted. Valid certificates have a raised seal. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify laboratory's accreditation status.



RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2010 Issued April 21, 2009

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DR. TIMOTHY S. OOSTDYK LANCASTER LABORATORIES INC 2425 NEW HOLLAND PIKE LANCASTER, PA 17601-5994 NY Lab Id No: 10670 EPA Lab Code: PA00009

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES POTABLE WATER All approved analytes are listed below:

Drinking Water Non-Metals		Drinking Water Organohalide Pesti	cides
Alkalinity	SM 18-21 2320B (97)	Lindane	EPA 508
Color	SM 18-21 2120B (01)		EPA 525.2
Cyanide, Total	EPA 335.4 Rev. 1.0	Methoxychlor	EPA 508
Fluoride, Total	EPA 300.0 Rev. 2.1		EPA 525.2
	SM 18-21 4500-F C (97)	Metolachlor	EPA 525.2
Hydrogen Ion (pH)	SM 18-21 4500-H B (00)	Metribuzin	EPA 525.2
Nitrate (as N)	EPA 300.0 Rev. 2.1	Simazine	EPA 507
	EPA 353.2 Rev. 2.0		EPA 525.2
Nitrite (as N)	EPA 300.0 Rev. 2.1	Toxaphene	EPA 508
	EPA 353.2 Rev. 2.0	Drinking Water Trihalomethanes	
Silica, Dissolved	SM 20-21 4500 SiO2-C (97)	Bromodichloromethane	EPA 524.2
Solids, Total Dissolved	SM 18-21 2540C (97)		EPA 524.2
Specific Conductance	SM 18-21 2510B (97)	Bromoform	EPA 524.2
Drinking Water Organohalide P	oeticidas	Chloroform Dibromochloromethane	EPA 524.2
			EPA 524.2
Alachior	EPA 507	Total Trihalomethanes	EPA 324.2
	EPA 525.2	Microextractibles	
Aldrin	EPA 508	1,2-Dibromo-3-chloropropane	EPA 504.1
Atrazine	EPA 507	1.2-Dibromoethane	EPA 504.1
	EPA 525.2		
Chlordane Total	EPA 508	Volatile Aromatics	
Dieldrin	EPA 508	1,2,3-Trichlorobenzene	EPA 524.2
	EPA 525.2	1,2,4-Trichlorobenzene	EPA 524.2
Endrin	EPA 508	1,2,4-Trimethylbenzene	EPA 524.2
	EPA 525.2	1,2-Dichlorobenzene	EPA 524.2
Heptachlor	EPA 508	1,3,5-Trimethylbenzene	EPA 524.2
	EPA 525.2	1,3-Dichlorobenzene	EPA 524.2
Heptachlor epoxide	EPA 508	1,4-Dichlorobenzene	EPA 524.2
	EPA 525.2	- Whitehales	

Serial No.: 40039

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RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2010 Issued April 21, 2009

### CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

DR. TIMOTHY S. OOSTDYK LANCASTER LABORATORIES INC 2425 NEW HOLLAND PIKE LANCASTER, PA 17601-5994

EPA 524.2

EPA 524.2 EPA 524.2

EPA 524.2

EPA 524.2

EPA 524.2

EPA 524.2

EPA 524.2

EPA 524.2

NY Lab Id No: 10670 EPA Lab Code: PA00009

PDA 5242

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES POTABLE WATER All approved analytes are listed below:

#### Volatile Halocarbons

2,2-Dichloropropane	EPA 524.2
Bromochloromethane	EPA 524.2
Bromomethane	EPA 524.2
Carbon tetrachloride	EPA 524.2
Chloroethane	EPA 524.2
Chloromethane	EPA 524.2
cis-1,2-Dichloroethene	EPA 524.2
cis-1,3-Dichloropropene	EPA 524.2
Dibromomethane	EPA 524.2
Dichlorodifluoromethane	EPA 524.2
Methylene chloride	EPA 524.2
Tetrachloroethene	EPA 524.2
trans-1,2-Dichloroethene	EPA 524.2
trans-1,3-Dichloropropene	EPA 524.2
Trichloroethene	EPA 524.2
Trichlorofluoromethane	EPA 524.2
Vinyl chloride	EPA 524.2
VIII) GIIDIGO	

1, 1, 1-11/01/01/05/01/01/05	
1,1,2,2-Tetrachloroethane	EPA 524.2
1,1,2-Trichloroethane	EPA 524.2
1,1-Dichloroethane	EPA 524.2
1.1-Dichloroethene	EPA 524.2
1,1-Dichloropropene	EPA 524.2
1,2,3-Trichloropropane	EPA 524.2
iberia trianner-but	

1,2-Dichloropropage EPA 524.2

EPA 524.2

EPA 524.2

1,2-Dichloropropane EPA 524.2 1,3-Dichloropropane EPA 524.2

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**Volatile Aromatics** 

2-Chlorotoluene

4-Chlorotoluene

Bromobenzene

Chlorobenzene

Ethyl benzene

Hexachlorobutadiene

Isopropyibenzene

n-Butylbenzene

n-Propylbenzene

sec-Butylbenzene

tert-Butylbenzene

Total Xylenes

Volatile Halocarbons

Styrene

Toluene

p-Isopropyltoluene (P-Cymene)

1,1,1,2-Tetrachloroethane

4.4.1.Trichlomethane

Benzene

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NY Lab Id No: 10670 EPA Lab Code: PA00009

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER All approved analytes are listed below:

		t Doct	aidee
Acrylates		Chlorinated Hydrocarbon Pesti	
Acrolein (Propenal)	EPA 603	4,4'-DDE	EPA 608
Acrolein (Properlar)	EPA 624		EPA 8081A
	EPA 8260B	4,4'-DDT	EPA 608
A to-strillo	EPA 603		EPA 8081A
Acrylonitrile	EPA 624	Aldrin	EPA 608
	EPA 8260B		EPA 8081A
	53	alpha-BHC	EPA 608
Amines			EPA 8081A
1,4-Phenylenediamine	EPA 8270C	beta-BHC	EPA 608
3-Nitroanlline	EPA 8270C		EPA 8081A
4-Chloroaniline	EPA 8270C	Chlordane Total	EPA 608
Aniline	EPA 8270C		EPA 8081A
Carbazole	EPA 8270C	delta-BHC	EPA 608
Diphenylamine	EPA 8270C		EPA 8081A
Methapyrilene	EPA 8270C	Dieldrin	EPA 608
Pronamide	EPA 8270C	189	EPA 8081A
Propionitriie	EPA 8260B	Endosulfan I	EPA 608
Pyridine	EPA 8270C	1	EPA 8081A
o. •		Endosulfan II	EPA 608
Benzidines	EPA 625		EPA 8081A
3,3'-Dichlorobenzidine	EPA 8270C	Endosulfan sulfate	EPA 608
	EPA 8270C		EPA 8081A
3,3'-Dimethylbenzidine	EPA 625	Endrin	EPA 608
Benzidine	EPA 8270C		EPA 8081A
3.	EPA 8270C	Endrin aldehyde	EPA 608
Chlorinated Hydrocarbon Pes	ticides		EPA 8081A
4,4'-DDD	EPA 608	Endrin Ketone	EPA 8081A
4,4-000	EPA 8081A	Heptachlor	EPA 608

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Chlorinated Hydrocarbon Pesticio	les	Chlorophenoxy Acid Pesticides	
Heptachlor	EPA 8081A	2,4,5-T	EPA 8151A
Heptachlor epoxide	EPA 608	2,4,5-TP (Silvex)	EPA 8151A
	EPA 8081A	2,4-D	EPA 8151A
Lindane	EPA 608	2,4-DB	EPA 8151A
	EPA 8081A	Dalapon	EPA 8151A
Methoxychior	EPA 8081A	Dicamba	EPA 8151A
Toxaphene	EPA 608	Dichloroprop	EPA 8151A
	EPA 8081A	Dinoseb	EPA 8151A
Chlorinated Hydrocarbons		Demand	
1,2,3-Trichlorobenzene	EPA 8260B	Biochemical Oxygen Demand	SM 18-20 5210B (01)
1,2,4,5-Tetrachlorobenzene	EPA 8270C	Carbonaceous BOD	SM 18-20 5210B (01)
1,2,4-Trichlorobenzene	EPA 625	Chemical Oxygen Demand	EPA 410.4 Rev. 2.0
	EPA 8260B	Fuel Oxygenates	
2-Chloronaphthalene Hexachlorobenzene	EPA 8270C EPA 625 EPA 8270C EPA 625	Ethanol Methyl tert-butyl ether tert-Butyl alcohol	EPA 8015 B EPA 8260B EPA 8015 B
110/00/10/02/10	EPA 8270C		EPA 8260B
Hexachlorobutadiene	EPA 625	Haloethers	
	EPA 8260B	4-Bromophenyiphenyi ether	EPA 625
	EPA 8270C		EPA 8270C
Hexachlorocyclopentadiene	EPA 625	4-Chlorophenylphenyl ether	EPA 625
	EPA 8270C		EPA 8270C
Hexachloroethane	EPA 625	Bis (2-chloroisopropyl) ether	EPA 625
	EPA 8270C		EPA 8270C
Hexachloropropene	EPA 8270C	Bis(2-chloroethoxy)methane	EPA 625
Pentachlorobenzene	EPA 8270C		EPA 8270C

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Heleethere		Mineral	
Haloethers			
Bis(2-chloroethyl)ether	EPA 625	Alkalinity	SM 18-21 2320B (97)
	EPA 8270C	Chloride	EPA 300.0 Rev. 2.1
Low Level Polynuclear Aromatics		Fluoride, Total	EPA 300.0 Rev. 2.1
	EPA 8310		SM 18-21 4500-F C (97)
Acenaphthene		Hardness, Total	SM 18-20 2340C (97)
Acenaphthylene	EPA 8310	Sulfate (as SO4)	EPA 300.0 Rev. 2.1
Anthracene	EPA 8310	Nitroaromatics and Isophorone	
Benzo(a)anthracene	EPA 8310		FD4 0070C
Benzo(a)pyrene	EPA 8310	1,3,5-Trinitrobenzene	EPA 8270C
Benzo(b)fluoranthene	EPA 8310		EPA 8330
Benzo(g,h,i)perylene	EPA 8310	1,3-Dinitrobenzene	EPA 8270C
Benzo(k)fluoroanthene	EPA 8310		EPA 8330
Chrysene	EPA 8310	1,4-Naphthoquinone	EPA 8270C
Dibenzo(a,h)anthracene	EPA 8310	2,4,6-Trinitrotoluene	EPA 8330
Fluoranthene	EPA 8310	2,4-Dinitrotoluene	EPA 625
Fluorene	EPA 8310		EPA 8270C
Indeno(1,2,3-cd)pyrene	EPA 8310		EPA 8330
Naphthalene	EPA 8310	2,6-Dinitrotoluene	EPA 625
Phenanthrene	EPA 8310		EPA 8270C
Pyrene	EPA 8310		EPA 8330
Microextractables		2-Amino-4,6-dinitrotoluene	EPA 8330
	722722	2-Nitrotoluene	EPA 8330
1,2-Dibromo-3-chloropropane	EPA 8011	3-Nitrotoluene	EPA 8330
V8 20 1 2 2	EPA 8260B	4-Amino-2,6-dinitrotoluene	EPA 8330
1,2-Dibromoethane	EPA 8011	4-Nitrotoluene	EPA 8330
	EPA 8260B	Hexahydro-1,3,5-trinitro-1,3,5-triazine	EPA 8330
Mineral		Isophorone	EPA 625
Acidity	SM 18-20 2310B.4a (97)		EPA 8270C
. 17070 707		Nitrobenzene	EPA 625

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is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER All approved analytes are listed below:

Nitroaromatics and Isophorone		Organophosphate Pesticides	
Nitrobenzene	EPA 8270C	Demeton-O	EPA 8141A
	EPA 8330	Demeton-S	EPA 8141A
Octahydro-tetranitro-tetrazocine	EPA 8330	Diazinon	EPA 8141A
Nitrosoamines		Disulfoton	EPA 8141A
	FDA 00700	Famphur	EPA 8141A
N-Nitrosodiethylamine	EPA 8270C	Malathion	EPA 8141A
N-Nitrosodimethylamine	EPA 625	Parathion ethyl	EPA 8141A
	EPA 8270C	Parathion methyl	EPA 8141A
N-Nitrosodi-n-butylamine	EPA 8270C	Phorate	EPA 8141A
N-Nitrosodi-n-propylamine	EPA 625	Simazine	EPA 8141A
	EPA 8270C	3,2,3,1,2,3,1,2,1,2,1,2,1,2,1,2,1,2,1,2,	
N-Nitrosodiphenylamine	EPA 625	Phthalate Esters	
	EPA 8270C	Benzyl butyl phthalate	EPA 625
N-nitrosopiperidine	EPA 8270C		EPA 8270C
N-Nitrosopyrrolidine	EPA 8270C	Bis(2-ethylhexyl) phthalate	EPA 625
Nutrient			EPA 8270C
Mindahi Mitanaa Tatal	EPA 351.2 Rev. 2.0	Diethyl phthalate	EPA 625
Kjeldahl Nitrogen, Total			EPA 8270C
Nitrate (as N)	EPA 300.0 Rev. 2.1	Dimethyl phthalate	EPA 625
20.00	EPA 353.2 Rev. 2.0		EPA 8270C
Nitrite (as N)	EPA 300.0 Rev. 2.1	Di-n-butyl phthalate	EPA 625
	EPA 353.2 Rev. 2.0		EPA 8270C
Orthophosphate (as P)	EPA 365.3 Rev. 1978	Di-n-octyl phthalate	EPA 625
	SM 18-21 4500-P E	5.6	EPA 8270C
Phosphorus, Total	EPA 365.1 Rev. 2.0	B-1-14-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	
Organophosphate Pesticides		Polychlorinated Biphenyls	
Atrazine	EPA 8141A	PCB-1016	EPA 608
Azinphos methyl	EPA 8141A		EPA 8082
real photo metry	EFA 0141A	PCB-1221	EPA 608

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is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER All approved analytes are listed below:

	Polynuclear Aromatics	
EPA 8082	Benzo(ghi)perylene	EPA 625
EPA 608		EPA 8270C
EPA 8082	Benzo(k)fluoranthene	EPA 625
		EPA 8270C
EPA 8082	Chrysene	EPA 625
EPA 608	Contractor	EPA 8270C
EPA 8082	Dibenzo(a,h)anthracene	EPA 625
EPA 608		EPA 8270C
EPA 8082	Fluoranthene	EPA 625
EPA 608		EPA 8270C
EPA 8082	Fluorene	EPA 625
EPA 8082		EPA 8270C
EPA 8082	Indeno(1,2,3-cd)pyrene	EPA 625
		EPA 8270C
	Naphthalene	EPA 625
EPA 8270C		EPA 8260B
EPA 8270C		EPA 8270C
EPA 625	Phenanthrene	EPA 625
EPA 8270C		EPA 8270C
EPA 625	Pyrene	EPA 625
EPA 8270C		EPA 8270C
EPA 625	But although the stand Dhamain	
EPA 8270C	Priority Pollutant Phenois	
EPA 625	2,4,5-Trichlorophenol	EPA 8270C
EPA 8270C	2,4,6-Trichlorophenol	EPA 625
EPA 625		EPA 8270C
EPA 8270C	2,4-Dichlorophenol	EPA 625
EPA 625		EPA 8270C
EPA 8270C	2,4-Dimethylphenol	EPA 625
	EPA 8082 EPA 608 EPA 8082 EPA 608 EPA 8082 EPA 608 EPA 8082 EPA 608 EPA 8082 EPA 8082 EPA 8082 EPA 8082 EPA 8082 EPA 8270C EPA 625	EPA 8082 EPA 608 EPA 8082 E

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		Purgeable Aromatics	4
Priority Pollutant Phenols			EPA 8270C
2,4-Dimethylphenol	EPA 8270C	1,2-Dichlorobenzene	EPA 8260B
2,4-Dinitrophenol	EPA 625	1,3,5-Trimethylbenzene	EPA 601
	EPA 8270C	1,3-Dichlorobenzene	EPA 602
2,6-Dichlorophenol	EPA 8270C		EPA 624
2-Chlorophenol	EPA 625		EPA 625
	EPA 8270C		EPA 8021B
2-Methyl-4,6-dinitrophenol	EPA 625		EPA 8260B
2-Methylphenol	EPA 8270C		EPA 8270C
2-Nitrophenol	EPA 625		EPA 601
	EPA 8270C	1,4-Dichlorobenzene	EPA 602
4-Chioro-3-methylphenol	EPA 625		EPA 624
	EPA 8270C		EPA 625
4-Methylphenol	EPA 8270C		EPA 8021B
4-Nitrophenol	EPA 625		EPA 8260B
A TELEVISION FOR SECURITION OF	EPA 8270C		EPA 8270C
Pentachlorophenol	EPA 625	S2000000000000000000000000000000000000	EPA 602
	EPA 8151A	Benzene	EPA 624
	EPA 8270C		EPA 8021B
Phenol	EPA 625		EPA 8260B
	EPA 8270C	211-1-1-1-1	EPA 601
Purgeable Aromatics		Chlorobenzene	EPA 602
	EPA 8260B		EPA 624
1,2,4-Trimethylbenzene	EPA 601		EPA 8021B
1,2-Dichlorobenzene	EPA 602		EPA 8260B
	EPA 624	Ethal bannens	EPA 602
	EPA 625	Ethyl benzene	EPA 624
	EPA 8021B		EPA 8021B
2	EPA 8260B		
	El Mazon		

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Purgeable Aromatics		Purgeable Halocarbons	
Ethyl benzene	EPA 8260B	1,1,2-Trichloroethane	EPA 8021B
Isopropylbenzene	EPA 8260B		EPA 8260B
n-Butylbenzene	EPA 8260B	1,1,2-Trifluoro-1,2,2-Trichloroethane	EPA 8260B
n-Propylbenzene	EPA 8260B	1,1-Dichloroethane	EPA 601
p-isopropyltoluene (P-Cymene)	EPA 8260B		EPA 624
sec-Butylbenzene	EPA 8260B		EPA 8021B
Styrene	EPA 8021B		EPA 8260B
	EPA 8260B	1,1-Dichloroethene	EPA 601
Toluene	EPA 602		EPA 624
	EPA 624		EPA 8021B
	EPA 8021B		EPA 8260B
	EPA 8260B	1,1-Dichloropropene	EPA 8260B
Total Xylenes	EPA 602	1,2,3-Trichloropropane	EPA 8260B
	EPA 624	1,2-Dichloroethane	EPA 601
	EPA 8021B		EPA 624
	EPA 8260B		EPA 8021B
			EPA 8260B
Purgeable Halocarbons	1000000000	1,2-Dichloropropane	EPA 601
1,1,1,2-Tetrachloroethane	EPA 8260B		EPA 624
1,1,1-Trichloroethane	EPA 601		EPA 8021B
	EPA 624		EPA 8260B
	EPA 8021B	1,3-Dichloropropane	EPA 8260B
	EPA 8260B	2,2-Dichloropropane	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 601	2-Chloroethylvinyl ether	EPA 601
	EPA 624		EPA 624
	EPA 8021B		EPA 8021B
	EPA 8260B		EPA 8260B
1,1,2-Trichloroethane	EPA 601	3-Chloropropene (Allyl chloride)	EPA 8260B
	EPA 624		

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Purgeable Halocarbons		Purgeable Halocarbons	
	EPA 8021B	Chloromethane	EPA 8021B
Bromochloromethane	EPA 8260B		EPA 8260B
Bromodichloromethane	EPA 601	cis-1,2-Dichloroethene	EPA 8260B
Bromodichiorometrarie	EPA 624	cis-1,3-Dichloropropene	EPA 601
	EPA 8021B		EPA 624
	EPA 8260B		EPA 8021B
Bromoform	EPA 601		EPA 8260B
Bromotoriii	EPA 624	Dibromochloromethane	EPA 601
	EPA 8021B		EPA 624
	EPA 8260B		EPA 8021B
Bromomethane	EPA 601		EPA 8260B
Bromoniettane	EPA 624	Dibromomethane	EPA 8260B
	EPA 8021B	Dichlorodifluoromethane	EPA 601
	EPA 8260B		EPA 624
Carbon tetrachloride	EPA 601		EPA 8021B
Carpon tenacinonde	EPA 624		EPA 8260B
	EPA 8021B	Methylene chloride	EPA 601
	EPA 8260B		EPA 624
Chloroethane	EPA 601		EPA 8021B
Chloroentarie	EPA 624		EPA 8260B
	EPA 8021B	Tetrachioroethene	EPA 601
50	EPA 8260B		EPA 624
Chloroform	EPA 601		EPA 8021B
Oniorora.	EPA 624		EPA 8260B
	EPA 8021B	trans-1,2-Dichloroethene	EPA 601
	EPA 8260B		EPA 624
Chloromethane	EPA 601		EPA 8021B
Othorogram and	EPA 624		EPA 8260B

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is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER All approved analytes are listed below:

Purgeable Halocarbons	12	Purgeable Organics	
trans-1,3-Dichloropropene	EPA 601	o-Toluidine	EPA 8270C
	EPA 624	Vinyl acetate	EPA 8260B
	EPA 8021B	Residue	
trans-1,4-Dichloro-2-butene Trichloroethene	EPA 8260B EPA 8260B EPA 601 EPA 624 EPA 8021B EPA 8260B	Solids, Total Solids, Total Dissolved Solids, Total Suspended Semi-Volatile Organics 2-Methylnaphthalene	SM 18-20 2540B (97) SM 18-21 2540C (97) SM 18-20 2540D (97) EPA 8270C
Trichlorofluoromethane	EPA 601	4-Amino biphenyl	EPA 8270C
	EPA 624	Acetophenone	EPA 8270C
	EPA 8260B	Benzaldehyde	EPA 8315
Vinyl chloride	EPA 601	Benzoic Acid	EPA 8270C
	EPA 624	Benzyl alcohol	EPA 8270C
	EPA 8021B	Dibenzofuran	EPA 8270C
	EPA 8260B	Ethyl methanesulfonate	EPA 8270C
Purgeable Organics		Isosafrole	EPA 8270C
1,4-Dioxane 2-Butanone (Methylethyl ketone) 2-Hexanone 4-Methyl-2-Pentanone	EPA 8260B EPA 8260B EPA 8260B EPA 8260B	Methyl methanesulforiate O,O,O-Triethyl phosphorothioate Phenacetin Safrole	EPA 8270C EPA 8270C EPA 8270C EPA 8270C
Acetone	EPA 8260B	Wastewater Metals I	
Acetonitrile Carbon Disulfide	EPA 8260B EPA 8260B	Barium, Total	EPA 200.7 Rev. 4.4 EPA 200.8 Rev. 5.4
Cyclohexane	EPA 8260B		EPA 6010B
Ethyl Acetate	EPA 8260B		EPA 6020
Isobutyl alcohol	EPA 8260B	Cadmium, Total	EPA 200.7 Rev. 4.4

Serial No.: 40040

Methyl iodide

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**EPA 8260B** 



RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2010 Issued April 21, 2009

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Wastewater Metals I		Wastewater Metals I	
Cadmium, Total	EPA 200.8 Rev. 5.4	Potassium, Total	EPA 6010B
	EPA 6010B	Silver, Total	EPA 200.7 Rev. 4.4
	EPA 6020		EPA 6010B
	EPA 7131A	Sodium, Total	EPA 200.7 Rev. 4.4
Calcium, Total	EPA 200.7 Rev. 4.4		EPA 6010B
	EPA 6010B	Strontium, Total	EPA 6010B
Chromium, Total	EPA 200.7 Rev. 4.4	Wastewater Metals II	
	EPA 200.8 Rev. 5.4		EPA 200.7 Rev. 4.4
	EPA 6010B	Aluminum, Total	EPA 200.7 Rev. 4.4
	EPA 6020		
Copper, Total	EPA 200.7 Rev. 4.4	Antimony, Total	EPA 200.7 Rev. 4.4
3.5	EPA 200.8 Rev. 5.4		EPA 200.8 Rev. 5.4
	EPA 6010B		EPA 204.2
Iron, Total	EPA 200.7 Rev. 4.4		EPA 6010B
Transfer State	EPA 6010B		EPA 6020
Lead, Total	EPA 200.7 Rev. 4.4		EPA 7041
Loud, Total	EPA 200.8 Rev. 5.4	Arsenic, Total	EPA 200.7 Rev. 4.4
	EPA 6010B	- I	EPA 200.8 Rev. 5.4
	EPA 6020		EPA 6010B
	EPA 7421		EPA 6020
Magnesium, Total	EPA 200.7 Rev. 4.4		EPA 7060A
Magnesium, rotai	EPA 6010B	Beryllium, Total	EPA 200.7 Rev. 4.4
Manganese, Total	EPA 200.7 Rev. 4.4		EPA 200.8 Rev. 5.4
Manganese, rotal	EPA 6010B		EPA 6010B
blickel Total	EPA 200.7 Rev. 4.4		EPA 6020
Nickel, Total	EPA 200.7 Rev. 4.4	Chromium VI	EPA 218.6 Rev. 3.3
			EPA 7196A
	EPA 6010B		EPA 7199
Potassium, Total	EPA 200.7 Rev. 4.4		SM 20 3500-Cr B (01)

Serial No.: 40040

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		Wastewater Miscellaneous	
Wastewater Metals II		Bromide	EPA 300.0 Rev. 2.1
Mercury, Total	EPA 1631E	Color	SM 18-21 2120B (01)
	EPA 245.1 Rev. 3.0	Cyanide, Total	EPA 335.4 Rev. 1.0
	EPA 7470A	Cyanide, Total	EPA 9012A
Selenium, Total	EPA 200.7 Rev. 4.4	Hydrogen Ion (pH)	EPA 9040B
	EPA 6010B	Hydrogen for (pri)	SM 18-21 4500-H B (00)
	EPA 7740	Oil & Grease Total Recoverable (HEM)	EPA 1664A
Vanadium, Total	EPA 200.7 Rev. 4.4	Organic Carbon, Total	SM 18-21 5310B (00)
	EPA 6010B	Organic Carbon, Total	SM 18-21 5310C (00)
Zinc, Total	EPA 200.7 Rev. 4.4	Phenols	EPA 420.4 Rev. 1.0
	EPA 6010B	Silica, Dissolved	SM 20-21 4500 SiO2-C (97)
Wastewater Metals III		Specific Conductance	EPA 120.1 Rev. 1982
	EPA 200.7 Rev. 4.4	Specific Contract	SM 18-21 2510B (97)
Cobalt, Total	EPA 6010B	Sulfide (as S)	EPA 376.1
Molybdenum, Total	EPA 200.7 Rev. 4.4	Sumoe (as s)	EPA 376.2
Worybaeriam, Total	EPA 6010B		SM 18-20 4500-S D (00)
Thallium, Total	EPA 200.7 Rev. 4.4		SM 19-20 4500-S F (00)
Highlight, Total	EPA 200.8 Rev. 5.4	Surfactant (MBAS)	SM 18-21 5540C (00)
	EPA 279.2 Rev. 1978	Total Recoverable Petroleum Hydroca	rb EPA 418.1
	EPA 6010B		
	EPA 6020	Sample Preparation Methods	EPA 3005A
Tin, Total	EPA 200.7 Rev. 4.4		EPA 3000A EPA 3010A
1111, 1312	EPA 6010B		EPA 3020A
Titanium, Total	EPA 200.7 Rev. 4.4		EPA 3510C
	EPA 6010B		EPA 3520C
Wastewater Miscellaneous			EPA 5030B
	EPA 200.7 Rev. 4.4		C11100000
Boron, Total	EPA 200.1 Nov. 4.4		

Serial No.: 40040

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**EPA 6010B** 



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is hereby APPROVED as an Environmental Laboratory for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER All approved subcategories and/or analytes are listed below:

Nitroaromatics and Isophorone

Methyl-2,4,6-trinitrophenylnitramine

**EPA 8330** 

Serial No.: 40041

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Acrylates		Characteristic Testing	
	EPA 8260B	Corrosivity	EPA 9040B
Acrolein (Propenal)	FPA 8260B	100000000000000000000000000000000000000	EPA 9045C
Acrylonitrile	EPA 8260B	Ignitability	EPA 1010
Ethyl methacrylate	EPA 8260B		oe.
Methyl methacrylate	EPA 6200B	Chlorinated Hydrocarbon Pesticio	
Amines		4,4'-DDD	EPA 8081A
1,2-Diphenylhydrazine	EPA 8270C	4,4'-DDE	EPA 8081A
1,4-Phenylenediamine	EPA 8270C	4,4'-DDT	EPA 8081A
1-Naphthylamine	EPA 8270C	Aldrin	EPA 8081A
2-Naphthylamine	EPA 8270C	alpha-BHC	EPA 8081A
	EPA 8270C	alpha-Chlordane	EPA 8081A
2-Nitroaniline	EPA 8270C	beta-BHC	EPA 8081A
3-Nitroaniline	EPA 8270C	Chlordane Total	EPA 8081A
4-Chloroaniline	EPA 8270C	delta-BHC	EPA 8081A
4-Nitroaniline	EPA 8270C	Dieldrin	EPA 8081A
5-Nitro-o-toluidine	EPA 8270C	Endosulfan I	EPA 8081A
Aniline	EPA 8270C	Endosulfan II	EPA 8081A
Carbazole	EPA 8270C	Endosulfan sulfate	EPA 8081A
Methapyrilene	EPA 8270C	Endrin	EPA 8081A
Pronamide	EFA 02100	Endrin aldehyde	EPA 8081A
Benzidines		Endrin Ketone	EPA 8081A
3,3'-Dichlorobenzidine	EPA 8270C	gamma-Chlordane	EPA 8081A
3.3'-Dimethylbenzidine	EPA 8270C	Heptachlor	EPA 8081A
		Heptachlor epoxide	EPA 8081A
Carbamate Pesticides	Oppose	Lindane	EPA 8081A
Aldicarb	EPA 8318	Methoxychlor	EPA 8081A
Aldicarb Sulfone	EPA 8318	Pentachloronitrobenzene	EPA 8270C
Carbofuran	EPA 8318	Toxaphene	EPA 8081A

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is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE All approved analytes are listed below:

		Haloethers	
Chlorinated Hydrocarbons			ED 1 00700
1,2,4,5-Tetrachlorobenzene	EPA 8270C	Bis(2-chloroethyl)ether	EPA 8270C
1,2,4-Trichlorobenzene	EPA 8260B	Low Level Polynuclear Aromatic Hydrocarbons	
	EPA 8270C	Acenaphthene	EPA 8310
2-Chloronaphthalene	EPA 8270C	Acenaphthylene	EPA 8310
Hexachlorobenzene	EPA 8270C	Anthracene	EPA 8310
Hexachlorobutadiene	EPA 8260B	Benzo(a)anthracene	EPA 8310
	EPA 8270C	Benzo(a)pyrene	EPA 8310
Hexachlorocyclopentadiene	EPA 8270C	Benzo(b)fluoranthene	EPA 8310
Hexachloroethane	EPA 8270C	Benzo(g,h,i)perylene	EPA 8310
Hexachloropropene	EPA 8270C	Benzo(k)fluoroanthene	EPA 8310
Pentachlorobenzene	EPA 8270C	Chrysene	EPA 8310
Chlorophenoxy Acid Pesticides		Dibenzo(a,h)anthracene	EPA 8310
2.4.5-T	EPA 8151A	Fluoranthene	EPA 8310
2,4,5-TP (Silvex)	EPA 8151A	Fluorene	EPA 8310
2.4-D	EPA 8151A	Indeno(1,2,3-cd)pyrene	EPA 8310
2.4-DB	EPA 8151A	Naphthalene	EPA 8310
Dalapon	EPA 8151A	Phenanthrene	EPA 8310
Dicamba	EPA 8151A	Pyrene	EPA 8310
Dichloroprop	EPA 8151A	Metals I	
Dinoseb	EPA 8151A	Barlum, Total	EPA 6010B
MCPA	EPA 8151A	Cadmium, Total	EPA 6010B
MCPP	EPA 8151A	Cadmidit, Total	EPA 6020
Haloethers		Calcium, Total	EPA 6010B
4-Bromophenylphenyl ether	EPA 8270C	Chromium, Total	EPA 6010B
4-Chlorophenylphenyl ether	EPA 8270C		EPA 6020
Bis (2-chloroisopropyl) ether	EPA 8270C	Copper, Total	EPA 6010B
Bis(2-chloroethoxy)methane	EPA 8270C	E STEWNSTON	EPA 6020
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NY Lab Id No: 10670 EPA Lab Code: PA00009

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE All approved analytes are listed below:

Metals I		Metals III	
	19200000000000		
Iron, Total	EPA 6010B	Molybdenum, Total	EPA 6010B
Lead, Total	EPA 6010B	Thallium, Total	EPA 6010B
	EPA 6020		EPA 6020
Magnesium, Total	EPA 6010B	Tin, Total	EPA 6010B
Manganese, Total	EPA 6010B	Titanium, Total	EPA 6010B
Nickel, Total	EPA 6010B	Miscellaneous	
	EPA 6020		
Potassium, Total	EPA 6010B	Boron, Total	EPA 6010B
Silver, Total	EPA 6010B	Cyanide, Total	EPA 9012A
Sodium, Total	EPA 6010B	Hydrogen Ion (pH)	EPA 9040B
Strontium, Total	EPA 6010B		EPA 9045C
Metals II		Phenois	EPA 9066
		Specific Conductance	EPA 9050
Alumínum, Total	EPA 6010B	Nitroaromatics and Isophorone	
Antimony, Total	EPA 6010B		
	EPA 6020	1,2-Dinitrobenzene	EPA 8270C
Arsenic, Total	EPA 6010B	1,3,5-Trinitrobenzene	EPA 8330
	EPA 6020	1,3-Dinitrobenzene	EPA 8330
	EPA 7060A	1,4-Dinitrobenzene	EPA 8270C
Beryllium, Total	EPA 6010B	1,4-Naphthoquinone	EPA 8270C
	EPA 6020	2,4,6-Trinitrotoluene	EPA 8330
Chromium VI	EPA 7196A	2,4-Dinitrotoluene	EPA 8270C
Mercury, Total	EPA 7471A	2,6-Dinitrotoluene	EPA 8270C
Selenium, Total	EPA 6010B	2-Amino-4,6-dinitrotoiuene	EPA 8330
Vanadium, Total	EPA 6010B	4-Amino-2,6-dinitrotoluene	EPA 8330
Zinc, Total	EPA 6010B	Isophorone	EPA 8270C
+		Nitrobenzene	EPA 8270C
Metals III			EPA 8330
Cobalt, Total	EPA 6010B	Nitroquinoline-1-oxide	EPA 8270C

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Nitroaromatics and Isophorone		Organophosphate Pesticides	
Octahydro-tetranitro-tetrazocine	EPA 8330	Fenthion	EPA 8141A
Pyridine	EPA 8270C	Malathion	EPA 8141A
Nitrosoamines		Mevinphos	EPA 8141A
N-Nitrosodiethylamine	EPA 8270C	NALED	EPA 8141A
	EPA 8270C	Parathion ethyl	EPA 8141A
N-Nitrosodimethylamine		Parathion methyl	EPA 8141A
N-Nitrosodi-n-butylamine	EPA 8270C	Phorate	EPA 8141A
N-Nitrosodi-n-propylamine	EPA 8270C	Ronnel	EPA 8141A
N-Nitrosodiphenylamine	EPA 8270C	Tokuthion	EPA 8141A
N-nitrosomethylethylamine	EPA 8270C	Trichloronate	EPA 8141A
N-nitrosomorpholine	EPA 8270C		
N-nitrosopiperidine	EPA 8270C	Petroleum Hydrocarbons	
N-Nitrosopyrrolidine	EPA 8270C	Diesel Range Organics	EPA 8015 B
Organophosphate Pesticides		Gasoline Range Organics	EPA 8015 B
	EPA 8141A	Oil & Grease Total Recoverable (HEM)	EPA 9071 (Solvent:Hexane)
Azinphos methyl		Phthalate Esters	
Bolstar	EPA 8141A		de como
Chlorpyriphos	EPA 8141A	Benzyl butyl phthalate	EPA 8270C
Coumaphos	EPA 8141A	Bis(2-ethylhexyl) phthalate	EPA 8270C
Demeton-O	EPA 8141A	Diethyl phthalate	EPA 8270C
Demeton-S	EPA 8141A	Dimethyl phthalate	EPA 8270C
Diazinon	EPA 8141A	Di-n-butyl phthalate	EPA 8270C
Dichlorvos	EPA 8141A	Di-n-octyl phthalate	EPA 8270C
Disutfoton	EPA 8141A	Polychlorinated Biphenyls	
EPN	EPA 8141A	PCB-1016	EPA 8082
Ethion	EPA 8141A	1.77 1717	
Ethoprop	EPA 8141A	PCB-1221	EPA 8082
Famphur	EPA 8141A	PCB-1232	EPA 8082
Fensulfothion	EPA 8141A	PCB-1242	EPA 8082

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Polychlorinated Biphenyls		<b>Priority Pollutant Phenois</b>	
PCB-1248	EPA 8082	2,4-Dimethylphenol	EPA 8270C
PCB-1254	EPA 8082	2,4-Dinitrophenol	EPA 8270C
PCB-1260	EPA 8082	2-Chlorophenol	EPA 8270C
PCB-1262	EPA 8082	2-Methyl-4,6-dinitrophenol	EPA 8270C
PCB-1268	EPA 8082	2-Methylphenol	EPA 8270C
Balance to a Assessment Budgenesshops		2-Nitrophenol	EPA 8270C
Polynuclear Aromatic Hydrocarbons		4-Chloro-3-methylphenol	EPA 8270C
7,12-Dimethylbenzyl (a) anthracene	EPA 8270C	4-Methylphenol	EPA 8270C
Acenaphthene	EPA 8270C	4-Nitrophenol	EPA 8270C
Acenaphthylene	EPA 8270C	Pentachiorophenol	EPA 8151A
Anthracene	EPA 8270C		EPA 8270C
Benzo(a)anthracene	EPA 8270C	Phenol	EPA 8270C
Benzo(a)pyrene	EPA 8270C		
Benzo(b)fluoranthene	EPA 8270C	Purgeable Aromatics	
Benzo(ghi)perylene	EPA 8270C	1,2,4-Trimethylbenzene	EPA 8021B
Benzo(k)fluoranthene	EPA 8270C		EPA 8260B
Chrysene	EPA 8270C	1,2-Dichlorobenzene	EPA 8260B
Dibenzo(a,h)anthracene	EPA 8270C		EPA 8270C
Fluoranthene	EPA 8270C	1,3,5-Trimethylbenzene	EPA 8021B
Fluorene	EPA 8270C		EPA 8260B
Indeno(1,2,3-cd)pyrene	EPA 8270C	1,3-Dichlorobenzene	EPA 8260B
Naphthalene	EPA 8260B		EPA 8270C
and the second second	EPA 8270C	1,4-Dichlorobenzene	EPA 8260B
Phenanthrene	EPA 8270C		EPA 8270C
Pyrene	EPA 8270C	2-Chlorotoluene	EPA 8260B
Polosito Politotent Phonolo		4-Chlorotoluene	EPA 8260B
Priority Pollutant Phenols		Benzene	EPA 8021B
2,4,6-Trichlorophenol	EPA 8270C		EPA 8260B
2,4-Dichlorophenol	EPA 8270C	Bromobenzene	EPA 8260B

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Durasable Halocarbone

Purgeable Aromatics		Purgeable Halocarbons	
Chlorobenzene	EPA 8260B	1,2-Dibromoethane	EPA 8260B
Ethyl benzene	EPA 8021B	1,2-Dichloroethane	EPA 8260B
**************************************	EPA 8260B	1,2-Dichloropropane	EPA 8260B
Isopropylbenzene	EPA 8021B	1,3-Dichloropropane	EPA 8260B
	EPA 8260B	2,2-Dichloropropane	EPA 8260B
n-Butylbenzene	EPA 8260B	2-Chloroethylvinyl ether	EPA 8260B
n-Propylbenzene	EPA 8260B	3-Chloropropene (Allyl chloride)	EPA 8260B
p-Isopropyltoluene (P-Cymene)	EPA 8260B	Bromochloromethane	EPA 8260B
sec-Butylbenzene	EPA 8021B	Bromodichloromethane	EPA 8260B
,	EPA 8260B	Bromoform	EPA 8260B
Styrene	EPA 8260B	Carbon tetrachloride	EPA 8260B
tert-Butylbenzene	EPA 8021B	Chloroethane	EPA 8260B
	EPA 8260B	Chloroform	EPA 8260B
Toluene	EPA 8021B	Chloromethane	EPA 8260B
	EPA 8260B	cis-1,2-Dichloroethene	EPA 8260B
Total Xylenes	EPA 8021B	cis-1,3-Dichloropropene	EPA 8260B
	EPA 8260B	Dibromochloromethane	EPA 8260B
Duran alda Uala assisana		Dibromomethane	EPA 8260B
Purgeable Halocarbons		Dichlorodifluoromethane	EPA 8260B
1,1,1,2-Tetrachloroethane	EPA 8260B	Methylene chloride	EPA 8260B
1,1,1-Trichloroethane	EPA 8260B	Tetrachloroethene	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 8260B	trans-1,2-Dichloroethene	EPA 8260B
1,1,2-Trichloroethane	EPA 8260B	trans-1,3-Dichloropropene	EPA 8260B
1,1,2-Trifluoro-1,2,2-Trichloroethane	EPA 8260B	Trichloroethene	EPA 8260B
1,1-Dichloroethane	EPA 8260B	Trichlorofluoromethane	EPA 8260B
1,1-Dichloroethene	EPA 8260B	Vinyl chloride	EPA 8260B
1,1-Dichloropropene	EPA 8260B	Purgeable Organics	
1,2,3-Trichloropropane	EPA 8260B		ED4 0000E
1,2-Dibromo-3-chloropropane	EPA 8260B	1,4-Dioxane	EPA 8260B

Serial No.: 40042

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RICHARD F. DAINES, M.D.



Expires 12:01 AM April 01, 2010 Issued April 21, 2009

#### CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

DR. TIMOTHY S. OOSTDYK LANCASTER LABORATORIES INC 2425 NEW HOLLAND PIKE LANCASTER, PA 17601-5994 NY Lab Id No: 10670 EPA Lab Code: PA00009

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE All approved analytes are listed below:

#### Purgeable Organics

#### Sample Preparation Methods

Purgeable Organics		Sample Preparation Methods	
2-Butanone (Methylethyl ketone)	EPA 8260B		EPA 1311
2-Hexanone	EPA 8260B		EPA 3005A
4-Methyl-2-Pentanone	EPA 8260B		EPA 3010A
Acetone	EPA 8260B		EPA 3020A
Acetonitrile	EPA 8260B		EPA 3050B
Carbon Disulfide	EPA 8260B		EPA 3060A
Isobutyl alcohol	EPA 8260B		EPA 3540C
Methyl tert-butyl ether	EPA 8260B	14	EPA 3545
o-Toluidine	EPA 8270C		EPA 3550B
Propionitrile	EPA 8260B		EPA 5030B
tert-Butyl alcohol	EPA 8260B		EPA 5035
Vinyl acetate	EPA 8260B		
Semi-Volatile Organics			
1,1'-Biphenyl	EPA 8270C		
2-Methylnaphthalene	EPA 8270C		
4-Amino biphenyl	EPA 8270C		
Acetophenone	EPA 8270C	1	
Benzoic Acid	EPA 8270C	•	
Benzyl alcohol	EPA 8270C		
Caprolactam	EPA 8270C		
Dibenzofuran	EPA 8270C		
Ethyl methanesulfonate	EPA 8270C		
Isosafrole	EPA 8270C		
Methyl methanesulfonate	EPA 8270C		
O,O,O-Triethyl phosphorothicate	EPA 8270C		

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**EPA 8270C** 

**EPA 8270C** 



Phenacetin

Safrole

RICHARD F. DAINES, M.D.



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NY Lab Id No: 10670 EPA Lab Code: PA00009

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:

Amines

Diphenylamine

EPA 8270C

**Priority Pollutant Phenols** 

2,4,5-Trichlorophenol

**EPA 8270C** 

Semi-Volatile Organics

Aramite

**EPA 8270C** 

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is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

	Purgeable Aromatics	
EPA TO-15	Total Xylenes	EPA TO-14A
EPA TO-15		EPA TO-15
	Purgeable Halocarbons	
EPA TO-14A	1,1,1-Trichloroethane	EPA TO-14A
EPA TO-15		EPA TO-15
EPA TO-14A	1,1,2,2-Tetrachloroethane	<b>EPA TO-15</b>
EPA TO-15	1,1,2-Trichloroethans	EPA TO-14A
		EPA TO-15
FD4 TO 45	1,1,2-Trifluoro-1,2,2-Trichloroethane	EPA TO-14A
EPA 10-15		EPA TO-15
	1,1-Dichloroethane	EPA TO-14A
EPA TO-14A		EPA TO-15
EPA TO-14A	1,1-Dichloroethene	EPA TO-14A
EPA TO-15		EPA TO-15
EPA TO-14A	1,2-Dibromoethane	EPA TO-14A
EPA TO-14A		EPA TO-15
EPA TO-14A	1,2-Dichloro-1,1,2,2-tetrafluoroethane	EPA TO-14A
EPA TO-14A	Bromoform	EPA TO-15
EPA TO-15	Bromomethane	EPA TO-14A
EPA TO-14A		EPA TO-15
EPA TO-15	Carbon tetrachloride	EPA TO-14A
EPA TO-14A		EPA TO-15
EPA TO-15	Chloroethane	EPA TO-14A
EPA TO-14A		EPA TO-15
EPA TO-15	Chloroform	EPA TO-14A
EPA TO-14A		EPA TO-15
EPA TO-15	Chloromethane	EPA TO-14A
		EPA TO-15
	EPA TO-15  EPA TO-14A  EPA TO-15  EPA TO-15  EPA TO-15  EPA TO-14A  EPA TO-15  EPA TO-14A  EPA TO-15  EPA TO-15  EPA TO-16  EPA TO-15  EPA TO-16  EPA TO-15  EPA TO-16  EPA TO-15  EPA TO-15  EPA TO-14A  EPA TO-15  EPA TO-14A  EPA TO-15  EPA TO-14A	EPA TO-15 EPA TO-15  Purgeable Halocarbons  EPA TO-14A EPA TO-15 EPA TO-15  EPA TO-15  EPA TO-15  EPA TO-15  EPA TO-15  1,1,2-Trichloroethane  EPA TO-15  1,1-Dichloroethane  EPA TO-14A EPA TO-14A EPA TO-15  EPA TO-14A EPA TO-15 EPA TO-14A EPA TO-15 EPA TO-15 EPA TO-16 EPA TO-15 EPA TO-15 EPA TO-15 EPA TO-15 EPA TO-15 EPA TO-16 EPA TO-15 EPA TO-14A

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#### Purgeable Halocarbons

cis-1,2-Dichloroethene	EPA TO-14A
	EPA TO-15
cls-1,3-Dichloropropene	EPA TO-14A
Dichlorodifluoromethane	EPA TO-14A
Methylene chloride	EPA TO-15
Tetrachloroethene	EPA TO-14A
	EPA TO-15
trans-1,2-Dichloroethene	EPA TO-15
trans-1,3-Dichloropropene	EPA TO-14A
	EPA TO-15
Trichloroethene	EPA TO-14A
	EPA TO-15
Trichlorofluoromethane	EPA TO-14A
Vinyl chloride	EPA TO-15
Volatile Organics	
2-Butanone (Methylethyl ketone)	EPA TO-15
Hexane	EPA TO-15

Serial No.: 40044

Vinyl acetate

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EPA TO-15



APPENDIX D

SITE-SPECIFIC HEALTH AND SAFETY PLAN

# HEALTH AND SAFETY PLAN

Page <u>1</u> of <u>24</u>

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

1. Project Information	
Project Name Former IBM Kingston New	York Site
	Conductivity Investigation, Geoprobe Activities and
Requested byAnthony Savino	
Proposed Start-Up Date04/15/2009	
Pre	epared by
Printed NameCourtney Jackson	
Signature	Date
	Health and Safety Officer
Signature	Date
	Project Manager
Signature Anthony Savino	Date
Title Senior Consultant	

Note to Project Managers:

A signed and completed copy of the Health and Safety Plan and a signed and completed copy of the safety briefing (p. 14) <u>must</u> be included in the project file.

Page 2 of 24

Golder Associates Inc.

#### **HEALTH AND SAFETY PLAN**

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

#### 2. Project Description:

IBM has been conducting site investigation and remedial action activities at the former IBM Kingston New York Site, pursuant to a RCRA Corrective Action (6 NYCRR Part 373 Hazardous Waste Management Permit #3-5154-00067/00090, dated October 24, 1996). Golder Associates Inc. (Golder) has been retained by IBM to provide consulting services associated with certain portions of the Site.

The 258-acre property was developed by IBM in 1954, with manufacturing operations beginning in 1955. Operations included, but were not limited to: computer manufacturing, metal plating, circuit board production and electric typewriter production. IBM ceased operations at the Site during the mid-1990's. In 1998, IBM sold the site to AG Properties of Kingston, LLC and Ulster Business Complex, LLC, who renamed the Site, TechCity and subdivided the property into multiple parcels. The Site is currently owned and managed by Tech City Properties (TechCity).

Thirty-two (32) Solid Waste Management Units (SWMUs) have been identified on-site. Twenty eight (28) SWMUs have been proposed for No Further Action; and four (4) SWMUs for remediation using interim corrective measures (ICMs). Primary constituents of concern (COCs) identified at the Site include: 1,1,1-trichloroethane (TCA), trichloroethene (TCE) and tetrachloroethene (PCE) and related degradation products (i.e., 1,1-dichloroethene [1,1-DCE], 1,1-dichloroethane [1,1-DCA], and 1,2-dichloroethene [1,2-DCE]). Other volatile organic compounds (VOCs) have been detected in groundwater, including carbon tetrachloride, Freon and petroleum (BTEX) hydrocarbons; however, the concentrations of these VOCs are generally lower and less extensive than the chlorinated compounds that are present.

Proposed Site activities include the use of Membrane Interface Probe/Electrical Conductivity (MIP/EC) technology for field screening purposes, a direct-push (Geoprobe®) drilling rig to obtain subsurface soil and groundwater samples and the collection of stormwater samples. Groundwater samples will be collected using temporary well points or existing monitoring wells. Stormwater sewer samples will be collect at the surface from manholes. No entry into the storm sewers will be permitted or required. The possibility of exposure exists via direct contact with and/or inhalation of contaminants found in the site soil, groundwater or stormwater to be investigated and sampled.

#### **HEALTH AND SAFETY PLAN**

Page 3 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

This Health and Safety Plan (HASP) has been developed to address the potential physical and chemical hazards that workers may be exposed to while performing field activities at the Site and establishes procedures to minimize worker exposures through the use of personal protective equipment and safe work practices. This HASP has been developed to meet the requirements of the Occupational Safety and Health Administration (OSHA) regulation, Title 29, Code of Federal Regulations, Part 1910.120 (20 CFR 1910.120), "Hazardous Waste Operations and Emergency Response (HAZWOPER)." The HASP is intended for the protection of Golder employees. Anyone else, including the client, subcontractors, and visitors may review this HASP and follow its procedures. However, these entities are responsible for the safety and health of its employees and must provide their own HASP to address any specialized work or activities being performed.

#### 3. Location:

The Site address is 300 Enterprise Avenue, Kingston, New York, 12401. The Site is located approximately 4 miles north of the City of Kingston. The property is bound to the east by retail properties, the north by Old Neighborhood Road, the northwest and southwest by Esopus Creek, and the south and west by residential properties.

# 4. Facility/Work Site Description:

Approximately 25 buildings are found on-Site. Some of the buildings are occupied by tenants of TechCity while other buildings are vacant and in a state of disrepair. Field investigations, including MIP/EC screening, soil boring and environmental media sampling will be conducted at various locations as presented in the work plans. Specific reference is made to the work plans and the RFI Management Plans for additional details. Both the work plans and the RFI Management Plans are incorporated into this HASP by reference.

# 5. Proposed Personnel and Tasks:

Project Manager \_\_\_\_ Anthony Savino

Field Team Leader \_\_\_\_ Daniel Gorman

#### **HEALTH AND SAFETY PLAN**

Page 4 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

Proposed Field Team	Job Function/Tasks
Anthony Savino	Project Management
Christopher Hemingway	Senior Hydrogeologist
Daniel Gorman	Field Team Leader
To Be Assigned	Field Personnel

### 6. Confined Space Entry:

A confined space is defined as any space not currently used or intended for human occupancy, having a limited means of egress, which is subject to the accumulation of toxic contaminants, a flammable or oxygen deficient atmosphere, or other hazards, such as engulfment, or electrical or mechanical hazards should equipment be inadvertently activated while an employee is in the space. Confined spaces include but are not limited to storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, air pollution control devices, smoke stacks, underground utility vaults, sewers, septic tanks, and open top spaces more than four feet in depth such as test pits, waste disposal trenches, sumps and vats.

Will this task require entry into any confined or partially confined space?	YES - Describe below
	⊠ No
Note: Stormwater samples will be collected as part of this work. Sampsurface pursuant to the Standards Operating Procedures provided in the Quality Assurance Project Plan [QAPP]), which incorporated into this HA	RFI Management Plans (i.e., the
7. Cutting and Welding:	

Will this task involve use of a cutting torch or welding?	YES - Describe below
	⊠ No

# HEALTH AND SAFETY PLAN

Page 5 of 24

Revision Level: 000 Job No.: 083-87071

# 8. Other Potential Hazards:

○ Chemical	□ Trips, Slips, Falls
Radiological	☐ Trenching/Shoring
Fire/Explosion	Heavy Equipment/Vehicular Traffic
Heat Stress	Overhead Hazards
⊠ Electrical	□ Unstable/Uneven Terrain
Machinery/Mechanical Equipment	Other - Describe below
Cold Stress	

See attached Standard Work Practice Exhibits and/or other descriptions provided in the HASP.

# Description/Other:

The use of a MIP/EC introduces the potential for contact with extremely hot metal surfaces. Special precaution should be taken to reduce potential contact with the probe. The driller should hold the MIP/EC with an attached rod extension or after is has been set aside to cool.

Drilling activities will be conducted at various locations within the Site as per the work plans (see Standard Work Practice Exhibits).

The use of cones and barriers must be used to create a safety zone and to divert traffic in areas where the potential for or know vehicular or other forms of traffic are known or may occur during the performance of the work.

Prior to any subsurface work, a Utility One call will be performed and historical operation utilities identified.

Subcontractors will utilize standard work gloves while handling the Geoprobe® and associated tools. Only retractable utility knives will be allowed on-Site for the extraction of soil from macro-core liners.

### **HEALTH AND SAFETY PLAN**

Page 6 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

#### 9. Cold Stress:

Personnel exposed to cold temperatures (especially during windy conditions) may be subjected to cold stress in the form of frost nip, frost bite or hypothermia. Workers shall monitor themselves and others for signs of frost nip when cold weather occurs. Extra caution will be exercised when working in windy conditions and/or when clothing becomes wet. Standard Work Procedures for Cold Stress are attached.

#### 10. Heat Stress

Personnel exposed to warm temperatures may be subjected to heat stress in the form of heat rash, heat cramps, heat exhaustion, or heat stroke. Workers shall monitor themselves and others for signs of heat stroke when hot weather occurs. To prevent and monitor heat stress, be sure drink plenty of water, acclimate workers to Site conditions, take breaks in cool, shaded areas, wear proper personal skin protection and clothing. Standard Work Procedures for Heat Stress are attached.

11. I, <u>Anthony Savino</u>, attest that this information is accurate to the best of my knowledge and hereby request a Health and Safety Plan for the task(s) designated above.

Signature		Date	
Title	Senior Consultant		

#### **HEALTH AND SAFETY PLAN**

Page 7 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

### 12. Chemical/Radiological Hazard Evaluation:

Waste Media	<b>Hazardous Characteristics</b>
	☐ Ignitable
Surface Contamination	☐ Corrosive
○ Contaminated Soil	☐ Reactive
○ Contaminated Groundwater	☐ Explosive
Contaminated Stormwater	☐ Toxic (non-radiological)
☐ Solid Waste	☐ Radioactive
Liquid Waste	
Sludge	

#### Substance:

This task will involve the reasonable possibility of exposure to the substances listed below at concentrations or in quantities which may be hazardous to the health of the site personnel.

		PRIM	IARY HAZ	ARD (Rate: Low	, Med, High,	Ext)		
Substance	Inhalation of Gases / Vapors	Inhalation of Dusts / Mists	Ingestion	Dermal Absorption of Solids / Liquids and/or Skin Contamination	Dermal Absorption of Gases / Vapors	Corrosive / Irritant	Ignitability	Reactivity Explosion
1,1,1-Tri- chloroethane	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW
Trichloro- ethylene	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW
Tetra- chloroethane	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW

# **HEALTH AND SAFETY PLAN**

Page <u>8</u> of <u>24</u>

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

| 1,1-Dichloro-<br>ethene | LOW |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| 1,1-Dichloro-<br>ethane | LOW |
| 1,2-Dichloro-<br>ethene | LOW |
| Carbon<br>Tetrachloride | LOW |
| Freon 113               | LOW |
| Benzene                 | LOW |
| Toluene                 | LOW |
| Ethylbenzene            | LOW |
| Total Xylene            | LOW |

Know Chemicals On-site	Media	PEL/TLV	IDLH	Symptoms
1,1,1-Trichloroethane CAS No. 71-55-6	Soil/GW/ SW	350 ppm	700 ppm	Irritation eyes, nose; central nervous system depression; liver kidney damage; dermatitis; [potential occupational carcinogen]
Trichloroethylene (TCE) CAS No. 79-01-6	Soil/GW/ SW	200 ppm	1,000 ppm	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]
Tetrachloroethane (PCE) CAS No. 127-18-4	Soil/GW Soil Gas/ SW	100 ppm	150 ppm	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, uncoordination; headache,

# HEALTH AND SAFETY PLAN

Page <u>9</u> of <u>24</u>

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

Know Chemicals On-site	Media	PEL/TLV	IDLH	Symptoms
				drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen] carcinogen]
1,1-Dichloroethene CAS No. 75-35-4	Soil/GW/ SW	100 ppm	3,000 ppm	Irritation skin; liver, kidney, lung damage; [potential occupational carcinogen]
1,1-Dichloroethane CAS No. 75-34-3	Soil/GW/ SW	100 ppm	3,000 ppm	Irritation skin; central nervous system depression; liver, kidney, lung damage
1,2-Dichloroethene CAS No. 540-59-0	Soil/GW/ SW	200 ppm	1000 ppm	Irritation eyes, respiratory system central nervous system depression
Carbon Tetrachloride CAS No. 56-23-5	Soil/GW/ SW	5 ppm	200 ppm	Irritation eyes, nose; central nervous system depression; liver, kidney damage; drowsiness; dizziness; incoordiantion [potential occupational carcinogen]
Freon 113 CAS No. 76-13-1	Soil/GW/ SW	1000 ppm	2000 ppm	Irritation skin, throat; drowsiness, dermatitis; cardiac arrhythmias; narcosis; central nervous system depression
Benzene CAS No. 71-43-2	Soil/GW/ SW	0.5 ppm	500 ppm	Irritation eyes, nose; respiratory system; headache; nausea, staggered gait; anorexia; lassitude; dermatitis; bone marrow depression [potential occupational carcinogen]
Toluene CAS No. 108-88-3	Soil/GW/ SW	50 ppm	500 ppm	Irritation eyes, nose; headache; nausea; lassitude; dermatitis; liver, kidney damage; drowsiness; muscle fatigue; insomnia; lacrimation; parasthesia; anxiety
Ethylbenzene CAS No. 100-41-4	Soil/GW/ SW	100 ppm	800 ppm	Irritation eyes, skin; dermatitis; mucous membrane; headache; narcosis, coma
Total Xylenes CAS No. 95-47-6	Soil/GW/ SW	100 ppm	900 ppm	Irritation eyes, nose, throat; dizziness, excitement; drowsiness; incoordination; corneal vacuolization; nausea, staggered gait; anorexia; vomiting; abdominal pain; dermatitis

#### **HEALTH AND SAFETY PLAN**

Page 10 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

PEL = Permissive Exposure Limit (OSHA & NIOSH)

TLV = Threshold Limit Value (ACGIH)

IDLH = Immediately Dangerous to Life and Health (NIOSH)

Instrument

#### 13. Ambient Air/Site Monitoring Procedures:

The following instruments shall be used to monitor the work environment and workers' breathing zones prior to site entry and at the specified intervals.

Monitoring Frequency

#### X PID (HNU, OVM) w/ 11.7 eV lamp 30min. hourly Cont. 15min other OVA Cont. 15min. 30min. hourly other X Combustible Gas Indicator Cont. 15min. 30min. hourly other X H2S Detector Cont. 15min. 30min. hourly other Colorimetric Detector Tubes Cont. 15min. 30min. hourly other Other (describe below)

PID monitoring will be conducted continuously while in the Exclusion Zone during drilling activities and soil groundwater and sewer sampling.

Combustible gas and H2S monitoring will be performed during any storm sewer sampling activities.

#### 14. Action Levels:

Task personnel shall observe the following Action Levels:

Instrument	Action Level/Criteria	Specific Action
Mini Rae 2000 Photo Ionization Detector (PID)	If the PID reading is 1.0 ppm above background level (in breathing zone)	Cease work and evacuate area. Upgrade to Level C for emergency stabilization/demobilization purposes only. Evaluate if mechanical ventilation is feasible
Mini Rae 2000 Photo Ionization Detector (PID)	If the PID reading is 5.0 ppm above background level	Cease work and evacuate area. Upgrade to Level C for emergency stabilization/demobilization purposes only.

#### HEALTH AND SAFETY PLAN

Page 11 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

Instrument	Action Level/Criteria	Specific Action
	(in breathing zone)	Evaluate if mechanical ventilation is feasible
	Continuously greater than 25ppm or frequent peaks greater >50ppm	Cease work and evacuate area. Upgrade to Level B for emergency stabilization/demobilization purposes only. Evaluate of mechanical ventilation is feasible.

15.	Personal	Monitoring:
-----	----------	-------------

☐ Passive Dosimeter ☐ Personal Air Sampling ☐ Other ☒ Not appli	pplicable
---	-----------

### 16. Special Instructions:

In addition to the potential contaminants listed in the tables in Section 12, workers should also be cognizant of hazards such as heat and cold stress and working around drilling equipment. To ensure compliance and understanding of safety issues, a daily safety meeting will be conducted at the job site each morning prior to commencement of work activities. Attendance by all workers is mandatory, and a Daily Safety Briefing form will be signed by everyone in attendance of the daily safety meeting.

#### 17. On-Site Control:

Drilling activities will be conducted at various locations within the Site as per the work plans. The use of cones and barriers must be used to create a safety zone and to divert traffic in areas where the potential for or know vehicular or other forms of traffic are known or may occur during the performance of the work.

Visitor and observer access must be controlled at all times. If present, these individual are to only be allowed in areas deemed safe (e.g., Support Zone) and never in the Exclusion Zone.

# HEALTH AND SAFETY PLAN

Page 12 of 24

Revision Level: 000

Job No.: 083-87071

### 18. Personal Protective Equipment:

Location	Job Function/Task	Initial Level of Protection
Exclusion/Hot Zone	Drilling, Sampling (upgrade to level C or B for emergency stabilization/demob only)	D B C D1, D2, D3
Decon/Contamin ation Control & Support Zone	Decontamination or personnel and/or equipment	D B C D1, D2, D3

Specific protective equipment and material for the different Levels of Protection. Level B □ - Emergency stabilization and demobilization only. ▼ Full face Supplied-air respirator (MSHA/NIOSH approved) ☑ Disposable, full body protective clothing (poly-coated Tyvek) I Hard hat, steel toed boots ■ Double latex gloves ☑ Outer NBR (Nitrile Butyl Rubber) gloves ■ Boot covers Level C □ - Emergency stabilization and demobilization only. Half face air purifying respirator with organic vapor cartridges in combination with dust and mist filters ▼ Full face air purifying respirator with organic vapor cartridges in combination with dust and mist filters ☐ Full face canister Air Purifying Respirator □ Disposable, full body protective clothing Hard hat, steel toed boots ■ Double latex gloves ☑ Outer NBR (Nitrile Butyl Rubber) gloves ■ Boot covers Level D 🗵 ☐ Hard hat, steel toed boots, safety glasses ■ Latex gloves

#### **HEALTH AND SAFETY PLAN**

Page 13 of 24

Revision Level: 000 Job No.: 083-87071

Where air purifying respirators are authorized (Level C - emergency stabilization/demobilization), organic vapor cartridges in combination with dust and mist filters are the appropriate respiratory protection equipment for use with the specific substances and concentrations anticipated. Level C will only be implemented to stabilize the site for demobilization in the event conditions exist which prevents working in Level D. If Level C is required, cartridges will be properly discarded after use.

No changes to the specified levels of protection shall be made without the knowledge and approval of the Health and Safety Officer, the Site Safety Officer, the Field Operations Leader and/or the Project Manager.

### 19. On-Site Control, Organization and Coordination:

Daniel Gorman has been designated as person responsible to coordinate access control on the work site.
No unauthorized person shall be allowed beyond the Support Zone.

Project Manager:

**Anthony Savino** 

Field Operations Leader:

Daniel Gorman

Site Safety Officer:

**Daniel Gorman** 

#### 20. Sanitation Requirements:

Potable water supply available on work site? ☐ Yes ☐ No

Portable toilets required on work site? ☐ Yes, how many? Unknown ☐ No

Temporary washing/shower facilities required at work site? ☐ Yes, describe below.

X No

#### **HEALTH AND SAFETY PLAN**

Page 14 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

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		er com	24 1111	111124	

Decontamination is required for all equipment prior to drilling activities, before advancing each borehole and between each sample collection. All equipment will be decontaminated using Alconox soap or equivalent, and/or steam cleaned.

Field personnel should change gloves between each borehole and each sample location.

22.	Conf	ined E	ntry Procedures: Not Applica	ble		
	Yes	N/A	Provide Forced Ventilation Test Atmosphere For (a) %O <sub>2</sub> (b) %LEL (c) Other	Yes	N/A	Refer to Personal Protective Equip. Refer to Emergency Procedures Other Special Procedures
23.	Cutti	ing/We	elding Procedures:   Not Applic	able		
	Yes	N/A				
			Relocate or Protect Combustibles			
			Wet Down or Cover Combustible Flo	oor		
			Check Flammable Gas Concentration	ns		
			(%LEL) in air			
			Cover Wall, Floor, Duct and Tank			

Openings

Provide Fire Extinguisher

### **HEALTH AND SAFETY PLAN**

Page 15 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

#### 24. Electrical:

An additional hazard exists in the use of electrical appliances such as drills, welding machines on wet surfaces. The water is a potential source of conductance for electricity and therefore electric equipment should not be operated under wet conditions. Golder employees should avoid approaching any area where the equipment or its power cord is in contact with water.

The following precautions should be taken when working around potential electrical hazards:

- Employees should be aware of the fact that high voltage is not necessary for serious electric shock;
- All electrical wiring and equipment must be of a type listed by Underwriters Laboratory (UL) or Factory Mutual Engineering Corporation (FMEC) for the specific application;
- All installations must comply with the National Electrical Safety Code (NESC), National Electrical Code (NEC), or U.S. Coast Guard regulations;
- All electrical work must be by personnel familiar with code requirements and qualified for the class of work to be performed;
- Live parts of wiring or equipment must be guarded to protect all persons or objects from harm;
- All electrical wiring passing through a work area must be covered or elevated in order to protect it from damage by vehicles, foot traffic, projections, sharp corners, or pinching. This includes temporary wiring;
- If it is necessary to work on energized lines or equipment, rubber gloves and other protective equipment or hotline tools designed to meet the provisions of the American National Standards Institute (ANSI) J-6 series will be used;
- Before any work is initiated, ascertain by inquiry, direct observation or instruments whether any part
  of an electrical power circuit, exposed or concealed, is located in such a way that allows contact with
  persons, tools or machines. Whenever possible, de-energize all equipment or circuits to be worked on
  before work is started, and make sure that all personnel are protected by clearance procedures and
  grounding;
- · Patched, oil soaked, worn or frayed electrical cords must not be used;
- · Do not hang extension cords with staples or nails, or suspend them from base wire;

#### **HEALTH AND SAFETY PLAN**

Page 16 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

- All portable and semi-portable electrical tools and equipment, floodlights and work lights must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle;
- All flexible cord sets must be of a type listed by UL. Sets used on construction sites will contain the number of conductors required for the service plus equipment ground wire. The cords must be Type ST, STO, SJT, SJTO, S, SO, SEO, W, or G;
- Portable electrical lighting used in confined, wet, or hazardous locations (drums, tanks, vessels) must be explosion proof or low voltage, operating at 12 volts or less;
- Clearance of overhead lines must be adequate for the movement of vehicles and for the operation of construction equipment; and
- All ladders, drill rigs, man lifts or any other aerial extensions must be established so there is no
  possibility of accidental contact with any electrical transmission line or device.

#### 25. Slips, Trips and Falls:

There are many situations that can cause slips, trips, and falls, such as ice, wet spots, grease, polished floors, loose flooring or carpeting, uneven walking surfaces, clutter, electrical cords, open desk drawers and filing cabinets, and damaged ladder steps. The controls needed to prevent these hazards are usually obvious, but too often ignored, such as keeping walkways and stairs clear of scrap and debris; coiling up extension cords, lines, and hoses when not in use; keeping electrical and other wires out of the way; wearing lug soles in icy weather; clearing parking lots, stairs, and walkways in snowy weather; and using salt/sand as needed. Be aware of your surroundings and take the time to maintain an orderly worksite. This will reduce chances of slips, trips and falls. Proper footwear (safety shoes) may improve foot/ankle support and traction to prevent slips, trips and falls.

#### 26. Heavy Equipment / Vehicular Traffic:

Vehicular traffic along the roadways will be an important hazard to recognize during drilling and sample collection activities. All personnel will stay off of the roads during periods of high traffic activity; and wear orange reflective safety vests. If working in an area of heavy traffic, notify the Project Manager and use extreme caution.

# HEALTH AND SAFETY PLAN

Page 17 of 24

Revision Level: 000 Job No.: 083-87071

The following precautions should be taken when working around heavy equipment and vehicular traffic:

- Check with local authorities for appropriate regulations, need for traffic control and site specific hazards;
- Adequate barricades, channelization cones, flashing lights, flagmen, and warning signs shall be provided at all project sites adjacent to or in public traffic lanes;
- Adequate safety precautions must be observed when parking vehicles. Whenever a vehicle or heavy
  equipment is parked, the parking brake must be set. Equipment parked on inclines must have the
  wheels chocked or track mechanism blocked and the parking brake set; and
- Hard hats and reflective clothing must be worn while performing work in the vicinity of moving traffic.

### 27. Overhead Hazards:

Overhead hazards occur whenever there is moving equipment such as hoists, conveyors, drilling tools, etc., protrusions from machinery, or structural members present above eye level, or whenever an employee must work where other work activities being conducted above him (or her).

The following precautions should be followed:

- Be alert for potential overhead hazards;
- When working "below grade", be sure to keep all hand-tools, equipment and materials such as pipe, braces, lumber, etc., well back from the edge of the trench or hole so it doesn't get kicked in on your head; and
- Always wear a hard hat when working in the vicinity of potential overhead hazards whether it is a "hard-hat area" or not. All hardhats must comply with ANSI Z89,1-1986.

#### **HEALTH AND SAFETY PLAN**

Page 18 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

28. Field Safety Procedures Change Authoriza	tion	
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This Safety Procedures Change Authorization Form will be completed and signed before any safety procedures identified in this HASP can be modified by the Field Team. All revisions to safety procedures must be approved by the Project Manager.

Instruction Number Duration of	Authorization Requested	
Date:		
To be changed  Today only		
☐ Duration of Task		
Description of Procedures Modification:		
Justification:		
Person Requesting Change:	Verbal Authorization Received From:	
Name	Name	Time
Name	Name	Time

within 48 hours of verbal authorization)

#### **HEALTH AND SAFETY PLAN**

Page 19 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

### 29. Emergency Procedures:

This section of the Health & Safety Plan, and the Hospital Route Figure, are to be posted at a prominent location on site. The Hospital Route Figure which has written directions is included on Page 24.

Yes No

□ ☑ On-site Communications Required? Emergency Channel: NA

Nearest Telephone: Field Staff Cell Phone

### 30. Fire and Explosion:

In the event of a fire or explosion, if the situation can be readily controlled with available resources without jeopardizing the health and safety of yourself, the public, or other site personnel, take immediate action to do so, otherwise:

- 1. Notify emergency personnel by calling 911.
- 2. If possible, isolate the fire to prevent spreading.
- 3. Evacuate the area and meet at the Designated Location.

# HEALTH AND SAFETY PLAN

Page 20 of 24

Revision Level: <u>000</u>

Job No.: <u>083-87071</u>

# 31. Chemical Exposure:

Site workers must notify the site safety officer immediately in the event of any injury or any of the signs or symptoms of overexposure to hazardous substances identified in the following table.

Know Chemicals	Symptoms	First Aid	
1,1,1-Trichloroethane CAS No. 71-55-6	Irritation eyes, nose; central nervous system depression; liver, kidney damage; dermatitis; [potential occupational carcinogen]	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Trichloroethylene (TCE) CAS No. 79-01-6	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Tetrachloroethane (PCE) CAS No. 127-18-4	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, uncoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen] carcinogen]	Eye: Irrigate immediately; Skin: Soap wash promptly; Breath: Respiratory support; Swallow: Medical attention immediately	
1,1-Dichloroethene CAS No. 75-35-4	Irritation skin; liver, kidney, [potential occupational carcinogen]	Skin: Soap wash immediately	

Revision Level: <u>000</u>

Job No.: <u>083-87071</u>

Know Chemicals	Symptoms	First Aid	
1,1-Dichloroethane CAS No. 75-34-3	Irritation skin; central nervous system depression; liver, kidney, lung damage	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
1,2-Dichloroethene CAS No. 540-59-0	Irritation eyes, respiratory system; central nervous system depression	Eye: Irrigate Immediately Breath: Respiratory support; Swallow: Medical attention immediately	
Carbon Tetrachloride CAS No. 56-23-5	Irritation eyes, nose; central nervous system depression; liver, kidney damage; drowsiness; dizziness; incoordiantion [potential occupational carcinogen]	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Freon 113 CAS No. 76-13-1	Irritation skin, throat; drowsiness, dermatitis; cardiac arrhythmias; narcosis; central nervous system depression	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Benzene CAS No. 71-43-2	Irritation eyes, nose; respiratory system; headache; nausea, staggered gait; anorexia; lassitude; dermatitis; bone marrow depression [potential occupational carcinogen]	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Toluene CAS No. 108-88-3	Irritation eyes, nose; headache; nausea; lassitude; dermatitis; liver, kidney damage; drowsiness; muscle fatigue; insomnia; lacrimation; parasthesia; anxiety	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	
Ethylbenzene CAS No. 100-41-4	Irritation eyes, skin; dermatitis; mucous membrane; headache; narcosis, coma	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory suppor Swallow: Medical attention immediately	
Total Xylenes CAS No. 95-47-6	Irritation eyes, nose, throat; dizziness, excitement; drowsiness; incoordination; corneal vacuolization; nausea, staggered gait; anorexia; vomiting; abdominal pain; dermatitis	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory suppor Swallow: Medical attention immediately	

#### **HEALTH AND SAFETY PLAN**

Page 22 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

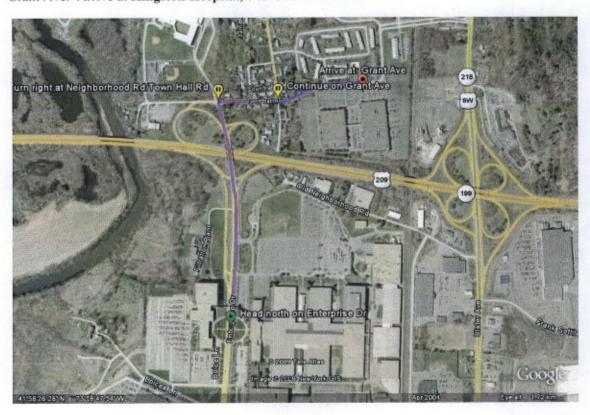
#### 32. On Site Injury Or Illness:

In the event of an injury requiring more than minor first aid, or any employee reporting any sign or symptom of exposure to hazardous substances, immediately take the victim to <u>Kingston Hospital</u> located at 741 Grant Avenue, Lake Katrine, NY, phone (845)336-0526. In the event of life-threatening or traumatic injury, implement appropriate first-aid and immediately call for emergency medical assistance at <u>911</u>.

The nearest designated trauma center is <u>Kingston Hospital</u> located at 741 Grant Avenue, Lake Katrine, NY, phone (845)336-0526. Police assistance can also be reached at 911.

#### **Hospital Directions:**

Start at 300 Enterprise Drive, Kingston, New York. Turn left on Enterprise Drive, heading north. Turn right at Neighborhood Road / Town Hall Road. Neighborhood Road turns into Grant Avenue. Continue on Grant Ave. Arrive at Kingston Hospital, 741 Grant Avenue.



#### **HEALTH AND SAFETY PLAN**

Page 23 of 24

Revision Level: <u>000</u> Job No.: <u>083-87071</u>

#### Personnel with First Aid/CPR Training (Names):

Daniel Gorman

#### Required Emergency Back-Up Equipment:

Fully-charged ABC Class fire extinguisher First Aid Kit

### Emergency Response Authority:

The Site Safety Officer is the designated site emergency coordinator and has final authority for first response to on-Site emergency situations. The Project Manager is the designated back-up Site emergency coordinator.

Upon arrival of the appropriate emergency response personnel, the Site emergency coordinator shall defer all authority but shall remain on the scene if necessary to provide any and all possible assistance. At the earliest opportunity, the Site Safety Officer or the site emergency coordinator shall contact the Project Manager or Health and Safety Officer.

Project Manager: Anthony Savino

Phone (w) 973-645-1922

(cell) 845-216-9160

Health and Safety Officer: Jim Valenti

Phone (w) 856-793-2005

(cell) 609-413-5474

# HEALTH AND SAFETY PLAN

Page 24 of 24

	Revision Level: 000	
	Job No.: <u>083-87071</u>	
Health & Safety Briefing		
	11111 Carling and add at	(time) o
The following personnel were present	at pre-job/daily safety briefing conducted at	(mile) o
	(location), and have read the above p	ian and are familiar
with its provisions:		
Name	Signature	
Fully charged ABC Class fire exting	uisher available on site?	YES
Fully stocked First Aid Kit available		YES
All project personnel advised of loca		YES
	tion of designated medical facility or facilities?	YES
All project personner advised of loca		
	Circ Co Cott Officer	
Printed Name of Field Team Leader	or Site Safety Officer	
Signature	Ī	Date

STANDARD WORK PRACTICES



# STANDARD WORK PROCEDURE SAMPLING CONTAMINATED SOIL/WASTE PILES

# SAMPLING CONTAMINATED SOIL/WASTE PILES

#### DEFINITIONS

Photo ionizing air monitoring instrument (PID): A direct reading air monitoring instrument equipped with an ultraviolet light source that ionizes organic vapors with ionization potentials less than that of the lamp.

Flame ionizing air monitoring instrument (FID): A direct reading air monitoring instrument equipped with a hydrogen flame that ionizes (through combustion) all combustible organic vapors.

#### KEY HAZARDS

- Chemical exposure via inhalation, skin contact or ingestion (See Chemical SWP).
- Heat or cold stress (See Inclement Weather SWP).
- Lightning and high winds.
- Drilling (See Drilling SWP).
- · Motor vehicles.
- · Slip, Trip and Fall.
- Electrical (See Electrical SWP).
- Excavations (See Excavation SWP).
- Working near or over water (See Working over water SWP).

#### Chemical Hazards

Sampling of contaminated soils involves obtaining representative samples from waste piles, beneath bodies of water, on level or sloped grounds and in excavations. Avoid any direct contact from contaminated soil with a skin surface or eyes. Air monitoring should be performed utilizing an intrinsically safe photo ionizing or flame ionizing instrument that can measure a minimum of 0.5 PPM organic vapor. Calibrate the air monitoring instrument daily as described in the literature provided. In general, total organic vapor readings of less than 1 PPM are safe. Steady breathing zone measurements at 1 PPM or above warrant engineering controls (ventilation) or personal protective equipment (respiratory protection) to reduce exposure; however, review of the site specific health and safety plan will aid in understanding the site-specific hazards. Concentrations in excavations that exceed 500 PPM could indicate a large quantity of organic vapor; not only toxicity risks but also a flammability risk. Soils with high organic vapor concentrations should be sampled carefully with attention paid to the types of tools used, since some tools may be or aid sources of ignition.

Maintain material safety data sheets (MSDS) or equivalent for all chemicals of concern at the site.

Detailed chemical safety information can be found at <a href="https://www.osha.gov">www.osha.gov</a> and <a href="https://www.osha.gov">www.cdc.gov/NIOSH</a>.



# STANDARD WORK PROCEDURE SAMPLING CONTAMINATED SOIL/WASTE PILES

Sampling in excavations and over water entail additional risks requiring the use of additional SWPs.

#### PRECAUTIONS

Sampling for contaminated soils or sludges often occurs at sites that are known hazardous waste sites or adjacent to those sites. Follow all local regulations in regards to working at such properties.

This project task commonly presents construction-related hazards such as trips, falls, and slips, and resulting injuries which are typical of undeveloped or industrial sites. In order to aid in preventing these types of hazards:

- Wear proper footwear including steel toes for earthwork.
- Wear long pants and long sleeve shirts.
- Clean boots and testing equipment as needed, since slips may result from mud on a hard surface.
- Avoid jumping across obstacles (i.e.: anchor trenches).
- Exercise caution while walking on improvised plank bridges across ditches or anchor trenches.
- Wear high visibility clothing (reflective vests) to aid motor vehicle operators in noticing your presence.

When traversing a site by foot or when operating a motor vehicle observe site traffic rules and right-ofway practices at all times. Heavy equipment and trucks should be assumed to have the right-of-way. Generally, the following rules apply to determining the right-of-way:

- The heavier piece of equipment has the right-of-way.
- Loaded trucks and equipment have precedence over unloaded ones.
- Equipment moving down slope has precedence over one going upslope.

# MINIMUM PERSONAL PROTECTIVE EQUIPMENT REQUIRED

- Hard hat as required.
- Safety glasses.
- Respirator with appropriate cartridges as required.
- High visibility clothing (reflective vest).
- Steel-toed and shank safety boots.
- Nitrile (or equivalent) gloves.

#### TRAINING

- 10 hour OSHA Construction Training
- Golder and site specific induction
- Emergency and First Aid Course



# STANDARD WORK PROCEDURE SAMPLING CONTAMINATED GROUNDWATER

#### SAMPLING CONTAMINATED GROUNDWATER

Photo ionizing air monitoring instrument – A direct reading air monitoring instrument equipped with an ultraviolet light source that ionizes organic vapours with ionization potentials less than that of the lamp.

Flame ionizing air monitoring instrument – A direct reading air monitoring instrument equipped with a hydrogen flame that ionizes (through combustion) all combustible organic vapours.

#### KEY HAZARDS

- Chemical exposure via inhalation, skin contact or ingestion (See Chemical SWP);
- · Heat or cold stress (See Extreme Weather SWP);
- · Lightning and high winds;
- · Drilling (See Drilling SWP)
- · Motor vehicles:
- · Slip, Trip and Fall and
- Electrical (See Electrical SWP)
- · Insect bites/stings
- Heavy lifting

#### Chemical Hazards

Groundwater sampling often involves the use of line operated pumps to extract water from the subsurface. Ensure that the generator utilized is equipped with ground fault interrupter (GFI) circuitry to prevent possible shock hazards. Collect development or purge water in containers as required for proper disposal. Protect the public and client staff from investigation derived waste (IDW) by utilizing secure areas for storage. If internal combustion engines are used (generators), they must be in an area with adequate ventilation, and in an area free of combustible materials (i.e. dry grass, gasoline, etc.).

Keep your face as far as possible from the opening of the well to avoid inhalation of volatile contaminants. Avoid any direct contact with a skin surface or eyes from ground water. Air monitoring should be performed utilizing a photo ionizing or flame ionizing instrument that can measure a minimum of 0.5 PPM organic vapour. Calibrate the air monitoring instrument daily as described in the literature provided. In general, total organic vapour readings of less than 1 PPM are safe. Steady breathing zone measurements at 1 PPM or above warrant engineering controls (ventilation) or personal protective equipment (respiratory protection) to reduce exposure. Concentrations in the well opening that exceed 500 PPM could indicate a large quantity of organic vapour, not only a toxicity risk but also a



# STANDARD WORK PROCEDURE SAMPLING CONTAMINATED GROUNDWATER

flammability risk. Wells with high organic vapour concentrations should be sampled carefully with a minimum of ferrous tools or other sources of ignition.

Maintain material safety data sheets (MSDS) or equivalent for all chemicals of concern at the site including any chemicals required as part of the sampling program (i.e. calibration gas, sample preservatives, etc.). Detailed chemical safety information can be found at <a href="https://www.cdc.gov/NIOSH">www.cdc.gov/NIOSH</a>

#### PRECAUTIONS

Sampling for contaminated groundwater often occurs at sites that are known hazardous wastes or adjacent to those sites. Follow all local regulations in regards to working at such properties.

This project presents construction related hazards such as trips, falls, and slips, and resulting injuries which are typical of undeveloped or industrial sites.

- · Wear proper footwear including steel toes for earthwork
- Clean boots and testing equipment, since slips may result from mud on a hard surface.
- Avoid jumping across obstacles (ie: anchor trenches).
- Exercise caution while walking on improvised plank bridges across ditches or anchor trenches.

Observe site traffic rules and right-of-way practices at all times. Heavy equipment and trucks should be assumed to have the right-of-way. Generally, the following rules apply to determining the right-of-way:

- The heavier piece of equipment has the right-of-way.
- Loaded trucks and equipment have precedence over unloaded ones.
- Equipment moving down slope has precedence over one going upslope.

Other general site vehicle operation rules are as follows:

- Observe speed limits within the site which usually do not exceed 15 miles per hour;
- Do not follow another vehicle closely; material may fall off the vehicle or be thrown by the tires when in motion;
- Large equipment may have a significant "blind spot" on the right side of the vehicle. Avoid passing
  heavy equipment unless specifically instructed to do so by the operator of that equipment. Assume
  the equipment operator does not know you are present in an area and maneuver accordingly;
- Listen for and heed back-up alarms from heavy equipment;
- When possible, make eye contact with equipment operators;
- Park the company vehicle near the work location to mark your presence in the area. Wear high
  visibility clothing (reflective vests) to aid the operator in noticing your presence. Use extreme
  caution when operating in dusty conditions. Drive with your headlights on to increase your
  visibility. If conditions become dusty and significantly reduce visibility across the site, leave the area
  and wait for conditions to improve and contact the Golder Project Manager.



# STANDARD WORK PROCEDURE SAMPLING CONTAMINATED GROUNDWATER

- Do not ride on the contractor's equipment, and do not attempt to operate any such equipment.
- Do not ride on anything that does not have a seat designed for human occupancy.
- Wear your seatbelt at all times.

Because monitoring wells may provide habitat for insects such as bees, spiders and wasps, caution should be take when initially opening the well. When opening the well protective cover, open the cover and stand back for a few minutes to allow any flying insects an opportunity to leave. Prior to removing the well cap, inspect the inside of the protective casing to make sure no inhabitants of the well are present.

# MINIMUM PERSONAL PROTECTIVE EQUIPMENT REQUIRED

- · Hard hat as required
- Safety glasses
- Respirator with appropriate cartridges as required.
- High visibility clothing (reflective vest)
- Steel-toed and shank safety boots
- Nitrile (or equivalent) gloves

#### TRAINING

- 40 hour HAZWOPER or equivalent local requirement (8 hour annual refresher required)
- Golder and site specific induction
- Emergency and First Aid Course



### HEAT STRESS

Employees may experience heat stress due to a combination of elevated ambient temperatures and the concurrent use of personal protection equipment; this depends in part on the location of the site, the type of work, and the time of year. The project manager (PM) should consider the need to monitor heat stress during the project planning stage. The Site Safety Officer (SSO) and/or field staff will evaluate heat stress using the techniques specified below whenever the ambient temperature exceeds 21°C or 70°F.

# HEAT STRESS RELATED PROBLEMS

- Heat Rash caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreases ability to tolerate heat, as well as being a nuisance;
- Heat Cramps caused by profuse perspiration with inadequate fluid intake and chemical replacement. Signs: muscle spasms and pain in the extremities and abdomen;
- Heat Exhaustion caused by increased stress on various organs to meet increased demands to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness, and lassitude. If symptoms occur, the employee should leave the work area and proceed to the nearest air-conditioned location, drinks liquids such as water or Gatorade, and rest until the symptoms pass. Contact the Golder PM immediately; and
- Heat Stroke the most severe form of heat stress. Body must be cooled immediately to prevent severe injury and/or death. Signs: red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma. Medical help must be obtained immediately. If heat stroke is suspected, implement emergency response plan. Remove excess clothing and cool the person by sponging with cool or luke warm water. Never place ice on the person or throw water on the individual. Contact the Golder Project Manager as soon as time permits.

## HEAT STRESS MANAGEMENT

### Heat Stress Monitoring

The American Conference of Governmental Industrial Hygienists (1992) states that workers should not be permitted to work when their deep body temperature exceeds 38°C (100.4°F).

For strenuous field activities that are part of ongoing site work activities in hot weather, the following procedures shall be used to monitor the body's physiological response to heat, and to monitor the work cycle of each site worker. There are two phases to this monitoring: initial work/rest cycle determination and physiological monitoring. The initial work/rest cycle is used to estimate how long the first work shifts of the day should be. Heart rate monitoring of each worker will establish the length of the successive work periods.

# Determination of Initial work/Rest Cycles

Measure the air temperature with a standard thermometer. Estimate the fraction of sunshine by judging what percent the sun is out: 100% sunshine - no cloud cover = 1.0; 50 % sunshine and 50% cloud cover = 0.5; 0% sunshine = full cloud cover = 0.0.

Plug these variable into the following equation to determine the adjusted temperature: T (°C, adjusted) = T (°C, actual) + (7.2 x fraction sunshine)



Use the chart below to determine the length of the first work shift. At the first break, initiate the heart rate monitoring as described in the next section.

ADJUSTED TEMPERATURE	NORMAL CLOTHING	WORK	IMPERMEABLE CLOTHING
21° - 25°C (70-77°F)	150 Minutes		120 Minutes
25° - 28°C (77-82°F)	120 Minutes		90 Minutes
28° - 31°C (82-88°F)	90 Minutes	A sign transferred	60 Minutes
31° - 32°C (88-90°F)	60 Minutes		30 Minutes
>32°C (>90°F)	45 Minutes		15 Minutes

#### **Heart Rate Monitoring**

Heart rate (HR) should be measured by radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 33 percent while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats/minute at the beginning of the next rest period, the following work period should be further shortened by 33 percent while the length of the rest period stays the same.

#### **Heat Stress Prevention**

The best approach is preventive heat stress management. In general:

- · have workers drink additional water before beginning work;
- provide disposable cups of water that is maintained at 10 to 16°C (50 to 60°F);
- urge workers to drink one to two cups of water every 20 minutes or at each rest break for a total
  of four to eight litres per day;
- provide a cool, preferably air-conditioned area for rest breaks;
- discourage the drinking of alcohol at night and discourage the intake of coffee during working hours;
- · monitor for signs of heat stress;
- acclimatise workers to site work conditions by slowly increasing workloads, ie., do not begin site
  work activities with extremely demanding activities; and
- Reschedule your work hours so that you are not working in the heat of the day between 10 am and 2 pm.

#### **Sun Protection**

- Employees are encouraged to maximize use of the shade provided by trees, buildings and other structures. Where there is limited access to natural shade, fixed or portable shade structures may be used and will be provided where practical.
- Rotate your work with others between indoor/shaded areas and outdoor/exposed locations to minimize time spent in the sun.
- The selection of appropriate protective clothing will take into account both the need to block out UV and the need to reduce the effects of heat.
- It is recommended that Golder employees tight woven clothing which has a minimum UPF of at least 30. Clothing should be lightweight, loose fitting and have a collar to assist with keeping cool.



# STANDARD WORK PROCEDURE HEAT STRESS

- Hats provide shade and the bigger the brim the greater the amount of shade that is provided. Hats should be made of close-weave material and have a wide brim or be legionnaire-style. In circumstances where the wearing of a broad-brimmed hat causes difficulties due to their size sunscreen and other protective measures should be used instead.
- Safety glasses will be supplied to protect the eyes from effects of UV radiation and potential eye injuries from flying objects, dust or chemical splashes. Safety glasses complying with ANSI
- Sunscreen does not offer complete protection and should always be used in conjunction with other protection such as protective clothing. Broad spectrum and water-resistant sunscreen with a sun protection factor (SPF) of 30+ should be used.
- Staff using sunscreen are encouraged to regularly check use by dates to ensure sunscreen is not
- Sunscreen will be placed in an easily accessible location and employees instructed in correct application and use. Sunscreen should be generously applied to all areas of exposed skin at least twenty minutes before going outside and should be reapplied at least every two hours.



### STANDARD WORK PROCEDURE COLD ENVIRONMENT – COLD STRESS

#### COLD ENVIRONMENT - COLD STRESS

In a cold environment, body heat must be conserved to maintain the core temperature at normal levels and to ensure an adequate blood flow to the brain and extremities. Feelings of cold and discomfort should not be ignored, since these may be early warning signals. The effects of cold are such that problems can occur before the worker is aware of them, and furthermore, over-exposure to cold may affect judgment.

#### MAIN FACTORS INVOLVED IN CAUSING COLD STRESS

- Temperature
- Humidity
- · Movement of air
- Radiant temperature of the surroundings
- Clothing/physical activity

#### COLD STRESS RELATED PROBLEMS

- Frostbite is a condition in which the skin and underlying tissues freeze. Usually affects fingers, hands, toes, feet, ears and nose.
- Hypothermia is a condition in which a person's body temperature falls below 95° F or 35 degrees Centigrade. Hypothermia occurs when more heat is lost from the body than the body can produce. It usually happens when a person is exposed to extremely cold temperatures but it can occur even at moderate temperatures. It does not have to be freezing outside for a person to become hypothermic. For example, falling into cold water or wearing wet clothing in cold weather can bring on hypothermia. Failing to wear a hat in cold weather can also lead to hypothermia, since a large amount of body heat escapes from the head. Extreme fatigue, hunger or lack of fluids can also lead to hypothermia. As well, excessive wind can increase the amount of heat lost and cause hypothermia.

#### FROSTBITE MANAGEMENT

- Move person to a warm dry area. Don't leave the person alone.
- Minimize walking on frozen feet.
- Do not apply any lotions or ointments to frozen skin.
- Remove any wet or tight clothing that may cut off blood flow to the affected area.
- DO NOT rub the affected area, because rubbing causes damage to the skin and tissue.
- Gently place the affected are in a warm (105°F) water bath and monitor the water temperature to slowly warm the tissue. Don't pour warm water directly on the affected area because it will warm the tissue too fast causing tissue damage. Warming takes about 25-40 minutes.
- After the affected area has been warmed, it may become puffy and blister. The affected area may
  have a burning feeling or numbness. When normal feeling, movement, and skin color have
  returned, the affected area should be dried and wrapped to keep it warm. NOTE: If there is a
  chance the affected are may get cold again, do not warm the skin. If the skin is warmed and then
  becomes cold again, it will cause severe tissue damage.
- Seek medical attention as soon as possible and contact the Site Safety Officer.



# STANDARD WORK PROCEDURE COLD ENVIRONMENT - COLD STRESS

### HYPOTHERMIA MANAGEMENT

The most obvious sign of hypothermia is a low core body temperature. The person with hypothermia may not realize that his or her prolonged exposure to cold requires emergency medical care. Other signs and symptoms include:

- apathy or loss of interest in surroundings
- lethargy or difficulty moving
- confusion
- drowsiness
- loss of coordination
- cold skin
- shock caused by decreased blood flow
- slurred speech
- uncontrollable shivering
- weakness

If a person is suspected of suffering from hypothermia, contact the Site Safety Officer, and apply first aid.

### What should be done (land):

- Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace with warm, drying clothing or wrap the person in blankets.
- Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. Avoid drinks with caffeine (coffee, tea or hot chocolate) or alcohol.
- Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck and head areas. DO NOT rub the person's body or place them in a warm bath. This may stop their heart.

### What should be done (water):

- DO NOT remove any clothing. Button, buckle, zip and tighten any collars, cuffs, shoes, and hoods because the layer of trapped water closest to the body provides a layer of insulation that slows the loss of heat. Keep the head out of the water and put on a hat or hood.
- Get out of the water as quickly as possible or climb on anything floating. DO NOT attempt to swim unless a floating object technical water rescue can be reached because swimming or other physical activity uses the body's heat and reduces survival time by about 50 percent.
- If getting out of the water is not possible, wait quietly and conserve body heat by folding arms across the chest, keeping thighs together, bending knees, and crossing ankles. If another person is in the water, huddle together with chests held closely.

#### PRECAUTIONS

Use the buddy system.



# STANDARD WORK PROCEDURE COLD ENVIRONMENT – COLD STRESS

- Recognize the environment and workplace conditions that lead to potential cold-induced illnesses and injuries,
- Learn the sign and symptoms of cold induced illnesses/injuries and what to do to help the worker.
- Dress appropriately for expected weather conditions. Dress in a minimum of three layers (a skin layer to absorb moisture and keep the skin dry, an insulating layer, and an outer protective layer), wear a hat and gloves, in addition to underwear that will keep water away from the skin.
- Take frequent short breaks in warm dry shelters to allow the body to warm up.
- Perform work during the warmest part of the day.
- Eat warm, high calorie foods like hot pasta dishes.
- Avoid vasodilators, which allow the body to lose heat faster which can accelerate hypothermia.
   These include alcohol and drugs;
- Avoid vasoconstrictors, including tobacco products, which constrict blood vessels and can accelerate the onset of frostbite;
- · Avoid touching cold metal with bare skin; and
- Keep active.



## STANDARD WORK PROCEDURE SLIPS, TRIPS AND FALLS

#### SLIPS, TRIPS AND FALLS

Over half of all office injuries are the result of falls. The majority of falls occur on slippery, uneven, defective, cluttered or obstructed walking surfaces. A significant number of debilitating falls are the result of a person falling out of his or her own chair, typically while in the process of sitting down, or leaning back. Falls from elevations while reaching for an overhead object are also common, and frequently cause severe injuries.

#### PRECAUTIONS WHEN IN THE OFFICE - HOUSEKEEPING

- Watch your step! Wipe up spilled liquids immediately. Tripping hazards such as defective
  floors, missing floor tiles, loose or matted carpeting, bunched-up floor mats, extension cords,
  phone cords, etc., should be corrected or reported and repaired immediately. Don't carry loads
  that are so large or bulky that the line of vision is impaired.
- Be careful when sitting down. Sitting on the edge of a seat, sitting too far back, or kicking the
  chair out from under one's self can result in a fall and fractured vertebrae. Occasionally check
  the mechanical condition of chairs commonly used.
- Be especially careful going up and down stairs. Avoid using stairs if both arms are loaded.
   Watch your step and if possible always have one hand free to use a railing. Maintain 3 points of contact when ascending/descending.

#### PRECAUTIONS WHEN OUT IN THE FIELD

In the field, falls are the second leading cause of work-related deaths.

#### TYPES OF FALLS

Falls are of two basic types: elevated falls and same-level falls. Same-level falls are most frequent, but elevated falls are more severe.

- Same-Level Falls: high frequency--low severity
- Elevated Falls: lower frequency--high severity

Same-level falls are generally slips or trips. Injury results when the individual hits a walking or working surface or strikes some other object during the fall. Over 60 percent of elevated falls are from less than 10 feet.

#### SAME-LEVEL FALLS

Examples of same-level falls are described below.

#### SLIP AND FALL

Slips are primarily caused by a slippery surface and compounded by wearing the wrong footwear. In normal walking, two types of slips occur. The first of these occurs as the heel of the forward foot contacts the walking surface. Then, the front foot slips forward, and the person falls backward.



## STANDARD WORK PROCEDURE SLIPS, TRIPS AND FALLS

The second type of fall occurs when the rear foot slips backward. The force to move forward is on the sole of the rear foot. As the rear heal is lifted and the force moves forward to the front of the sole, the foot slips back and the person falls.

The force that allows you to walk without slipping is commonly referred to as "traction." Common experience shows that dry concrete sidewalks have good traction, while icy surfaces or freshly waxed floors can have low traction. Technically, traction is measured as the "coefficient of friction." A higher coefficient of friction means more friction, and therefore more traction. The coefficient of friction depends on two things: the quality of both the walking surface and the soles of your shoes.

To prevent slips and falls, a high coefficient of friction (COF) between the shoe and walking surface is needed. On icy, wet, and oily surfaces, the COF can be as low as 0.10 with shoes that are not slip resistant. A COF of 0.40 to 0.50 or more is needed for excellent traction. To put these figures in perspective, a brushed concrete surface and a rubber heel will often show a COF greater than 1.0. Leather soles on a wet smooth surface, such as ceramic tile or ice, may have a COF as low as 0.10.

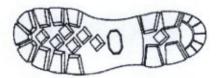


Figure 1. Shoes with soft rubber soles and heels with rubber cleats provide a high coefficient of friction (COF).

Providing dry walking and working surfaces and slip-resistant footwear are the answer to slips and their resultant falls and injuries. Obviously, high heels, with minimal heel-to-surface contact, taps on heels, and shoes with leather or other hard, smooth-surfaced soles lead to slips, falls, and injuries. Shoes with rubber-cleated, soft soles and heels provide a high COF and are recommended for most agricultural work.

In work areas where the walking and working surface is likely to be slippery, non-skid strips or floor coatings should be used. Since a COF of 0.40 to 0.50 is preferred for walking and working surfaces, we should strive for a surface which provides a minimum of 50 percent of this friction. If the working surface is very slippery, no footwear will provide a safe COF.

Trip and Fall Trips occur when the front foot strikes an object and is suddenly stopped. The upper body is then thrown forward, and a fall occurs.

As little as a 3/8" rise in a walkway can cause a person to "stub" his toe resulting in a trip and fall. The same thing can happen going up a flight of stairs: only a slight difference in the height of subsequent steps and a person can trip and fall.

#### CONTRIBUTING FACTORS

Proper housekeeping in work and walking areas can contribute to safety and the prevention of falls. Not only is it important to maintain a safe working environment and walking surface, these areas must also be kept free of obstacles which can cause slips and trips. One method which promotes good housekeeping in work environments is the painting of yellow lines to identify working and walking areas. These areas should never be obstructed by objects of any kind.



### STANDARD WORK PROCEDURE SLIPS, TRIPS AND FALLS

Adequate lighting to ensure proper vision is also important in the prevention of slips and falls. Moving from light to dark areas, or vice versa, can cause temporary vision problems that might be just enough to cause a person to slip on an oil spill or trip over a misplaced object.

Carrying an oversized object can also obstruct one's vision and result in a slip or a trip. This is a particularly serious problem on stairs.

#### BEHAVIORS THAT LEAD TO FALLS

In addition to wearing the wrong footwear, there are specific behaviors which can lead to slips, trips, and falls. Walking too fast or running can cause major problems. In normal walking, the most force is exerted when the heel strikes the ground, but in fast walking or running, one lands harder on the heel of the front foot and pushes harder off the sole of the rear foot; thus, a greater COF is required to prevent slips and falls. Rapid changes in direction create a similar problem.

Other problems that can lead to slips, trips and falls are: distractions; not watching where one is going; carrying materials which obstruct view; wearing sunglasses in low-light areas; and failure to use handrails. These and other behaviors, caused by lack of knowledge, impatience, or bad habits developed from past experiences, can lead to falls, injuries, or even death.



# STANDARD WORK PROCEDURE WORKING AROUND HEAVY EQUIPMENT

# WORKING AROUND HEAVY EQUIPMENT

The following safety protocol is intended for persons visiting sites that employ the use of heavy equipment. Such sites include surface and underground mines, remediation areas and construction sites. Heavy equipment activity may change daily or hourly, with differing potential hazards to be identified and addressed.

#### KEY HAZARDS

- Haulage trucks and dump trucks
- Shovels and Draglines
- Excavators
- Bulldozers
- Mobile Drill rigs
- Cranes
- · Other mobile equipment, such as water trucks, graders, and pick-up trucks

One of the most important points to remember about working around any piece of heavy equipment is that the operator has a limited field of vision. Always make eye contact with the operator of the equipment prior to moving into swing/operating radius.

### PRECAUTIONS

- Make arrangements / discuss protocols with operator during daily tailgate or at shift change or when operators and/or operations change.
- Never approach an operational piece of heavy equipment until the operator is aware of your presence, your desire to approach and signals the OK – where possible use radio contact.
- Stand in a safe location well outside the maximum extended reach of the shovel, dragline or
  excavator arm, and out of the way of other mobile equipment. With an excavator, the optimum
  location is within the quadrant of the operator's visual coverage.
- When contact is made, either radio or visual, advise the operator of your wish to approach the equipment. The operator may want to complete a task prior to shutting down. If so, remain at the same location until the operator signals the OK to advance. Usually this will involve the bucket being lowered to the floor, however practices may vary between sites. It is advisable to check with the site superintendent/foreman before entering areas where heavy equipment is operating.
- Advise the operator of your task and requirements. Complete your task, advise the operator that
  you have completed your work, and depart the work area.

#### SAFE DRIVING PRACTICES

 All pieces of haulage equipment and large mobile equipment will have the right of way on all roadways. All other equipment will give way and will keep a safe distance until the roadway is



# STANDARD WORK PROCEDURE WORKING AROUND HEAVY EQUIPMENT

cleared.

- In areas of traffic congestion and narrow travel-ways, the smallest vehicle shall always yield to larger vehicles.
- When following heavy equipment, a safe travelling distance should be maintained at all times.
   The driver's side mirror should always be visible to you, and hence you to the operator.
- On the majority of operating surface mines, all traffic travels on the left-hand side of the road.
   However practices may vary between sites. Check with the site superintendent/foreman before travelling on site roadways.
- Overtaking haulage trucks and dump trucks should be done only when told to by the operator of the truck. Visual and/or radio contact must be made with the operator.

#### RESPONSIBILITIES

It is your responsibility to understand the traffic and equipment operating rules of the site. Ask the site superintendent/foreman for this information upon entering the site for the first time. This information should be reviewed during daily tailgate meetings.

# MINIMUM PERSONAL PROTECTIVE EQUIPMENT REQUIRED

- Hard Hat
- Safety Boots
- High Visibility Vest
- Hearing Protection
- Safety Glasses

#### DRILLING

Drilling techniques include auger, rotary, percussion, and sonic which all have high-speed rotating and moving components which require caution to avoid injury when working.

Drilling can be safely undertaken in all types of terrain and in all types of conditions, if proper precautions are taken. Because of the variety of situations staff may experience, it is important to recognize and be aware of potential hazards associated with this operation.

#### KEY HAZARDS

- Impact by moving equipment;
- Encountering subsurface utilities;
- · Mast contact with overhead wires;
- Traversing uneven ground to drill, document and sample:
- Clothing, fingers or other body parts caught in high speed and high torque rotating equipment.
- Noise generated by the equipment or surroundings
- · Dust generated by equipment

#### PRECAUTIONS

#### Before Drilling:

- Inform staff of the emergency shut-off switch on the rig and have the driller test it daily.
- Get as much site-specific information as possible concerning ground conditions and surface obstructions. Ask the Project Manager and, if possible, the Client or Client Contact.
- Use available soils information (i.e., previous reports, US Geological Survey Surficial Geology Maps, colleagues who have had experience in the area) to ascertain potential subsurface conditions.
- Each drilling location should be inspected by the GAI field leader and subcontractor supervisor
  and approved as safe for drilling. Consider access requirements, and look for evidence of
  underground services (i.e., buried utility lines, wire, conduits, tanks, service boxes, plugs,
  exposed pipe, trenches, etc.), and locate the boreholes accordingly (see Test Pit).
- Always utilize state, local, or 811 utility location services to get clearance to proceed at each drilling location. Plan at least 48 hours in advance prior to scheduled work.
- Look for surface and overhead features that may represent a hazard. Overhead power lines are a
  major concern and must be avoided or de-energized. Even without direct contact, electricity can
  are from the power lines to another object (see Test Pit)
- Do not pile drill spoil such that it could endanger workers (see Test Pit)
- Drill rigs should not be operated within 12 feet of lines less than 132 KV; within 20 feet of lines 132 to 330 KV; or within 26 feet of lines greater than 330 KV.
- Drill rig should not be moved from one location to the next with the mast raised.
- Drill rig equipment should be safety inspected by the subcontractor on a daily basis dependent on specific use, field conditions, and manufacturer's recommendations.



### STANDARD WORK PROCEDURE DRILLING

#### During Drilling

- Identify a safe viewing area where you can observe the drilling operations, but not so close that
  you are either in danger of being struck by the equipment swinging from wirelines or winch
  cables.
- Always make sure you have a route of escape, should things go wrong. Be aware of wind direction and consider escaping upwind if subsurface contaminants are involved
- Make sure the drill crew knows where you are at all times.
- Approach the drill rig during times when it is safest to do so. If necessary, signal the operator
  first and make sure the equipment is stopped before you approach.
- Avoid the temptation to act as the driller's helper. Do not handle heavy rods or equipment.
  Remember that the drilling contractor is responsible for providing the necessary drilling
  equipment and personnel who are trained in its safe use. This also includes traffic control needs,
  unless otherwise specifically indicated by GAI project manager (i.e. for road drilling where GAI
  provided the necessary traffic control.)
- Know where everyone is at all times;
- Never use gasoline or any other combustible solvent as a cleaning agent. It is a fire and explosion hazard;
- Use a personal fall arrest system while working at any height above 5 feet on the mast or on top
  of the rig;
- Do not perform maintenance while the rig is running;
- Do not remove any blocking or jacks from under rig while the rig is drilling;
- Stand clear of cables as much as possible while pulling pipe or while the rig is under a heavy strain;
- When racking drill rods for rotary drilling/sampling, the total length of rods racked shall not be more than 1.5 times the height of the mast;
- · Do not wear loose clothing or jewelry around moving machinery;
- Be on guard for pinch and shear hazards for fingers and toes--especially around the drill string;
- Practice good housekeeping--keep excess spoil material and unnecessary equipment well out of the way;
- When jumping batteries during cold weather starting, be sure of terminal connections. Connect
  the positive terminal first, then the negative terminal. Batteries can explode, spraying acid to eyes
  and skin; wear protective goggles and clothing;
- · Communicate effectively; if using hand signals, make sure everyone knows what they are;
- Know where fire extinguisher(s) are and how to use them. Check the charge condition before the start of project activities, and periodically thereafter;
- All hoses carrying high pressure air or fluids should have safety chains or cables at connectors;
- Lighting on the site or rig shall be properly installed and sufficient in quantity to provide adequate illumination for night work. All receptacles shall be protected with a ground fault circuit interrupter (GFCI);
- Weight indicators should be standard equipment;
- All hooks shall have safety latches and be checked between borings;
- Do not ride on hook ropes or other traveling lines on rig;
- Keep walkways clear;



# STANDARD WORK PROCEDURE DRILLING

- Using a properly calibrated real-time air quality instrumentation,, monitor for suspected airborne gas hazards (combustible and/or toxic as applicable);
- Ear protection must be worn by employees working in close proximity to equipment that generates noise (85 dB(A) or greater);
- Wear required respiratory protective equipment when hazards from toxic chemicals are suspected (See Respiratory Protection);
- · Observe proper lifting techniques;
- Fuel tanks should be properly installed according to local fire codes with appropriate secondary contaminant;
- Wastewater and drilling fluids must be properly diverted or contained;
- Containerize drilling spoils and fluids suspected to be contaminated as required by environmental regulatory requirements;
- · Protect the public by use of proper barricades, ramps over pipes, warning signs and guard rails;
- Use caution during welding activities, remain at a safe distance and do not look directly at the
  welding arc. The drillers will need to wear welding goggles and gloves; properly ground arcwelding equipment; properly vent PVC solvent glue vapors from installed well casings before
  cutting or welding the casings; and
- Have a first-aid safety kit handy.

### After Drilling

- Properly decontaminate all drilling equipment, as required, before leaving. This includes drilling tools, pipe, pumping equipment, and mud-pits, in addition to the drill rig and drill string;
- Never leave a borehole open for an extended period. Always backfill and compact the near surface soil after you have completed sampling, any instrumentation installation(s) and documentation activities. Open drill holes represent a potential hazard to yourself and others.
- Clean up waste materials from drilling operations, such as discarded containers, hoses, damaged tools or blocking, and wasted pipe and casing, etc. Dispose of properly.

# MINIMUM PERSONAL PROTECTIVE EQUIPMENT REQUIRED

- Hard Hat
- · Steel Toe Safety Boots
- · High Visibility Vest
- · Hearing Protection
- Safety Glasses
- Close fitting clothing
- Dust Mask (Respirator if required)
- Gloves

#### TRAINING

- OSHA 10 hour Construction Safety course
- · First Aid and CPR courses



# STANDARD WORK PROCEDURE DRILLING

### APPLICABLE OSHA REGULATION PARTS

The following are the major OSHA standards impacted by this work: 29 CFR 1926

- · .21 Safety Training
- .23 First Aid
- .52 Noise Exposure
- · .59 Hazard Communication
- .96 Foot Protection
- .100 Head Protection
- · .101 Hearing Protection
- .102 Eye and Face Protection
- .103 Respiratory Protection
- .351 Arc Welding
- .403 General Electrical
- .404 Wiring
- .500-503 Fall Protection
- .601 Motor Vehicles
- Subpart Z Toxic and Hazardous Substances