PROJECT OPERATIONS PLAN

CONTAMINATION PATHWAYS
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

VOLNEY LANDFILL
SILK ROAD
VOLNEY, NEW YORK

FEBRUARY, 1999

PREPARED FOR:

COUNTY OF OSWEGO
(SUPERVISING CONTRACTOR)

PREPARED BY:

BARTON & LOGUIDICE, P.C.
CONSULTING ENGINEERS
290 ELWOOD DAVIS ROAD
SYRACUSE, NEW YORK 13220

TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION 1

2.0 FORMAT 1

3.0 PURPOSE AND SCOPE 2

4.0 REFERENCES 3

APPENDICES

Section I: Sampling and Analysis Plan

Section II: Quality Assurance Project Plan

Section III: Health and Safety Plan

1.0 INTRODUCTION

Barton & Loguidice, P.C. was retained by Oswego County to prepare this Project Operations Plan (POP) for conducting the Contamination Pathways Remedial Investigation/Feasibility Study (CP RI/FS) at the Volney Landfill located on Silk Road in Volney, New York. The rationale and scope of work for the CP RI/FS are presented in the November1998 Work Plan, which was approved by the United State Environmental Protection Agency (USEPA) Region II on February 1, 1999.

The POP provides detailed descriptions of the methodologies and procedures to be used during the field activities associated with the implementation of the approved CP RI/FS Work Plan. As described in the work plan, the planned field activities include the following: monitoring well installation, water-level measurements, slug tests, and leachate, groundwater, surface water, sediment and soil sampling.

2.0 FORMAT

This document consists of three distinct parts or sections as follows: Section I: Sampling and Analysis Plan (SAP); Section II: Quality Assurance Project Plan (QAPP); and Section III: Health and Safety Plan (HASP). The three sections have been included as one volume. Since each of these sections serve a separate specific function and may be used individually, they each contain their own table of contents, references, and appendices.

The SAP provides detailed descriptions of the methodologies to be used in conducting the CP RI. The QAPP ensures that the precision, accuracy, representativeness, comparability, and completeness (PARCC parameters) of the data collected are known, documented, and adequate to satisfy the data quality objectives (DQOs) of the investigation. The HASP provides assurance that field personnel will conduct their tasks in a manner that will minimize health and safety risks to themselves, the public, and the environment.

3.0 PURPOSE AND SCOPE

3.1 Purpose

The Source Control RI/FS, the Record of Decision (ROD), the Public Decision Document (PDD) and the Explanation of Significant Differences (ESD) identified the need for a second operable unit to determine the nature, extent and consequences of contaminant migration from the landfill. The Supplemental Pre-Remedial Design Study (SPRDS) for the Volney Landfill site evaluated on-site conditions and completed some of the activities originally contemplated for the CP RI/FS, but was not designed to investigate the nature and extent of potential contamination migration away from the landfill and the consequences of such contaminant migration. The CP RI/FS has been designed to provide the necessary data to evaluate the following issues:

- The nature and extent of potential shallow overburden and bedrock groundwater contamination in both horizontal and vertical directions attributable to the landfill.
- The impact of the landfill, if any, on the stream/wetland systems adjacent to and downstream from the landfill.
- Groundwater quality in nearby residential wells.
- Determine the extent to which natural processes are attenuating contamination which has migrated from the site.
- Potential threats to human health or the environment from migration of contamination from the landfill.
- Development of appropriate remedial measures, if any.

3.2 Scope of Work

The first phase of the CP RI/FS is the development of detailed project plans which are contained in this document: the SAP, HASP and the QAPP. The Community Relations Plan (CRP) is the final plan which is designed to actively solicit public participation in the investigative, remedial, and regulatory processes. The USEPA will be responsible for the preparation of the CRP.

After USEPA has approved the detailed plans, RI data collection activities will commence. Data collection activities include the performance of a site reconnaissance, the installation of monitoring wells (overburden and bedrock), the installation of well points in stream beds, water level measurements, groundwater sampling, well point sampling, surface-water and sediment sampling, residential well sampling and aquifer testing. Monitoring wells will be installed in locations to characterize off-site hydrogeologic conditions and to better define on-site conditions. Groundwater and residential well samples will be collected to characterize the nature and extent of potential groundwater contamination. Well point, surface water and sediment samples will be collected to determine the impact, if any, which the site has had on Black and Bell Creeks and their tributaries and associated wetlands. Data from the field programs will be validated according to USEPA methodologies.

4.0 REFERENCES

Geraghty & Miller, Inc. and Barton & Loguidice, P.C. 1992. Proposed Inserts to the Supplemental Pre-Remedial Studies/Remedial Design Work Plan and Additional Comments, Volney Landfill Site, Town of Volney, Oswego County, New York, October 1991.

McLaren/Hart, Inc. and Barton & Loguidice, P.C. 1997. Design Data Evaluation Report, Volney Landfill Site, Town of Volney, Oswego County, New York, August 1997.

URS Company. 1987. Remedial Investigation/Feasibility Study Volney Landfill, Town of Volney, Oswego County, New York, May 1987.

U.S. Environmental Protection Agency (USEPA). 1997. Explanation of Significant Differences for the Volney Landfill Site, USEPA Region II, August, 1997.

U.S. Environmental Protection Agency (USEPA). 1991. Draft Supplemental Pre-Remedial Design Studies/Remedial Design Work Plan, Volney Landfill Site, Town of Volney, Oswego County, New York, October 1991.

U.S. Environmental Protection Agency (USEPA). 1989. Post-Decision Document for the Volney Landfill Site Source Control Operable Unit, USEPA Region II, September 1989.

U.S. Environmental Protection Agency (USEPA). 1987. Record of Decision for the Volney Landfill Site, USEPA Region II, July 27, 1987.

APPENDICES

SECTION I: SAMPLING AND ANALYSIS PLAN

TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION I-1

2.0 FIELD CONTROL PROCEDURES I-2

2.1 Access I-2
2.2 Security I-2
2.3 Clearance I-2
2.4 Field Project Coordination I-3

3.0 MONITORING PARAMETERS & FREQUENCY OF SAMPLE COLLECTION & MONITORING I-3

4.0 STANDARD OPERATING PROCEDURES I-3

5.0 SAMPLE HANDLING AND CUSTODY I-4

6.0 DATA VALIDATION PROCEDURES & RESPONSIBILITIES I-4

7.0 SCHEDULE I-5

8.0 DOCUMENTATION I-5

8.1 Sample Designations I-6
8.2 Data Reduction and Reporting I-6

9.0 FIELD QA/QC AND CORRECTIVE ACTION I-8

9.1 Performance and Systems Audits I-8
9.2 Corrective Action I-8

10.0 DELIVERABLES I-9

11.0 REFERENCES I-9

TABLE OF CONTENTS - Continued

APPENDICES

APPENDIX A - Groundwater Monitoring Well Specifications and Installation Protocols
APPENDIX B - Groundwater Level Measurement Protocols
APPENDIX C - Hydraulic Conductivity Testing Protocols
APPENDIX D - Groundwater and Formation Sampling Protocols
APPENDIX E - Chain-Of-Custody Procedures
APPENDIX F - Field Instrumentation Operating Procedures
APPENDIX G - Barton & Loguidice Forms and Logs

1.0 INTRODUCTION

The Sampling and Analysis Plan (SAP) addresses the field portion of the Contamination Pathways Remedial Investigation (CP RI) data collection activities. The purpose of the SAP is to provide a detailed description of the field program and how it will be organized, managed, and conducted. Standard Operating Protocols and Procedures (SOPs) are provided herein for the various CP RI field tasks. The SAP incorporates currently accepted and standard methodology for state and federal environmental programs. The format and contents of the SAP have been prepared in accordance with the following United States Environmental Protection Agency (USEPA) guidance documents:

- USEPA. December 1987. Compendium of Superfund Field Operations Methods. EPA/P-87/001.
- USEPA. October 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. Interim Final. EPA/540/G-89/004.
- USEPA. February 1991. Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites. EPA/540/P-91/001.
- USEPA. August 1995. Presumptive Remedies: CERCLA Landfill Caps RI/FS Data Collection Guide. EPA/540/F-95/009.

The role of the SAP is such that the CP RI/FS work plan consists of site history and scope of work, and the SAP serves as a supplement for provisions of the detailed SOPs. Information incorporated in the work plan is not repeated in the SAP.

2.0 FIELD CONTROL PROCEDURES

2.1 Access

Field activities are to be performed around the surrounding areas of the landfill. Access to the drilling sites will be controlled by the Barton & Loguidice, P.C. (B&L) field geologist or field engineer, who will oversee the completion of the monitoring well installations. Individuals not involved in the CP RI and not authorized by Barton & Loguidice, Oswego County, or regulatory authorities will be denied access to the drilling and sampling sites. Individuals will be required to log in as described in the Health and Safety Plan (HASP).

2.2 Security

At the completion of each day of drilling, the drilling site will be surrounded by a temporary fence and a caution sign will be posted nearby to warn intruders not to enter the area. Partially completed boreholes will be secured to prevent the introduction of foreign matter into the borehole. Equipment used in monitoring well drilling and installation, and for collection of samples will be secured daily to discourage theft. A protective locking well head assembly (curb box or protective steel casing) will be installed after completion of well installation.

2.3 Clearance

Prior to the start of field operations, B&L will establish drilling locations in the field and ensure that the necessary clearances are obtained. After site selection, it will be the responsibility of the drilling subcontractor to obtain necessary state or local permits for monitoring well drilling. B&L will be responsible for securing a source of potable water and for contacting the appropriate authorities or agencies to locate buried utilities.

2.4 Field Project Coordination

Responsibilities of field personnel are described in Sub-Section 8.0 of this SAP. Field project coordination will be carried out by the project director/officer in charge, project manager, field geologist, and field engineer in consultation with Oswego County, as necessary. The responsibilities of each are fully described in Sub-Section 2.0 of the Quality Assurance Project Plan (QAPP) (Section III).

3.0 MONITORING PARAMETERS & FREQUENCY OF SAMPLE COLLECTION & MONITORING

The proposed analytical program for groundwater is contained on Table 3 of the CP RI/FS work plan. In addition, the proposed analytical protocols for groundwater, surface water, sediment and geologic samples are contained on Table 4 of the CP RI/FS work plan. The rationale for sample collection is described in Section 6.0 of the CP RI/FS work plan.

4.0 STANDARD OPERATING PROCEDURES

The equipment, protocols, and procedures for the CP RI data collection activities are described in detail in the appended SOPs. Equipment decontamination for each applicable procedure is also included.

The following SOPs are included as appendices to the SAP:

SOP Title	SAP Appendix
Groundwater Monitoring Well Specifications and Installation Protocols	A
Groundwater Level Measurement Protocols	B
Hydraulic Conductivity Testing Protocols	C
Groundwater and Formation Sampling Protocols	D
Chain-of-Custody Procedures	E
Field Instrumentation Operating Procedures	F
Barton & Loguidice Forms and Logs	G

5.0 SAMPLE HANDLING AND CUSTODY

Samples will be handled in accordance with the chain-of-custody procedures (Appendix E of this SAP). These procedures include instructions for selecting containers, sample preservation, and sample security from the time of collection to arrival at the laboratory. Analytical parameters for samples are listed in Table 4 of the CP RI/FS work plan. The data usage and requirements, and analytical support levels for each type of sample, are described in detail in Sub-Section 3.3 of the QAPP (Section II).

6.0 DATA VALIDATION PROCEDURES & RESPONSIBILITIES

The data validation procedures consist of a systematic review of the analytical results and quality control (QC) documentation, and will be performed in accordance with the guidelines in "CLP Organics Data Review and Preliminary Review" (USEPA most recent edition) and "Evaluation of Metals Data for the Contract Laboratory Program (CLP)" (USEPA most recent edition).

Based on that review, the data validator will be responsible for making judgements and expressing concerns and comments on the quality and limitations of specific data, as well as on the validity of the overall data package. The data validator will prepare documentation of that review and provide conclusions using the standard USEPA Inorganic and Organic Regional Data Assessment forms to summarize overall deficiencies that require attention. The data validator will also evaluate general laboratory performance. These forms will be accompanied by appropriate supplementary documentation, clearly identifying specific problems.

The data validator will inform the project manager of data quality and limitations, and assist the project manager in interacting with the laboratory to correct data omissions and deficiencies. The laboratory may be required to rerun or resubmit data depending on the extent of the deficiencies and their importance in regard to the data quality objectives (DQOs). A detailed discussion of the data reduction and validation procedures is provided in Sub-Section 8.0 of the QAPP (Section II).

7.0 SCHEDULE

A schedule of tasks and deliverables, including field activities, is presented in the CP RI/FS work plan.

8.0 DOCUMENTATION

Project files containing data and reports generated during the CP RI including laboratory documentation will be maintained according to the procedures outlined in this section. Laboratory documentation (*e.g.*, chromatogram and results of spiked samples) will be maintained for purposes of validating analytical data collected during the CP RI. Summary reports will be kept in the project file. Incoming data will be logged and dated. Information generated from field activities will be documented on appropriate log forms listed below (Appendix G).

- Sample / Core Log.
- Water Sampling Log.
- Chain-of-Custody Record.
- Daily Log.
- Drilling and Installation of Monitoring Wells Daily Checklist.
- Utilities and Structures Checklist.
- Location Sketch.
- Water Level/Pumping Test Record.
- Sample Container Inventory.
- Well Construction Log.
- Sampling of Monitoring Wells Daily Checklist.
- Telephone Conversation Log.

8.1 Sample Designations

This section provides information on the designations for use on the groundwater samples that will be collected for laboratory analysis. Each groundwater sample will be given a unique designation that will be recorded in the field log book, on the water sampling log form, on the label affixed to the sample container, and on the chain-of-custody record. The sample designation will consist of the following three elements:

- The site code.
- The matrix code.
- The location number of the groundwater monitoring well.

Incoming documents will be date-stamped and filed. If distribution is required, the appropriate number of copies will be made and distributed to project personnel. In addition, notes from project meetings and telephone conversations will be filed along with other project documents.

8.2 Data Reduction and Reporting

The reduction of field and analytical data will consist of compiling and summarizing field data (water-level measurements, well logs, field parameters, and laboratory analytical results). Reduction, validation, and reporting of laboratory data are discussed in Sub-Section 8.0 of the QAPP (Section II). These data will be presented as tables, illustrations, and graphs as appropriate. The original data and reduced forms will be maintained until final reports are accepted.

Chemical and physical data will be stored and managed using a data-management computer system. Data entry will be performed by a designated person so that access to the database is limited.

The field measurement data will be similarly reduced into a tabulated format suitable for inclusion in the Contamination Pathways Remedial Investigation (CP RI) report and will be designed to facilitate the comparison and evaluation of the data. These tabulations will include but not be limited to the following:

- Field screening (PID) results.
- Well construction details.
- Water-level measurements and surveyed measuring point elevations.

Field logs will be transferred into typed format or will be presented in their original form for inclusion as CP RI appendices. The following logs will be used:

- Sample/Core Logs.
- Well Construction Logs.
- Water Level/Pumping Test Logs.
- Water Sampling Logs.

The tables will be compiled whenever feasible by the field team member who collected the data. The data compiler will inform the project manager of any problems encountered during data collection and of apparent inconsistencies and will also provide opinion on the data quality and limitations. The tables and logs will be used as the basis for data interpretation and will be checked against the original field documentation prior to use.

9.0 FIELD QA/QC AND CORRECTIVE ACTION

9.1 Performance and Systems Audits

The project quality assurance/quality control (QA/QC) manager will audit field aspects of the implementation of the CP RI on a regular basis. Significant QA/QC deficiencies will be reported and identified, and they will be corrected to the extent practicable. Performance and systems audits relevant to the CP RI as a whole are discussed in detail in Sub-Section 10.0 of the QAPP (Section II). Reviews will also be performed at the completion of each field activity and will include an assessment of field data quality and the results of system and/or performance audits.

9.2 Corrective Action

If the quality control audit results in the identification of unacceptable conditions, the project QA/QC manager and field geologist will be responsible for developing and initiating corrective efforts, in consultation with the project manager and project director. The condition or problem will be specifically identified and investigated, and the cause will be determined. Efforts necessary to eliminate the problem will be initiated. Corrective efforts may include the following:

- Repeating field measurements.
- Reanalyzing the samples if the holding-time criteria and sample volume permits.
- Resampling and reanalyzing.
- Evaluating and amending sampling and analytical procedures.
- Accepting data while acknowledging a level of uncertainty.

Upon completion of the corrective effort, its effectiveness will be evaluated, and the elimination of the condition will be verified.

10.0 DELIVERABLES

The data generated during the CP RI will be provided to the USEPA in data validation reports and also in the Contamination Pathways Remedial Investigation report.

11.0 REFERENCES

U.S. Environmental Protection Agency (USEPA). March 16, 1998. Groundwater Sampling Procedure for Low Stress (Low Flow) Purging and Sampling. Region II.

U.S. Environmental Protection Agency (USEPA). 1995. Presumptive Remedies: CERCLA Landfill Caps RI/FS Data Collection Guide. Office of Emergency and Remedial Response. USEPA, Washington, D.C.

U.S. Environmental Protection Agency (USEPA). 1991. Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites. Office of Emergency and Remedial Response. USEPA, Washington, D.C.

U.S. Environmental Protection Agency (USEPA). 1990a. CLP Organics Data Review and Preliminary Review. SOP No. HW-6, Revision 8.

U.S. Environmental Protection Agency (USEPA). 1990b. Evaluation of Metals Data for the Contract Laboratory Program (CLP), Revision XI.

U.S. Environmental Protection Agency (USEPA). 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Office of Emergency and Remedial Response. USEPA, Washington, D.C.

U.S. Environmental Protection Agency (USEPA). 1988. A Compendium of Superfund Field Operations Methods.

U.S. Environmental Protection Agency (USEPA). 1982. Handbook of Sampling and Sample Preservation of Water and Wastewater.

U.S. Environmental Protection Agency (USEPA). 1981. Manual of Groundwater Sampling Procedures, NWWA/USEPA.

APPENDIX A

GROUNDWATER MONITORING WELL SPECIFICATIONS AND INSTALLATION PROTOCOLS

APPENDIX A
GROUNDWATER MONITORING WELL SPECIFICATIONS AND INSTALLATION PROTOCOLS

DRILLING METHODOLOGY

There are nineteen proposed drilling locations for the CP RI field program; twelve shallow overburden monitoring wells (including five well points), three intermediate overburden monitoring wells, and four deep bedrock monitoring wells. The proposed locations are shown on Figure 3 of the CP RI work plan.

Two drilling methods will be employed during the CP RI field program: (1) the double cased boring method, and (2) the hollow-stem auger method. The double cased boring method will be used for drilling the four bedrock monitoring wells. The shallow and intermediate monitoring wells will be installed by the hollow-stem auger method.

The field geologist will be present at the operating drill rig and will be responsible for the collection and logging of soil samples, monitoring of drilling decontamination operations, recording of groundwater data, deciding on final drilling depths and screen intervals (in consultation with the project manager and the USEPA), preparing the boring logs and well completion diagrams, and recording the well installation procedures. Additionally the field geologist will maintain a log recording daily events, including arrivals and departures at the site by any and all personnel and equipment, and times of work start-up and stoppage. Forms to be used by the geologist as part of the Quality Assurance/Quality Control (QA/QC) measures of the project are included in Appendix G of this SAP.

If problems are encountered or questions arise during the field investigation that are beyond the scope or responsibility of the field geologist, then field activities will be temporarily halted and the project manager and/or the project director will be consulted.

DOUBLE CASED BORING METHOD

This method consists of drilling a 10-inch diameter borehole employing the hollow-stem auger method (described below), to 10 feet below the uppermost water bearing unit. The auger flights are removed and an 8-inch diameter casing is installed to the depth drilled, and grouted in place. Two methodologies are acceptable for advancing the borehole from this point; 1) using 6-inch flush joint spin-casing and a 5-7/8-inch roller bit; or 2) open hole using mud rotary with a 7-7/8-inch roller bit. If the borehole is advanced using the 6-inch spin-casing methodology, it will be necessary to ream the borehole (including the cored bedrock portion) with a 7-7/8-inch roller bit prior to installing the monitoring well. The cuttings are continuously removed from the borehole by pumping water through the drill rods and out the permanent 8-inch steel casing. The water/cuttings slurry is contained at the surface in a baffled mud tub that allows the cuttings to settle out, the water is then re-circulated down the borehole. Since the use of water is necessary for advancing this type of borehole, only water from a potable source will be used. The volume of water that is lost into the formation during the circulation process will be recorded by the field geologist and approximately five times that amount will be purged from the well during well development. For the purposes of lithologic descriptions, formation samples will be obtained at 5-foot intervals in advance of the casing to the completion depth (see Formation Sampling in Appendix D). The borehole will be advanced until bedrock is encountered.

For the purposes of installing the bedrock monitoring wells, the bedrock will be cored in accordance with ASTM standard D2113, utilizing an H-size (5-inch) core barrel. Coring will proceed continuously (in 5-foot increments) until a minimum of five feet of competent rock is encountered. Rock Coring Procedures are described under Formation Sampling in Appendix D. The coring tools will be removed from the bedrock and the hole reamed out using a roller

7-7/8-inch bit to accommodate setting a permanent 6-inch diameter casing into the bedrock. Once the casing has been set into the rock socket, it will be pressure grouted into place. After allowing sufficient time for the grout to set (approximately 72 hours), the bedrock will be cored an additional 15 feet. A 4-inch diameter PVC well will then be installed, screening the lowest 10 feet of cored bedrock. The sand pack will be emplaced two feet above the screen and a 5-foot bentonite seal placed above the sand pack and bridging the bottom of the 6-inch casing, so as to seal off any exposed grout. The remainder of the annulus will be grouted to within five feet of the surface and allowed to set up, after which the well will be finalized with a concrete surface seal and protective casing. Construction details are depicted on Figures 1 and 2, appended to this section.

HOLLOW-STEM AUGER METHOD

The shallow monitoring wells will be installed using the hollow-stem auger method. This method involves rotating a string of auger flights into the subsurface. Soil cuttings are continuously lifted to land surface along the outside of the flights, while drill rods and a plug are used inside the flights to keep the soil out. The plug and rods are removed for soil sampling and well installation inside the flights.

This method does not require the use of water for drilling. Formation samples will be taken continuously to the water table and in five-foot intervals to completion depth. This procedure is described in Appendix D.

MONITORING WELL INSTALLATION

The installation of each monitoring well will begin immediately after borehole completion, or as directed by the field geologist. Once monitoring well installation has begun, breaks will not be taken until the well has been completed and secured against unauthorized access. In cases of unscheduled delays, such as personal injury, equipment breakdowns, or sudden inclement weather, installation will be resumed as soon as practical.

Monitoring wells will be constructed of new four-inch diameter schedule 40 PVC casing and 4-inch diameter schedule 40 PVC screen (0.010 inch slot size). Fittings (couplings) will not restrict the inside well diameter as joints will be internally threaded. Glues, solvents, or chemical cleaners will not be used to join the casing and screen lengths. The lengths of casing and screen will be measured and recorded by the field geologist.

A monitoring well construction diagram will be prepared by the field geologist for each well and will show the following information

- The total drilled depth of the borehole.
- The borehole and well casing diameters.
- The casing and screen composition.
- The screen setting.
- The gravel pack interval.
- The bentonite seal interval.
- The grout interval.
- The height of the well casing (without cap/plug) above ground surface.
- The protective casing.

Each well construction diagram will be included as part of the QA/QC procedures. Monitoring well depths and screen zones will be determined based on lithologic profile determined from formation sampling.

GRAVEL PACK

A gravel pack consisting of clean silica sand will be installed in the borehole annulus around the screen. During emplacement of the gravel pack, a weighted steel tape will be placed down the annulus periodically to measure its depth to ensure that the gravel is not bridging and that it is at least two feet above the top of the screen. The gravel pack material will be examined to confirm its identification. The average particle size of the gravel pack material must be demonstrated to be appropriate for the slot size of the selected well screen material. Part 360 identifies a minimum 6-inch layer of fine sand above the gravel pack and the bentonite seal. This layer provides a protective buffer between these two materials and may be appropriate here since Part 360 is still an ARAR.

BENTONITE SEAL

A five-foot thick bentonite seal (pellets or slurry), will be emplaced above the gravel pack. The thickness of the seal will be verified by measuring the depth to the top of the gravel pack before the seal is emplaced and measuring the depth of the top of the seal after it is emplaced.

CEMENT/BENTONITE GROUT

The remaining annular space will be pressure-grouted to within approximately five feet of land surface using a mixture of cement/bentonite grout. The grout mixture will be proportioned in the following manner: approximately 3 to 5 pounds of bentonite (powder) and 94 pounds of cement mixed with about 8-gallons of water.

WELL COMPLETION

The wells will be completed with an aboveground, locking steel protective casing or a locking flush-mounted curb box that will be set over each well head to protect against vandalism. The protective casing will be set within a concrete surface seal, sloped away from the casing. The number for each well will be clearly marked on the protective casing or curb box.

The elevation of the top of the PVC well casing and the ground surface elevation at the well will be surveyed by a professional surveyor, licensed in New York State, to the nearest 0.01 foot and will serve as the measuring point for groundwater level measurements. The measuring point will be clearly indicated on the well casing for easy identification.

MONITORING WELL DEVELOPMENT

Well development will be accomplished using compressed air, a submersible pump, and/or surge block or any combination of these techniques. Well development will not be attempted until at least 24 hours after installation. Development will continue until the well responds to water-level changes in the formation, and the well produces clear, sediment-free water to the extent possible. The wells will be developed with a goal of producing water of a turbidity of 50 nephelometric units (NTUs) or less. However, in some instances, water may have noticeably high-turbidity levels due to a relatively high percentage of finer grained deposits indigenous to the screened formations. A portable nephelometer will be used in the field to measure turbidity levels.

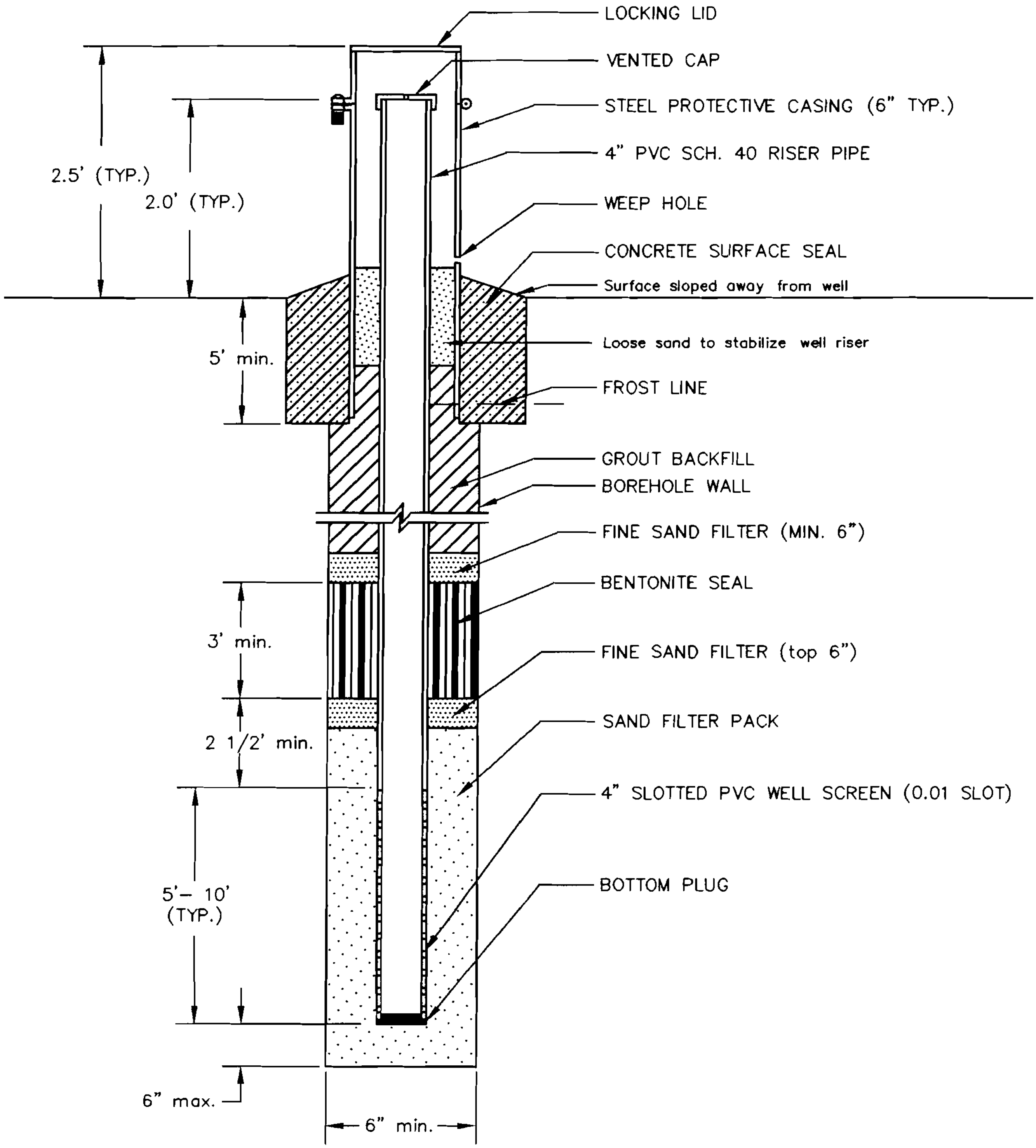
Dispersing agents, acids, disinfectants, or other additives will not be used during development nor will they be introduced into the well at any other time. During development, water will be removed from the entire column of water standing in the well by periodically lowering and raising the pump intake.

A record of well development will be maintained along with the other pertinent well data as part of the QA/QC procedures. The following data will be recorded as part of development and QA/QC procedures:

- The static water level measured from the top of the well casing before, during and after, development is completed.
- The calculated quantity of fluid standing in the well prior to development.
- The sounded depth of the well before and after development to determine if silt has accumulated inside the well.
- The physical character of water removed including changes during development such as water clarity, color, particulates, and odor.
- The pH and specific conductance of the discharge during development of the well.
- The type and size/capacity of pump used.
- The surging technique(s) used.
- The quantity of fluid/water removed and the time for removal (both incremental and total values).

DECONTAMINATION

The drilling casings, rods, split-spoon samplers, tools, water tanks, drilling rig, and any piece of equipment that can come in contact (directly or indirectly) with the formation will be steam cleaned prior to being set up for drilling. The same steam-cleaning protocol will be followed between boreholes (at a fixed site location) and before leaving the site at the end of the project. The steam-cleaning activities will be conducted within a designated area on site and monitored by the field geologist.



NOT TO SCALE

Barton & Loguidice, P.C.
Consulting Engineers
290 Elwood Davis Road / Box 3107, Syracuse, New York 13220

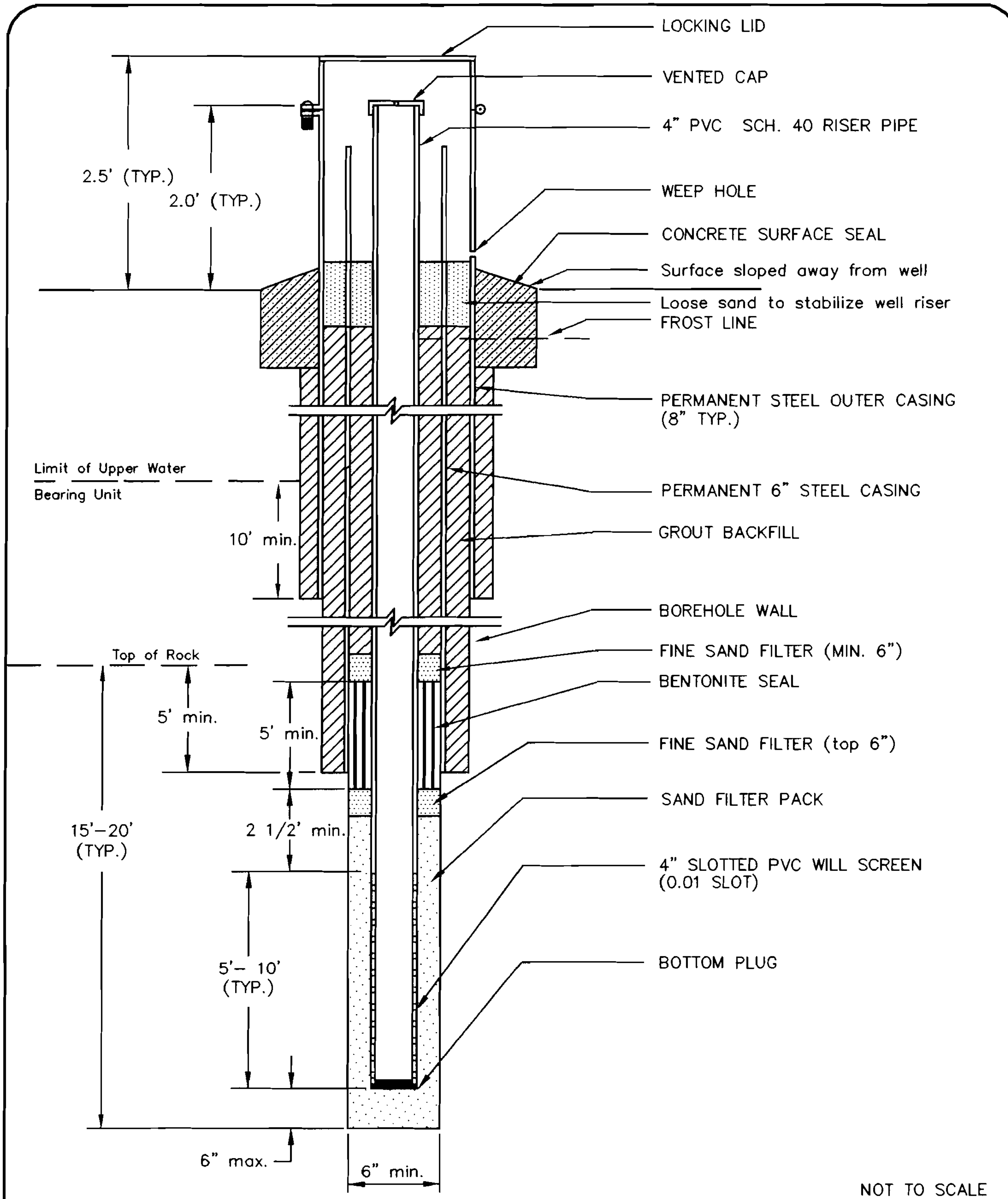
VOLNEY LANDFILL
CONTAMINATION PATHWAYS RI/FS

TYPICAL OVERBURDEN MONITORING WELL CONSTRUCTION DETAIL

TOWN OF VOLNEY OSWEGO COUNTY

Figure 1

Project No. 132.164



NOT TO SCALE

Barton & Loguidice, P.C.
Consulting Engineers
290 Elwood Davis Road / Box 3107, Syracuse, New York 13220

VOLNEY LANDFILL
CONTAMINATION PATHWAYS RI/FS

TYPICAL SHALLOW BEDROCK MONITORING WELL CONSTRUCTION DETAIL

TOWN OF VOLNEY OSWEGO COUNTY

Figure 2

Project No. 132.164

APPENDIX B

GROUNDWATER LEVEL MEASUREMENT PROTOCOLS

APPENDIX B

GROUNDWATER LEVEL MEASUREMENT PROTOCOLS

Depth to groundwater in the monitoring wells will be measured as part of the field program. These data will be converted to water-level elevations using surveyed vertical measuring points on individual well casings.

An electronic measuring tape (m-scope) graduated in tenths of a foot will be the primary instrument of measuring the depth to groundwater. Prior to insertion, the measuring tape will be rinsed with a laboratory-grade detergent solution (MicroÔ or equivalent), rinsed with distilled water and dried with a clean cloth. The tape will be lowered slowly down the center of the casing. After the electronic buzzer sounds and the light illuminates, signifying that water has been encountered in the well, the tape will be held at the pre-marked surveyed point at the top of the well. The measurement (depth to water) will be recorded on a B&L Water-Level/Pumping Record form (Appendix G). The tape will then be removed from the well and cleaned in the same manner as before insertion into the well.

APPENDIX C

HYDRAULIC CONDUCTIVITY TESTING PROTOCOLS

APPENDIX C

HYDRAULIC CONDUCTIVITY TESTING PROTOCOLS

IN-SITU HYDRAULIC CONDUCTIVITY TESTING

In-situ variable head hydraulic conductivity testing will be performed within each of the newly-installed monitoring wells following development. Also known as a slug or bail test, this method involves either the removal of a bail of water or the displacement of water within the well by the insertion of a slug. Upon creating an elevated or depressed hydraulic head, the water level in the well is measured and recorded periodically over the recovery time.

The underlying assumption in the analyses of these tests is that the rate of inflow to the well, after inducing a change in hydraulic head, is a function of the hydraulic conductivity (k) and the unrecovered head distance. The analytical method, typically relying on graphical solution techniques (time vs. head or head ratio), rearranges the flow equation to solve for parameter k. For unconfined groundwater flow conditions, the Hvorslev and Bouwer-Rice methods will be used. Details of these methods are given, respectively, in publications by Hvorslev (1951) and Cedergren (1977), and by Bouwer-Rice (1976) and Bouwer (1989). For confined groundwater flow conditions, if encountered, the Cooper-Bredehoeft-Papadopulous method will be used (Cooper et al. (1967); Papadopulous et al (1973)).

It is important to observe whether the static water level recorded prior to starting the varaible head test occurs within the screened interval of the monitoring well; if so, the use of the slug test (falling head) is inappropriate due to drainage into the vadose zone above the water table. A bail test (rising head) will be performed in this circumstance.

Depending upon the rate of recovery, water levels will be measured during the test with either an electronic probe, a tape equipped with a sounding "popper", or an immersed pressure transducer connected to an automatic data logger (e.g. HERMIT, Troll (In-Situ, Inc.) or equivalent). The latter device is appropriate for rapid recovery conditions.

APPENDIX D

GROUNDWATER AND FORMATION SAMPLING PROTOCOLS

APPENDIX D

GROUNDWATER AND FORMATION SAMPLING PROTOCOLS

INTRODUCTION

The collection, handling, and analysis of groundwater samples will be performed according to the protocols set forth in this appendix to ensure quality assurance/quality control (QA/QC). Quality control includes proper sampling procedures for well purging prior to sampling, sample-removal methods that utilize acceptable materials for all equipment and supplies, sample processing (including filtration, preservation, labeling, and bottle filling), and sample shipment. Sample collection will be performed by staff from the Oswego County Department of Health with field support by B&L. The B&L project manager will work in conjunction with the Oswego County Department of Health and with the analytical laboratory to assure that samples reach the laboratory in proper condition. Water-quality data will be scrutinized according to B&L's QA/QC protocols for data validation as discussed in the Quality Assurance Project Plan (QAPP in Section II).

Groundwater sampling will be conducted using a "low flow" (or low stress) technique. This method will be consistent with USEPA Region II procedures.

Pertinent information regarding groundwater sampling procedures will be recorded in the B&L daily log book and water sampling log forms (see Appendix G of this SAP).

PREPARATION OF SAMPLING EQUIPMENT

The sampling equipment (e.g., submersible pumps, M-scopes, buckets, filtration equipment for metals) will be thoroughly cleaned before each use. Any supplies, such as tubing, that cannot be properly cleaned after each use will be discarded in an appropriate manner. Specific conductance and pH meters will be calibrated according to manufacturer's instructions.

SAMPLING EQUIPMENT

The equipment and materials that will be needed for the collection of ground-water samples are listed below:

- Electric water-level probe (M-Scope)
- Clean rags
- Distilled or deionized water
- Plastic sheeting
- Bladder sampling pump (PVC or equivalent)
- Polypropylene rope
- Micro laboratory detergent (or equivalent)
- Sample bottles*
- Buckets (graduated)
- Gloves (Latex, Nitrile, or equivalent)
- pH meter and buffers (with millivolt scale)
- Redox probe and standards
- Dissolved oxygen meter
- Specific conductance meter and standard
- Turbidity meter
- Compressor and power source
- Thermometers
- Indelible marking pens
- Brushes
- Measuring tape
- Polyethylene tubing
- Beakers
- Flow-thru cell
- Clear tape

* Sample bottles will be obtained from the laboratory; they will be cleaned and quality controlled according to OSWER Directive #9240.0-5 titled "Specifications and Guidance for Obtaining Contaminant-Free Sample Containers."

PREPARATION OF WELL FOR SAMPLING

Opening the Well

Upon arrival at the well site, sampling personnel will record the well designations, inspect the well head for damage, wipe the top of the well clean, and then remove the cap and wipe the top of the well casing with clean paper towels. This information will be recorded on the daily log. Plastic sheeting will be placed around the well so sampling equipment will be protected from potential contamination on the ground surface.

Sounding the Well

The total depth of each well will be measured (sounded) to an accuracy of 0.1 feet using a weighted steel or plastic tape prior to sampling. This information together with the depth to water allows the sampling team to calculate the volume of water in the well and to determine if formation material has accumulated at the bottom of the well.

Measuring the Height of the Measuring Point

The height of the measuring point above or below ground surface will be measured to an accuracy of 0.01 feet as an indication of whether the well may have been disturbed since installation.

Measuring The Water Level

A full round of water levels will be collected prior to sampling the first well. The date and time of each measurement will be recorded. Each measurement will be made to an accuracy of 0.01 feet. Care will be taken to avoid cross contamination of wells by thoroughly cleaning the measuring instrument (M-scope or measuring tape) between wells.

Purging the Well

Assemble the pump and power source, attaching fresh discharge tubing to the pump. Slowly lower the pump, supply/discharge tubing and support rope into the well. The pump should be set near the midpoint of the well screen (at least 2 feet off the bottom of the well).

Calibrate field instruments according to manufacturer's instructions and insert probes into the flow-thru cell. Cut tubing to length and connect to the flow-thru cell. Begin pumping at a rate of 200-500 ml/min, measuring the water level in the well about every 5 minutes. Adjust pumping rate if necessary to try to achieve a relatively static water level with minimal drawdown.

Collect measurements from the field instruments on about 5 minute intervals. Ideally, three consecutive stabilized field parameter readings will be the basis for sample collection, with stabilization being defined as follows:

- +/- 0.1 for pH
- +/- 3% for specific conductance
- +/- 10 mV for redox potential
- +/- 10% for turbidity and dissolved oxygen

Field parameters may not completely stabilize, and it may also not be possible to achieve a relatively static water level in the well during pumping. Judgement may have to be used in the field to determine when to collect samples. Options would include 1) stopping pumpage and allowing the well to recover prior to sampling and 2) collecting samples despite readings which have not fully stabilized. Probably the most important parameter in making this decision is turbidity, as it has a significant effect on metals analysis. If turbidity has remained under 100

NTU (and preferably under 50 NTU), sampling can proceed. If turbidity has been consistently elevated over 100 NTU, the well should be allowed to recover (possibly overnight) before sample collection.

Collection of Ground-water Samples

After the well has been purged, disconnect the flow-thru cell and adjust the flow rate to 100-200 ml/min. Ground-water samples will be collected by directly filling each sample container from the pump discharge. The VOC vials should be filled first, and care taken not to rinse preservatives out of the sample containers. New disposable gloves will be worn by sampling personnel for each well sampled. The sample containers will be inspected to ensure that they are the correct type and number for the respective analytical parameters and have the correct preservative, if required. The labels will then be properly filled out and affixed to the containers and protected by clear tape affixed to the containers. Care will also be exercised to avoid breakage and to eliminate the entry or contact of, any substance with the interior surface of the bottles, vials, or caps, other than the water sample being collected. Caps will not be removed until sampling begins and then they will be replaced as soon as the container has been filled. The sample containers will be kept cool, dust-free, and out of the sun. The procedures that the sampling team will follow to collect water samples are described below in the order in which they will be performed:

1. Complete labels on all containers and protect labels by wrapping them to each container with clear tape. Information that will be provided on labels include the following: project name, well numbers, sampling date, etc.

2. Fill the 40 milliliter (ml) vials for volatile organic analysis first in such a manner as to ensure that there are no air bubbles. Prior to VOC sample collection, acidification of the VOC samples will be performed according to the following procedure:

- The pH of the sample will be adjusted to less than 2 by carefully adding 1:1 HCl drop by drop to the two 40 ml vials. The number of drops of 1:1 HCl required should be determined on a third portion of water sample of equal volume. If acidification causes effervescence, the sample will be submitted without preservation, except for cooling to 4°C, but the holding time will be reduced to 7 days.

3. Fill the remaining sample containers in the order of the parameter's volatilization sensitivity. The preferred order of sample collection is as follows: volatile organics, extractable organics, total metals, dissolved metals, TOC, phenols, cyanide, nitrate, ammonia, and the remaining fractions.

4. Replace the well cap and lock the well.

5. Pack the samples on ice in a cooler with the completed chain-of-custody record form. Samples will be delivered or shipped to the laboratory within 24 hours after sample collection and the receiver's signature will be obtained on the chain-of-custody record form.

6. Discard the disposable sampling equipment such as used cord, gloves, and plastic sheeting.

QUALITY CONTROL

Quality-control (QC) samples will be used to monitor sampling and laboratory performance. The types of QC samples that will be included in this investigation are replicates and blanks. To ensure unbiased handling and analysis by the laboratory, the identity of replicates will be disguised by means of coding so that the laboratory does not know which samples are used for this purpose. Detailed QC procedures are outlined in the QAPP (Section II).

Replicate Analyses

Replicate samples are samples collected from the same well and are identical within the limits of normal concentration fluctuations. Collection and analysis of such samples allow a check to be made on sampling precision. Five percent of all ground-water samples collected at this site will be replicated.

When collecting replicate samples for VOC analysis, each of the two sample vials for the sample and replicate will alternately be filled. For other analytes, the collected water will be distributed to fill portions of each sample container until the containers are filled. Sampling for replicates is discussed in more detail in the QAPP.

Blanks

The analysis of trip blanks will be incorporated into this field investigation. Trip blanks will be prepared fresh daily and will be composed of demonstrated analyte-free deionized water acidified to a pH of less than 2 with 1:1 HCl. It is analyzed to determine whether samples may have been contaminated by VOCs as a result of handling in the field, during shipment, or in the laboratory. One trip blank will accompany each day's shipment of water samples to the laboratory for VOC analysis. A field blank for all analytes will also be prepared using demonstrated analyte-free water to determine if the decontamination procedure was adequately performed and that cross contamination of samples is not occurring. Field blanks will be collected at the rate of one per equipment type per decontamination event, not to exceed one per day. Blank analyses are discussed in more detail in the QAPP.

Demonstrated analyte-free water is defined as water of a known quality meeting the following criteria: the assigned values for the Contract Required Detection Limits (CRDLs) and Contract Required Quantitation Limits (CRQLs) can be found in the most recent CLP SOWs. These criteria apply to all blank water, whether or not EPA CLP analytical methods are employed (volatile organics - less than 10 ug/L, semivolatile organics - less than CRQL, pesticides - less than CRQL, PCBs - less than CRQL, inorganics - less than CRQL). However, specifically for the common laboratory contaminants (methylene chloride, acetone, toluene, 2-butanone, and phthalates) the allowable limits are three times the respective CRQLs. The analytical testing required for the water to be demonstrated as analyte-free will be performed prior to the start of sample collection, and the results will be kept on file at the site for EPA auditing purposes.

RECORD KEEPING

Personnel involved in sample collection will carefully document the handling history of ground-water samples and blanks collected.

Daily Log

Daily logs will be used by the field team for QA/QC purposes to record all sampling events and field observations. Entries in the daily log forms will be dated by the person making the entry, and the logs will be kept in a secure, dry place. The following information will be included on each daily log form:

1. Project name.
2. Date and time of arrival at site.
3. Client.
4. Location.
5. Weather.
6. Sampling team members.
7. Work progress.
8. QC samples.
9. Departure time.

10. Delays.
11. Unusual situations.
12. Well damage.
13. Departure from established QA/QC field procedures.
14. Instrument problems.
15. Accidents.

Water Sampling Log

The sampling team will complete a water sampling log form for QA/QC purposes at the time of sampling to record information about each sample collected. The following information will be included on each Water Sampling Log form:

1. Date and time of sampling.
2. Well evacuation data.
3. Physical appearance of samples (e.g., color and turbidity).
4. Field observations.
5. Results of field analyses.
6. Sampling method and material.
7. Constituents sampled for.
8. Sample container size, composition, and color.
9. Preservative.
10. Sampling personnel.
11. Weather conditions.

Sample Labels and Chain-of-custody Record Form

Sample labels are necessary for proper sample identification. The labels will be affixed to the sample containers prior to the time of sampling: Labels will not be affixed to container lids or caps. To track QA/QC handling protocols the labels will be filled out by sampling personnel, and the chain-of-custody record form will be completed in the field before the sampling team leaves the site. Labels will include sample identification, project number, date and time collected, analyses to be performed, and pH adjustment information as required.

The sampling team will be responsible for maintaining custody of the samples until they are delivered to the carrier or the laboratory. The chain-of-custody record form will then be signed and custody formally relinquished. The containers (bearing custody seals) will be in view at all times or will be stored in a secure place restricted to authorized personnel.

EQUIPMENT DECONTAMINATION

Before sampling begins, between each well sampled, and prior to leaving the site, equipment such as submersible pumps, bailers, filtration apparatus (flasks, funnels, and beakers) and buckets will be decontaminated. Disposable equipment will be discarded in an appropriate manner. Submersible pumps will first be disassembled and rinsed/scrubbed. The pump will then be re-assembled and submersed in several gallons of a detergent solution and then operated for several minutes. The pump will then be submersed in several gallons of de-ionized/distilled water and then operated for several minutes. The pump will then be wrapped in clean plastic sheeting for transport.

FORMATION SAMPLING PROTOCOLS

Formation samples will be collected from the borings at each of the drilling sites. Samples will be obtained in intervals of five feet to the completion depth in accordance with the Standard Penetration Test (ASTM-D1586). Samples are collected by advancing the split-spoon ahead of the drill bit into the undisturbed formation at the desired depth. Before and after each use, the split-spoons will be decontaminated by scrubbing with MicroÔ solution and rinsing with distilled water. Split-spoon samples and soil cuttings of the well will be monitored with a photo ionization detector/flame ionization detector.

Auger cutting descriptions, water-level readings, air monitoring readings, and other pertinent observations will be logged by the field geologist. Split-spoon samples of unconsolidated sediment will be collected and visually identified by the field geologist using the Unified Soil Classification System. Standard identification practices detailed in ASTM D-2488 will be followed. The following information will be recorded by the field geologist, at a minimum:

- Sediment sample interval
- Sampling hammer weight and distance of fall
- Blow count (per 6-inch interval)
- Amount of sample recovered
- Sample color
- Sample texture
- Sample moisture content (dry, moist, wet)
- Organic vapor readings
- Any unusual characteristics
- Depth to water
- Drill rig behavior and penetration rate

Pertinent information regarding formation samples will be recorded on the B&L Sample/Core Log and transferred into the Daily Log Book (see Appendix G of this SAP).

Representative sediment samples from each sampled interval will be placed in glass jars with screw-type lids for future reference. Each sample container will be labeled with the site name and the boring and sample number. No geotechnical data will be written on the container that is not specified in the boring log. Jars will be stored in cardboard boxes for future reference.

In addition, samples will be collected for laboratory geotechnical analysis from the soil borings and from the unconsolidated monitoring well boreholes. At locations where monitoring wells will be installed, one sample from the midpoint of the screened interval will be collected and analyzed for grain size distribution, permeability, and Atterberg limits.

Rock coring will be performed at each of the bedrock monitoring well locations. Rock coring will be performed in accordance with ASTM D-2113 (Standard Practice for Diamond Core Drilling for Site Investigations).

Core drilling will be performed in 5-foot intervals utilizing diamond core drill bits. Potable water will be used as the drilling fluid for all coring. Water is necessary to remove cuttings and acts as a lubricant for the drill bit. Immediately after the barrel is retrieved and while the core is still intact inside the barrel, percent recovery will be recorded.

The core will be removed from the barrel and placed in wooden storage boxes that are specifically designed to contain rock cores. At a minimum, the following information will be recorded by the field geologist:

- Boring or well number
- Core interval
- Percent recovery

- Rock color (utilizing Munsell System)
- Sample texture
- Organic vapor readings
- Any unusual characteristics
- RQD (Rock Quality Design Index)
- Fracture occurrence and angles
- Penetration rate during drilling
- Fluid lost during drilling

RECORD KEEPING

B&L personnel involved in sample collection will carefully document the handling history of all groundwater samples and blanks collected. Standard B&L forms (see Appendix G in this SAP) will be completed for this purpose as described below.

Daily Log

Daily log books will be used by the field team for QA/QC purposes to record all sampling events and field observations. Entries in the daily log forms will be dated by the person making the entry, and the logs will be kept in a secure, dry place. The following information will be included on each daily log form:

1. Project name.
2. Date and time of arrival at site.
3. Client.
4. Location.
5. Weather.
6. Sampling team members.
7. Work progress.

Sample Labels and Chain-of-custody Record Form

Sample labels are necessary for proper sample identification. The labels will be affixed to the sample containers prior to the time of sampling: Labels will not be affixed to container lids or caps. To track QA/QC handling protocols the labels will be filled out by sampling personnel, and the chain-of-custody form (or laboratory supplied chain-of-custody form, see Appendix G of this SAP) will be completed in the field before the sampling team leaves the site. Labels will include sample identification, project number, date and time collected, analyses to be performed, and pH adjustment information as required.

The sampling team will be responsible for maintaining custody of the samples until they are delivered to the carrier or the laboratory. The chain-of-custody record form will then be signed and custody formally relinquished. The containers (bearing custody seals) will be in view at all times or will be stored in a secure place restricted to authorized personnel. Chain-of-custody procedures are discussed in more detail in Appendix E of this SAP.

Equipment Decontamination

Before sampling begins, between each well sampled, and prior to leaving the site, equipment such as bailers, filtration apparatus (flasks, funnels, and beakers) and buckets will be decontaminated. Disposable equipment will be discarded in an appropriate manner. Sampling equipment will be decontaminated by scrubbing with a Micro detergent solution (about two percent) followed by rinsing with distilled or deionized water. After the equipment is decontaminated, it will be stored by wrapping it in plastic, if it is not used immediately.

APPENDIX E

CHAIN-OF-CUSTODY PROCEDURES

APPENDIX E

CHAIN-OF-CUSTODY PROCEDURES

The chain-of-custody procedure for the collection of samples that will be sent to the laboratory for analysis is given below:

1. The field geologist or sampling team will maintain custody of any samples that are collected until they are delivered to the overnight common carrier or courier for shipment to the laboratory. Samples shipped to a laboratory will be accompanied by the chain-of-custody record form (duplicate) will be completed in the field; the original form will accompany the shipment, and the other copy will be retained by the field geologist for the project file. The chain-of-custody record form will list each of the individual sample containers from each well sampled and will be signed by each of the sampling team members who participated in the sampling program.

2. A separate chain-of-custody record form will be filled out for the contents of each shipment container (cooler). The form will be placed in a plastic bag and taped to the underside of the lid of the cooler.

3. To provide a means of detecting any potential tampering during shipment, all shipment containers (coolers) will have a signed B&L or laboratory-supplied seal placed across the outside of the cooler where the lid and cooler join. In addition, a 2-inch wide transparent tape will be wrapped entirely around the cooler securing the lid firmly to the cooler.

4. Receipts from couriers, air bills, and bills of lading will be retained in the field project file.

APPENDIX F

FIELD INSTRUMENTATION OPERATING PROCEDURES

APPENDIX F

FIELD INSTRUMENTATION OPERATING PROCEDURES

Field instruments used during the investigation will be calibrated and operated in accordance
with the following standard operating procedures and with the manufacturers' instructions.

<u>AIR MONITORING EQUIPMENT</u>

<u>Photoionization Detector</u> - A photo ionization detector (PID) will be used for monitoring VOCs in the breathing zone during the CP RI (see HASP). The PID will be calibrated prior to use on a daily basis. First the PID will be zeroed using background ambient air followed by a mixture of 100 parts per million (ppm) isobutylene and air. The calibration will be checked using a 50 ppb isobutylene in air.

<u>Combustible Gas Indicator</u> - A ***GasTechÔ Model 4320*** meter (or equivalent) will be used to measure the Lower Explosive Limit (LEL) of explosive gases during the CP RI. This instrument is calibrated by the manufacturers, and therefore, requires no field calibration.

<u>Flame Ionization Detector</u> - A ***Century Systems Model 88*** organic vapor analyzer (OVA) (or equivalent) flame-ionization detector (FID) may also be used during the CP RI, if necessary, to monitor for methane and total volatile organic compounds (VOCs). The OVA will be calibrated prior to use on a daily basis using zero air and a mixture of 100 parts per million (ppm) methane and air. The calibration procedure is detailed in the manufacturer's instructions.

FIELD ANALYSIS INSTRUMENTS

Field analysis of water samples will consist of measurements of pH, temperature, specific conductance and oxidation - reduction potential. A description of the equipment that will be used and the calibration procedure for each is provided below:

Temperature: This field parameter will be measured using a multi-parameter water-quality meter with a temperature measuring range of -15°C to 105°C. The probe will be placed into a flow-through cell, allowing the formation water to flow freely over the probe for the most accurate reading.

pH: This field parameter will be measured using a multi-parameter water-quality meter, or equivalent. Two buffer standards that bracket the anticipated pH of samples (nominal pH values of 4 and 7 or 7 and 11) will be used to calibrate the instrument, prior to analysis of each sample. The probe will be placed into a flow-through cell, allowing the formation water to flow freely over the probe for the most accurate reading. Calibration data will be recorded.

Specific conductance: This field parameter will be measured using a multi-parameter water-quality meter, or equivalent. Calibration will be made using a 2000 umhos standard solution. Calibration of the meter will be adjusted to temperature. The meter will be calibrated daily when in use. To measure this parameter, the probe will be placed into a flow-through cell, allowing the formation water to flow freely over the probe for the most accurate reading. All calibration data will be recorded.

Oxidation-Reduction Potential (Eh): The Eh is determined with a glass ORP electrode compared against a reference electrode by means of a pH/ORP meter set to read in millivolts (mV). Because Eh can change rapidly upon exposure to the atmosphere, measurements must be made quickly but carefully. At the beginning of the day the pH/ORP meter will be checked against a solution of known Eh and the necessary adjustments made.

Before any measurement is made, the probe will be completely rinsed with deionized or distilled water. Then the probe will be placed into a flow-through cell allowing the formation water to flow freely over the probe. An Eh reading will be taken after stabilization. Between measurements, the probe will be immersed in deionized water. The pH/ORP meter will be checked against a reference frequently during the sampling round to ensure accurate and precise measurements.

Dissolved Oxygen (DO): The DO is determined with a membrane electrode by means of an oxygen meter. At the beginning of the day, the DO meter will be calibrated as per the manufacturer's instructions.

Before any measurement is made, the probe will be completely rinsed with deionized or distilled water. Then the probe will be placed into a flow-through cell allowing the formation water to flow freely over the probe. A DO reading will be taken as soon as the reading on the meter equilibrates. Between measurements, the probe will be immersed in deionized water. The DO meter will be recalibrated frequently during the sampling round to ensure accurate and precise measurements.

APPENDIX G

BARTON & LOGUIDICE FORMS AND LOGS

Barton & Loguidice, P.C.
Consulting Engineers

PROJECT NO: ________
Date: ________

DAILY ACTIVITY RECORD SUBSURFACE INVESTIGATION

PROJECT: ______________________ BORING NO: ______________
CONTRACTOR: ______________________ WEATHER: ______________
RIG TYPE: ______________________ DRILLER: ______________

QUANTITIES LOG				
ITEM	ITEM SIZE	From (ft)	To (ft)	QUANTITY
Augers	3¼" ☐ 4¼" ☐ 6¼" ☐ 8¼" ☐ Other____			
Casing	3" ☐ 4" ☐ 5" ☐ 6" ☐ Other____			
Open Hole	$2\frac{5}{8}$" ☐ $3\frac{7}{8}$" ☐ $5\frac{7}{8}$" ☐ $7\frac{7}{8}$" ☐ Other____			
Rock core	AX ☐ BX ☐ NX ☐ HX ☐ Other____			
Reaming	$2\frac{5}{8}$" ☐ $3\frac{7}{8}$" ☐ $5\frac{7}{8}$" ☐ $7\frac{7}{8}$" ☐ Other____			
Cuttings Return	Air ☐ Water ☐ Mud ☐ Other________			
Split Spoon Samples	2"x18" ☐ 2"x24" ☐ 3"x24" ☐ Other________			
Well Screen	1¼" ☐ 2" ☐ 4" ☐ .01slot ☐ .02 slot ☐ Other____			
Well Riser	1¼" ☐ 2" ☐ 4" ☐ Other____________			
Guard Pipe	Length________ Diameter____________			
Other________	________________			
Other________	________________			

TIME LOG																	
ACTIVITY	6 am	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9 pm	REMARKS
Advancement																	
(open hole,																	
augers, casing, etc)																	
Decontamination																	
Hole-To-Hole Access																	
Well Installation																	
Well Development																	
Water Run																	
Set Up / Shut Down																	
Standby																	
Lunch Break																	Daily Items: (water truck, generator, etc.)
Other________																	
Other________																	

B&L Form No. 141 (rev. 2/99)

B&L Rep. Total Hours: ________ Signed: ______________________

Contractor Rep. Total Hours: ________ Signed: ______________________

Barton & Loguidice, P.C.
Consulting Engineers

PROJECT NO: __________
Date: __________

UTILITIES & STRUCTURES CHECKLIST

PROJECT: ______________________________ PREPARED BY: ____________________
LOCATION: ____

Instructions: This checklist is to be prepared by a B&L staff member as a safety measure to insure that all underground utility lines, other underground structures as well as above-ground power lines are clearly marked out in the area selected for boring or excavation. **DRILLING OR EXCAVATION WORK MAY NOT PROCEED UNTIL LINES ARE MARKED AND THIS CHECKLIST HAS BEEN COMPLETED.** Arrangements for underground utility markouts are best made at the time of the preliminary site visit to allow client and/or utility company sufficient time. Keep completed checklist and maps on-site: send copy to Project Manager.

Drilling or Excavation Sites: Attach a map of the property showing the proposed drilling or excavation site(s) clearly indicating the area(s) checked for underground utilities or underground structures and the location of above-ground power lines.

Utilities & Structures

Type	Not Present	Present	How Marked[1]
Petroleum products line			
Natural gas line			
Steam line			
Water line			
Sewer line			
Storm drain			
Telephone cable			
Electric power line			
Product tank			
Septic tank/drain field			
Overhead power line			

1) Flags, paint on pavement, wooden stakes, etc.

Name and affiliation of person who marked out underground lines or structures

______________________ ______________________ ______________________
NAME *ORGANIZATION* *PHONE #*

Emergency Procedures

Persons at site or facility to contact in case of emergency
1. ______________________________ Phone: ____________
2. ______________________________ Phone: ____________

Fire Dept.- Phone: ______________ Ambulance - Phone: ______________
Utility - Phone: ______________ Utility - Phone: ______________
Utility - Phone: ______________ Utility - Phone: ______________

Directions to nearest hospital (describe or attach map)

Barton & Loguidice, P.C.
Consulting Engineers

PROJECT NO: ____________
Date: ____________

LOCATION SKETCH

Well(s) ______________ Project ____ Page ____ of _____
Site Location ____
Prepared By ____

(Locate all wells, borings, etc. with reference to three permanent reference points; tape all distances; clearly label all wells, roads and permanent features)

N

0 ft. ft.

scale

Barton & Loguidice, P.C.
Consulting Engineers

PROJECT NO: ________
Date: ________

DRILLING & MONITORING WELL INSTALLATION DAILY CHECKLIST

PROJECT: ____________________ WELLS/BORINGS ____________
LOCATION: ____________________ WEATHER: ____________
B&L SITE REP: ____________________ TIME: ____________

ITEMS	OK/NA	COMMENTS
PRIOR TO DRILLING: Contractor has checked for underground utilities		
Well locations staked		
Well drilling permits secured		
B&L Work Plan/SAP available		
B&L HASP available		
Safety equipment on site		
Contractor equipment adequate		
Drilling equipment steam cleaned		
Drilling water source approved/sampled		
Drilling equipment water sample taken		
Drilling mud & additives approved		
Sand or gravel pack approved		
Grout composition approved		
DURING WELL INSTALLATION: Formation samples properly taken and jarred or bagged		
Rock color chart used		
PID monitoring during drilling and sampling		
Cores properly marked and stored		
Hard hats worn		
Proper safety procedures followed		
Hazardous soil, mud or water properly handled		
Daily Log kept		
Subsurface Investigation Log form filled out		
Well Construction details recorded		
Location Sketch made		
Tremie Pipe used in grouting		
Abandoned well/boring grouted & sealed		
Protective casing/well cap/lock installed		
Well identification number attached		
Well development adequate		
Well elevation and location surveyed		

Barton & Loguidice, P.C.

Consulting Engineers

290 Elwood Davis Road / Box 3107, Syracuse, New York 13220

SUBSURFACE LOG

Client ____________
Project ____________
____
Project No. ____________

Sheet ______ of ______
Boring No. ____________
Location ____________

Method of Investigation

Drill Rig ____________
Casing ____________
Soil Sampler ____________
Sample Hammer: Wt. ______ lb. Fall ______ in.
Rock Sampler ____________
Other: ____________

Contractor ____________
Driller ____________
Inspector ____________
Start Date ______ Completion Date ______
Surface Elevation ____________
Boring Location ____________

Depth ft.	SAMPLE					MATERIAL DESCRIPTION		REMARKS	
	No.	Type	Blows per 6"	Core Run	N / RQD	Rec	Depth of Change		USCS

KEY: S = Split Spoon C = Cored A = Auger Cuttings U = Undisturbed W = Washed RQD = Rock Quality Designation

USCS = Unified Soil Classification System REC = Recovery

Barton & Loguidice, P.C.

Consulting Engineers

290 Elwood Davis Road / Box 3107, Syracuse, New York 13220

Client ______________________

Location ______________________

Sheet ________ of ________

Boring No. ______________________

Depth ft.	SAMPLE					MATERIAL DESCRIPTION		REMARKS	
	No.	Type	Blows per 6" / Core Run	N / RQD	Rec		Depth of Change		USCS

B&L Form No. 135A

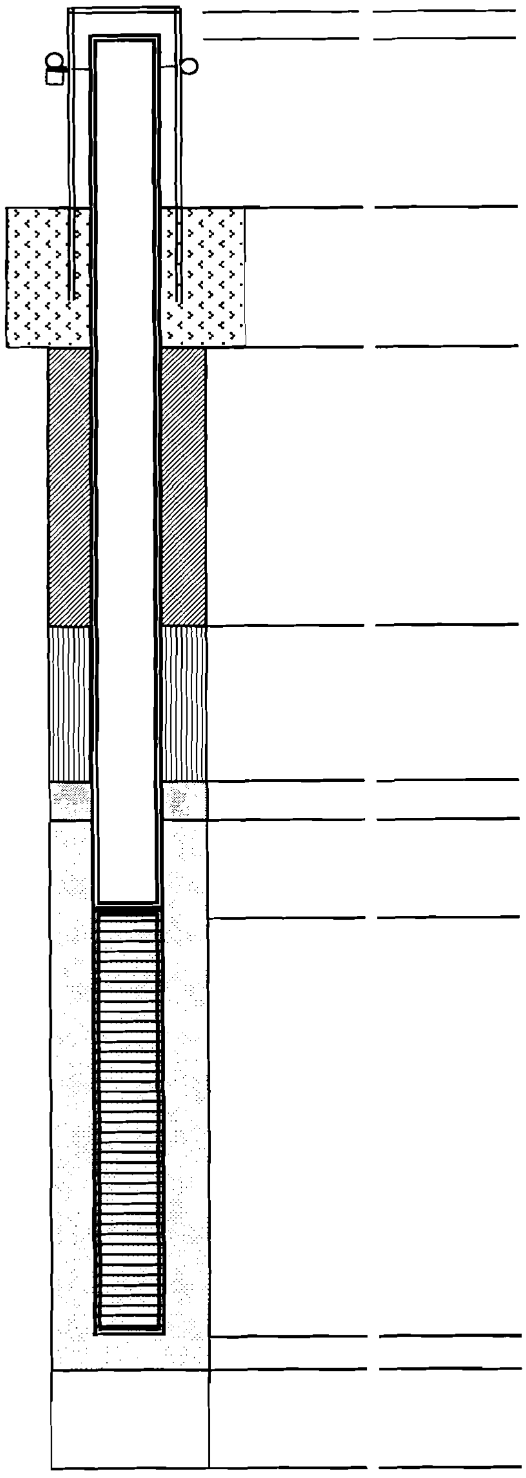
Barton & Loguidice, P.C.
Consulting Engineers

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)

CLIENT: ______________________________

PROJECT & NO: ______________________________

ELEVATION DATA	WELL DATA
Top of Riser Pipe: ____________	Well No.: ____________
Ground Elevation: ____________	Type: ____________
Datum: ____________	Location: ____________



Inspector: ____________

Drilling Contractor: ____________

Total well depth (below top of riser pipe): ____________

Water level (below top of water pipe): ____________ Date: ____________

Screen

Material: ____________ Slot size: ____________

Diameter: ____________ Length: ____________

Stratigraphic Unit: ____________

Riser Pipe

Material: ____________

Diameter: ____________ Length: ____________

Joint type: ____________

Standup above ground level: ____________

Filter Pack

Material: Sand size: ____________

Fine sand size: ____________

Length: ____________

Placement method: ____________

Annular seal:

Material: ____________

Length: ____________

Placement method: ____________

Backfill:

Material: ____________

Length: ____________

Protective Cover:

Material: ____________

Diameter: ____________ Length: ____________

Surface seal: ____________

Standup above ground level: ____________

Well Development:

Date: ____________

Method: ____________

Notes: ____________

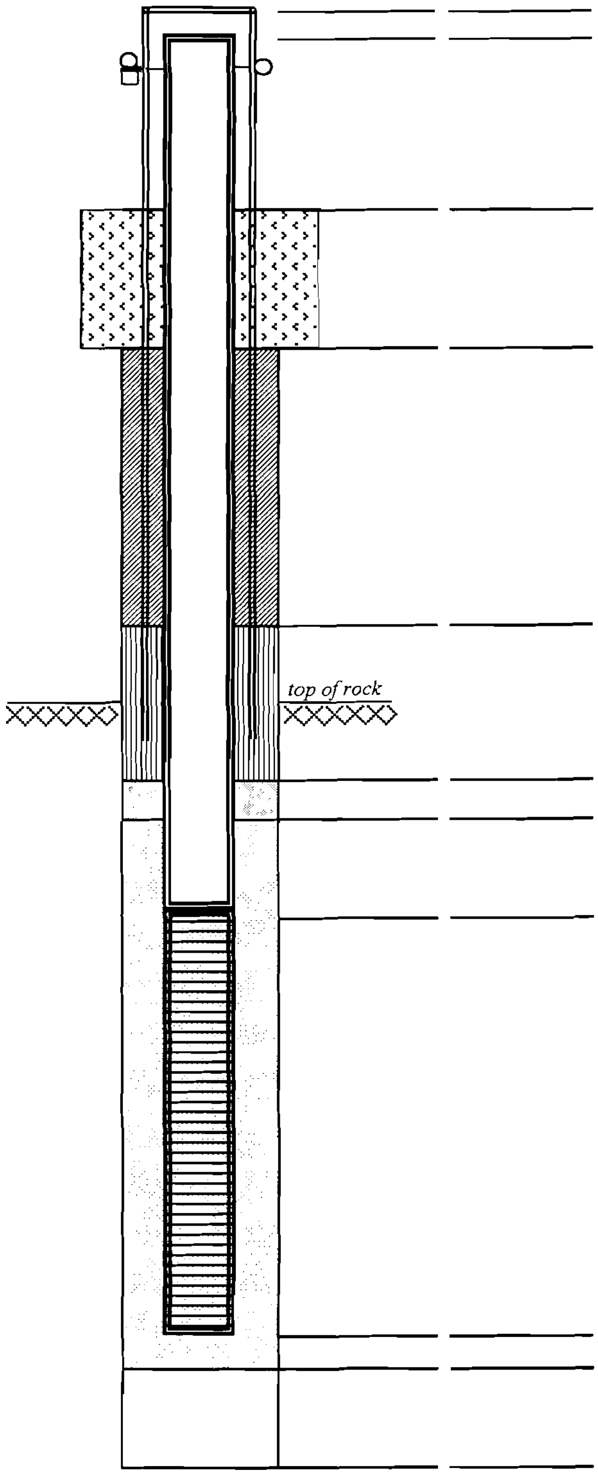
Barton & Loguidice, P.C.
Consulting Engineers

WELL CONSTRUCTION LOG
(BEDROCK)

CLIENT: ______

PROJECT & NO: ______

ELEVATION DATA	WELL DATA
Top of Riser Pipe: ______ Ground Elevation: ______ Datum: ______	Well No.: ______ Type: ______ Location: ______



Inspector: ______

Drilling Contractor: ______

Total well depth (below top of riser pipe): ______

Water level (below top of water pipe): ______ Date: ______

Screen

Material: ______ Slot size: ______

Diameter: ______ Length: ______

Stratigraphic Unit: ______

Riser Pipe

Material: ______

Diameter: ______ Length: ______

Joint type: ______

Standup above ground level: ______

Filter Pack

Material: Sand size: ______

Fine sand size: ______

Length: ______

Placement method: ______

Annular seal:

Material: ______

Length: ______

Placement method: ______

Backfill:

Material: ______

Length: ______

Protective Cover:

Material: ______

Diameter: ______ Length: ______

Surface seal: ______

Standup above ground level: ______

Well Development:

Date: ______

Method: ______

Notes: ______

B&L Form No. 139A (2/99)

Barton & Loguidice, P.C.
Consulting Engineers

PROJECT NO: ______
Date: ______

SAMPLE CONTAINER INVENTORY

PROJECT: ______

Shipped from: (laboratory)		Shipped to:	
Phone #:		Attn:	

SHIPMENT CONTENTS				
Shipped			**Received**	
Bottle size and type	Preservative	Quantity	Quantity	Condition / Comments

Packed by:		Received by:	
Date:		Date:	
Shipped by:		Inspected by:	
Date:		Date:	
Sealing method:		Seal Intact?	

Remarks:

Barton & Loguidice, P.C.
Consulting Engineers

PROJECT NO: ________
Date: ________

SAMPLING OF MONITORING WELLS DAILY CHECKLIST

PROJECT: ____________________ WELLS/BORINGS ____________
LOCATION: ____________________ WEATHER: ____________
B&L SITE REP: ____________________ TIME: ____________

ITEMS	OK/NA	COMMENTS
PRIOR TO SAMPLING: Health & Safety manual (HASP) received and reviewed; equipment ready		
Sample containers, coolers, received from laboratory; ice or ice packs ready		
Sampling equipment and supplies inventoried, clean and operational		
Check in with client at site		
Integrity of well noted		
Well area prepared for sampling; plastic around well; gasoline-powered pumps placed downwind		
Well and water level measurements made and recorded on water sampling log; additional pertinent well or sampling information noted		
Field instruments calibrated		
Sample containers labeled; preservatives added (if necessary)		
DURING AND AFTER SAMPLING: Well purged three to five times its volume		
Sample collected using a bailer or pump as per sampling plan		
Measurement of field parameters recorded on sampling log		
Sample containers filled according to collection protocol		
Field and trip blanks collected; replicate or split samples collected as per sampling plan		
Samples stored at 4°C in coolers for transport to laboratory		
Water sampling log and chain-of-custody form completed		
Reusable equipment decontaminated; non-reusable equipment disposed of in appropriate manner		
Well secured and locked		
Laboratory contacted to confirm receipt and condition of samples		
Additional Comments:		

Barton & Loguidice, P.C.
Consulting Engineers

SAMPLING DATA SHEET

SITE:______________________ SAMPLE LOCATION:______________
CLIENT:______________________ JOB #:______________
Weather Conditions:______________________ Temp:______________

SAMPLE TYPE: Groundwater ☐ Surface Water ☐ Leachate ☐
Sediment ☐ Other (specify): ______________

WATER LEVEL DATA

Static Water Level (feet)*:	
Measured Well Depth (feet)*:	
Well Casing Diameter (inches):	
Volume in Well Casing (gallons):	

* depth from measuring point

Measuring Point: Top of Riser ☐
Other (specify)______________
Measured by:______________
Time:__________ Date:__________

PURGING METHOD
Equipment: Bailer ☐ Submersible Pump ☐ Air Lift System ☐
Bladder Pump ☐ Foot Valve ☐ Peristaltic Pump ☐
Dedicated ☐ Non-dedicated ☐

*Volume of Water Purged (gallons):*__________
Did well purge dry? No ☐ Yes ☐
Did well recover? No ☐ Yes ☐ Recovery Time :______________

SAMPLING METHOD
Equipment: Bailer ☐ Submersible Pump ☐ Air Lift System ☐
Bladder Pump ☐ Foot Valve ☐ Peristaltic Pump ☐
Dedicated ☐ Non-dedicated ☐

Sampled by:______________ Time:__________ Date:__________

SAMPLING DATA
Sample Appearance
Color______________ Sediment______________
Odor______________ Product: No ☐ Yes ☐ Thickness__________

Field Measured Parameters

pH (Standard Units)			Sp. Conductivity (umhos/cm)	
Temperature (° F)			Eh-Redox Potential (mV)	
Turbidity (NTUs)			Dissolved Oxygen (mg/l)	
Explosive Gases	%LEL	ppm	Total Organic Vapors (ppm)	

*Samples Collected (Number/Type)*______________________________
____
____

*Samples Delivered to:*______________ Time:__________ Date:__________

COMMENTS:______________________________
____
____

Barton & Loguidice, P.C.

Chain Of Custody Record

Client:		Client Project # / Project Name				No. of Con- tain- ers	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	Special Turnaround Time______ (Lab Notification required) Remarks
Client Contact:	Phone #	Site Location (city/state)															
Sample Location:	Date	Time	Matrix	Grab or Comp.	ULI Internal Use Only												

parameter and method sample bottle:	type	size	pres.
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			

Note: The numbered columns above cross-reference with the numbered columns in the upper right-hand corner.

Sampled by: (Please Print)			
Company:			
Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (Signature)	Date	Time	Rec'd for Lab by: (Signature)

Barton & Loguidice, P.C.
Consulting Engineers

PROJECT NO: ______
Date: ______

WATER LEVEL / PUMPING TEST RECORD

Page 1 of ____

Project ______________ Well # ________ Site ______________

Screen Depths ________ Measuring Point ______________ Height Above Ground Surface ________
(top of casing, well guard lid, etc.)

Static Water Level ________ Measured with ______________ Date/Time ________

Pumping Test Type: Drawdown ☐ Recovery ☐ Start of Test ________ End of Test ________

Pumping Well ________ Distance from measured well to pumping well *(r)* ________

Time Data	Water Level Data	Discharge Data
Pump On: Date _____ Time _______ *(t)*	Static water level ________	How Q measured ________
Pump Off: Date _____ Time _______ *(t')*	Measuring point ________	Depth of pump/air line ________
Duration of Aquifer Test:	Elevation of measuring point ________	Previous pumping? Yes ____ No _____
Pumping _______ Recovery _______	________	Duration ________ End ________

Date	Clock Time	Time since pump started *t*	Time since pump stopped *t'*	*t/t'*		Water level measurement	Correction or Conversion (1)	Water Level	Water Level Change *s* or *s'*		Discharge Measurement	Rate	Remarks (2)

1) Dewatering Correction; $s_c = s - (s^2/2b)$

2) pH, specific conductivity, temperature, turbidity, weather, etc.

B&L Form No. 154 (2/99)

SECTION II: QUALITY ASSURANCE PROJECT PLAN

Barton & Loguidice, P.C.
Consulting Engineers

PROJECT NO: ________
Date: ________
Well #: ________

WATER LEVEL / PUMPING TEST RECORD cont.

Page ____ of ____

Date	Clock Time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion (1)	Water Level	Water Level Change s or s'		Discharge Measurement	Rate	Remarks (2)

1) Dewatering Correction; $s_c = s - (s^2/2b)$

2) pH, specific conductivity, temperature, turbidity, weather, etc.

RECORD OF TELEPHONE CONVERSATION

Barton & Loguidice, P.C.
Consulting Engineers

FROM:		TO:	
COMPANY:		PHONE NO.	
PROJECT:		PROJECT NO.	DATE: 2/18/99

CC:

ROUTING:

RETURN TO:

B&L Form No. 115 (8/93)

PAGE OF

TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION II-1

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES II-2

3.0 QUALITY ASSURANCE/QUALITY CONTROL II-2

3.1 Data Usage and Requirements II-2

3.2 Level of Quality Control Effort II-3

3.2.1 Precision II-4
3.2.2 Accuracy II-4
3.2.3 Representativeness II-4
3.2.4 Comparability II-5
3.2.5 Completeness II-5

3.3 Quality Control Objective II-6

4.0 SAMPLING PROCEDURES II-8

5.0 SAMPLE CUSTODY II-8

6.0 CALIBRATION PROCEDURES II-9

7.0 ANALYTICAL PROCEDURES II-9

8.0 DATA REDUCTION, VALIDATION, AND REPORTING II-10

9.0 INTERNAL QUALITY CONTROL II-12

10.0 PERFORMANCE AND SYSTEM AUDITS II-13

11.0 PREVENTIVE MAINTENANCE II-14

12.0 DATA ASSESSMENT PROCEDURES II-15

TABLE OF CONTENTS - Continued

PAGE

13.0 CORRECTIVE ACTION II-16

14.0 QUALITY ASSURANCE REPORTS II-17

APPENDIX A Laboratory QA/QC Plan (to be provided)

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) presents the organizational structure, data quality objectives (DQOs) and data management scheme for conducting the CP RI field program and defines the specific quality control (QC) checks and quality assurance (QA) auditing processes. The QAPP is designed to assure that the precision, accuracy, representativeness, comparability, and completeness (the "PARCC" parameters) of the collected data are known and documented and adequate to satisfy the DQOs of the study. The format and contents of the QAPP have been prepared in accordance with the following United States Environmental Protection Agency (USEPA) guidance documents:

- USEPA. 1989. Region II CERCLA Quality Assurance Manual. Revision I.
- USEPA. October 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. EPA/540/G-89/004.
- USEPA. March 1987. Data Quality Objectives for Remedial Response Activities: Development Process. EPA/540/G-87/003.
- USEPA. February 1983. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans. QAMS-005/80.
- USEPA. May 1978, Revised May 1986. NEIC Policies and Procedures. EPA-330/9-78-001-R.

The QAPP serves as an overall summary of the QA structure of the project. Some parts of the structure are described in this document (*e.g.*, data management); and other parts are described in the Sampling and Analysis Plan (SAP) and are incorporated into the QAPP by reference. This applies particularly to the Standard Operating Protocols and Procedures (SOPs), which have been developed for the various CP RI field tasks. Site background information and CP RI data collection activities are described in detail in the CP RI/FS work plan.

The internal laboratory SOPs and QA/QC procedures will be described in the laboratory QAPP, an independent plan to be provided by the analytical laboratory. This plan will be appended to this document (Appendix A) when the laboratory has been selected. The SOPs provided by the subcontracted laboratory will be consistent with the USEPA Contract Laboratory Program (CLP) Statements of Work (SOWs) planned for this project.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organizational structure is discussed in the CP RI/FS work plan.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

The overall QA objective is to develop and implement procedures for field measurements, sampling, and analytical testing that will provide data of known quality that is consistent with the intended use of the information. This section defines the objectives by (1) describing the use of the data; (2) specifying the applicable QC effort (field checks and analytical support levels), and (3) defining the QC objectives (data quality acceptance criteria).

3.1 Data Usage and Requirements

The field measurements and laboratory analyses will be used to support one or more steps in the CP RI process. These field steps include site characterization, evaluation of remedial alternatives, if necessary, and engineering design of remedial alternatives. The data to be collected range from qualitative information (based on field observations) to quantitative laboratory analyses. An important factor in the use of the data will be the ability to evaluate site conditions with respect to the applicable or relevant and appropriate requirements (ARARs).

The documents, "Contract Laboratory Program Statement of Work for Inorganic Analysis" (USEPA most recent edition), the "Contract Laboratory Program Statement of Work for Organics Analysis" (USEPA most recent edition), and Methods for Chemical Analysis of Water and Waste (EPA-600/4-79-20) will be followed by the laboratory for the analyses of groundwater samples collected during the CP RI. SOPs for sample control, calibration, analysis of samples, data analysis, data validation, data reporting, internal QC checks, system performance audits, preventive maintenance, and data assessment will be prepared in accordance with the Statements of Work (SOWs) for USEPA CLP analysis. Analytical procedures will be described in more detail in Sub-Section 7.0 of this QAPP. The sample handling procedures will be described in the laboratory QAPP (Appendix A) will be consistent with the SOWs mentioned above.

Quantitation limits for the organic and inorganic parameter analyses are provided in the Organic and Inorganic CLP SOWs; and Methods for Chemical Analysis of Water and Waste; however, dilution or interference effects may make it necessary to raise these limits. The laboratory will make every effort to achieve detection and quantitation limits as low as practicable and will report estimated concentration values at less than the contract required quantitation limit by flagging the value with a J.

3.2 Level of Quality Control Effort

The laboratory will follow standard QC measures to provide data of known and defensible quality. The data quality elements that will be checked and documented include the PARCC parameters which are discussed separately below.

3.2.1 Precision

Measurements of data precision are necessary to demonstrate the reproducibility of the analytical data. Precision of the groundwater sample data will be determined from the analyses of matrix spike and matrix spike duplicates (MS/MSDs) and field replicate samples. Field replicates will be collected and analyzed at a frequency of 10 percent (one per 10 samples) or at least one per sample matrix if less than 10 samples are to be collected. MS/MSD samples will be collected at a frequency of 5 percent (one MS/MSD pair per 20 samples), or one per two-week sampling period. An extra sample volume will be collected for each replicate and MS/MSD sample taken. QA/QC samples will be labeled on the sample container and appropriate sample log and chain-of-custody forms as replicate, or MS and MSD analyses. Laboratory precision requirements will be provided in the laboratory QAPP (Appendix A).

3.2.2 Accuracy

Accuracy is the relationship of the reported data to the "true" value. The accuracy of the methods use for the analyses of groundwater samples will be evaluated through the use of calibration standards, MS/MSD analyses, and surrogate spikes. MS/MSD samples will be collected and analyzed at a frequency of 5 percent (one MS and one MSD per 20 samples per matrix), or one MS/MSD pair per two-week period. An extra sample volume will be collected for each MS/MSD sample taken. Laboratory accuracy requirements will be provided in the laboratory QAPP (Appendix A).

3.2.3 Representativeness

All data obtained should be representative of actual conditions at the sampling location. Considerations for evaluating the representativeness of the data include, but are not limited to the following: the sampling location; the methods used to obtain samples at the site; and the appropriateness of the analytical method to the type of sample obtained. All field sampling activities will be performed according to the protocols and SOPs described in the SAP (Section I). Laboratory representativeness requirements will be provided in the laboratory QAPP (Appendix A).

3.2.4 Comparability

Comparability will be achieved by utilizing standardized sampling and analysis methods and data reporting format. The data will be generated such that it is comparable to the existing database.

3.2.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement program compared to the total amount collected. The validity of the collected data will be evaluated utilizing the appropriate QA/QC guidelines. Laboratory completeness requirements will be provided in the laboratory QAPP (Appendix A).

The sampling team will use many different types of QA/QC samples to ensure and document the integrity of the sampling procedures, laboratory handling procedures, and the validity of the measurement data.

Field replicate samples will be collected to also demonstrate the reproducibility of the sampling technique. These analyses will be in addition to the replicates that the laboratory must run and will not be replaced by a laboratory-generated replicate. The replicate sampling locations will be selected for each sampling event. Since the replicate will be "blind" to the laboratory, it will have a coded identity on its label and on the chain-of-custody record form. The actual sampling location will be recorded on a daily log form and on the water sampling log form.

To determine if cross-contamination has occurred during groundwater sampling, one field blank per day of sampling will be prepared using analyte-free water provided by the laboratory. Protocols for the collection of field blanks are provided in the SAP (Section I). Field blanks will be analyzed for the same analyte list as environmental samples using the CLP and/or USEPA methods, as appropriate.

One trip blank, consisting of two 40-ml vials filled by the laboratory with analyte-free water, will be provided by the laboratory for each container used to ship and store volatile organic samples during each sampling event. Trip blanks will be analyzed for VOCs only.

The USEPA has developed a standard series of analytical support levels to denote types of analysis and the associated level of QC efforts as follows:

- Level 1. Field screening or analysis using portable instruments.
- Level 2. Field analyses using more sophisticated instruments.
- Level 3. Standard USEPA approved laboratory methods.
- Level 4. USEPA CLP routine analytical services laboratory methods.
- Level 5. USEPA CLP non-standard services laboratory methods.

The analytical support levels which will be used to generate the project data are summarized in Table 1. As shown in this table, the analyses that will be performed during the CP RI will fall within Levels 1, 2, 3 and 4.

3.3 Quality Control Objective

The QC objective for the CP RI is to provide data of known and defensible quality. Several different types of QC check samples will be analyzed and the results will be compared to data quality acceptance criteria and/or QC control limits that are specified for each method. The laboratory will routinely run these QC samples in accordance with the protocols and frequencies specified in the CLP SOWs for Organics and Inorganics Analyses and will provide a comparable level of QC effort for the non-CLP analytical parameters. The QC check samples include the following:

- Blank samples
- Preparation
- Method
- Holding
- Calibration
- Instrument
- Tunings
- Initial and Continuing Calibrations
- Surrogate spikes
- Matrix spikes/analytical spikes
- Duplicate samples
- Control Samples
- Reagent check samples

The QC control limits, or data quality acceptance criteria, for each of the types of QC check samples will also be specified in the laboratory QAPP (Appendix A). The specific types and frequencies of QC checks which will be performed in support of each test method, the calibration procedures for each instrument, and the QC control limits and/or data quality acceptance criteria for each of the types of QC check samples, will also be specified in detail in the laboratory QAPP (Appendix A).

4.0 SAMPLING PROCEDURES

Samples will be collected in accordance with the approved project SOPs to the SAP (Section I). The SOPs specify detailed step-by-step protocols for sample collection and address the following as appropriate:

- Use of sampling equipment.
- Decontamination of sampling equipment.
- Pre-sampling requirements (well evacuation volumes).
- Field screening procedures.
- Field QC check sample collection procedures (blanks, rinseates, replicates).
- Sample packaging and shipment.
- Sampling documentation and chain-of-custody.
- Performance of field analyses.

All samples will be delivered to the laboratory within 24 hours from day of collection. Preservation, container, and holding time requirements for the parameters to be analyzed are provided in Table 1 of the laboratory QAPP (Appendix A).

5.0 SAMPLE CUSTODY

A chain-of-custody record will be maintained for each sample collected and will provide an accurate written record that can be used to trace the possession and holding of samples from collection through analysis and reporting. The procedures that will be followed to provide the chain-of-custody in the field from sample collection through shipment to the laboratory (including sample preservation) are specified in Appendices D and E of the SAP (Section I). The procedures that will be used to continue the chain-of-custody for each sample from its arrival in the laboratory through analysis and reporting will be specified in the laboratory QAPP

(Appendix A). The laboratory sample custody procedures conform to the guidelines in the USEPA CLP. The project samples will be retained by the laboratory until the holding times are exceeded, or until permission to discard is received.

6.0 CALIBRATION PROCEDURES

The calibration procedures for field instrumentation are discussed in the SAP (Section I). These procedures are described for the following instruments:

- Water-level recorder (m-scope).
- OVA flame ionization detector.
- OVM photo ionization detector.
- pH /ORP meter.
- DO meter.
- Specific conductance/temperature meter.
- Combustible gas indicator.

The calibration procedures for laboratory instrumentation will be discussed in the laboratory QAPP (Appendix A).

7.0 ANALYTICAL PROCEDURES

The analytical methods for testing for the volatile, semi-volatile, and inorganic parameters are those specified in the USEPA CLP, other parameters will utilize Methods for Chemical Analysis of Water and Waste. The types and frequencies of QC checks will be those specified in the analytical methods and are discussed in Sub-Section 3.3 of this QAPP. Full CLP data packages will be requested for the volatile, semi-volatile, and inorganic parameters and comparable data packages for the non-CLP analytical parameters.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

The laboratory procedures for reducing, validating, and reporting the analytical data will be described in the laboratory QAPP (Appendix A). The laboratory data will also be validated consisting of a systematic review of the analytical results and QC documentation, and will be performed in accordance with the guidelines in "CLP Organics Data Review and Preliminary Review" (USEPA most recent edition) and "Evaluation of Metals Data for the Contract Laboratory Program (CLP)" (USEPA most recent edition).

On the basis of this review, the data validator will make judgements and comments on the quality and limitations of specific data, as well as on the validity of the overall data package. The data validator will prepare documentation of his or her review and conclusions using the standard USEPA Inorganics Regional Data Assessment and Organics Regional Data Assessment forms to summarize any overall deficiencies that require attention. General laboratory performance will also be assessed by the data validator. These forms will be accompanied by appropriate supplementary documentation, clearly identifying specific problems.

The data validator will inform the project manager of data quality and limitations, and assist the project manager in interacting with the laboratory to correct any data omissions and/or deficiencies. The laboratory may be required to rerun or resubmit data depending on the extent of the deficiencies, and their importance in meeting the data quality objectives within the overall context of the project.

The validated laboratory data will be reduced into a computerized tabulation. The tabulated format will be suitable for inclusion in the CP RI report and will be designed to facilitate comparison and evaluation of the data. The data tabulations will be sorted by classes of constituents (*e.g.*, VOCs, semi-volatile organic compounds, inorganics). Each individual table will contain the following information: sample number; analytical parameters; detection limits; concentrations detected; and qualifiers, as appropriate.

The field measurement data will be similarly reduced into a tabulated format suitable for inclusion in the CP RI report and will be designed to facilitate comparison and evaluation for the data. These tabulations will include but not be limited to the following information:

- Field screen (PID) results.
- Field analyses (pH, temperature, and specific conductance).
- Well construction details.
- Water-level measurements and surveyed measuring point elevations.
- Aquifer and slug test results.
- Field logs will be transferred into typed formats or organized in their original form for inclusion as CP RI report appendices. The following log forms will be used:

  - Sample/Core Logs
  - Well Construction Logs
  - Water-Level/Aquifer Test Logs
  - Water Sampling Logs
  - Monitoring Well Installation Logs

The tables and logs will be compiled whenever feasible by the field geologist, who will inform the project manager of any problems encountered during data collection, identify apparent inconsistencies, and provide opinions on the data quality and limitations. The tables and logs will be used as the basis for data interpretation and will be checked against the original field documentation by an independent reviewer prior to use.

9.0 INTERNAL QUALITY CONTROL

The field geologist will make use of the following types of QA/QC samples to ensure and document the integrity of the sampling and sample handling procedures and the validity of the measurement data: field replicates, field blanks, and laboratory-prepared trip blanks. The frequencies for collecting the QA/QC samples are specified in the SAP (Section I).

Two types of quality assurance mechanisms are used to ensure the production of analytical data of known and documented quality: analytical method QC, and program QA. The internal quality control procedures for the analytical services on samples to be provided will be specified in the laboratory QAPP (Appendix A). These specifications include the types of control samples required (sample spikes, surrogate spikes, reference samples, controls, blanks), the frequency of each control, the compounds to be used for sample spikes and surrogate spikes, and the quality control acceptance criteria. The laboratory will be responsible for documenting that both initial and ongoing instrument and analytical QC criteria are met in each package. This information will be included in the packages generated by the laboratory and will be evaluated during the validation.

The field QA/QC analytical results will also be compared to acceptance criteria, and documentation will be performed showing that those criteria have been met. Any samples in nonconformance with the QC criteria will be identified and reanalyzed by the laboratory, if possible. The following QC procedures will be employed by the laboratory for analyses of groundwater samples:

- Proper storage of samples.
- Use of qualified and/or certified technicians.
- Use of calibrated equipment traceable to National Bureau of Standards or USEPA standards.

- Formal independent confirmation of all computations and reduction of laboratory data and results.
- Use of standardized test procedures.
- Inclusion of replicate samples at a frequency of one replicate per 20 samples.

10.0 PERFORMANCE AND SYSTEM AUDITS

System audits will be performed on a periodic basis, as appropriate, to assure that the CP RI field program is implemented in accordance with the approved project SOPs and in an overall satisfactory manner. Examples of systems audits that will be performed by Barton & Loguidice project personnel during the CP RI/FS are as follows:

- The field geologist will supervise and check on a daily basis the following tasks: that the groundwater program and other field programs are conducted correctly; that monitoring wells are installed properly and developed correctly; that field measurements are made accurately; that equipment is thoroughly decontaminated; that samples are collected and handled properly; and that all field work is accurately and neatly documented. QA checklists will be filled out daily during the drilling, installation, and development of new monitoring wells, and during sampling programs. The QA daily checklists for these activities are provided in the Appendix G of the SAP (Section I).

- On a timely basis, the data validator will review the data package submitted by the laboratory to check the following information: that all requested analyses were performed; that sample holding times were met; that the data were generated through the approved methodology with the appropriate level of QC effort and reporting; and that the analytical results are in conformance with the prescribed acceptance criteria. The data quality and limitations will be evaluated on the basis of these factors.

- The project manager will oversee the field geologist, field engineer, and data validator, and check that the management of the acquired data proceeds in an organized and expeditious manner.

- Systems audits of the laboratory are performed on a regular basis by the USEPA, as well as by the NYSDEC. These audits will be discussed in the laboratory QAPP (Appendix A).

Performance audits of laboratories participating in the CLP are performed quarterly in accordance with the procedures and frequencies established by USEPA for the CLP. The laboratory performance evaluation audits will be discussed in the laboratory QAPP (Appendix A).

11.0 PREVENTIVE MAINTENANCE

Barton & Loguidice has established a program for the maintenance of field equipment to ensure the availability of equipment in good working order when and where it is needed, as indicated in the following examples:

- An inventory of equipment, including model and serial number, quantity, and condition will be maintained. Each item will be tagged and signed out when in use, and its operating condition and cleanliness will be checked upon return. Routine checks will be made on the status of the equipment, and spare parts will be stocked. An equipment manual library will also be maintained.

- The field geologist is responsible for making sure that the equipment is tested, cleaned, charged, and calibrated in accordance with the manufacturer's instructions before being taken into the field.

The laboratory also follows a well-defined program to prevent the failure of laboratory equipment and instrumentation. This preventive maintenance program will be described in the laboratory QAPP (Appendix A).

12.0 DATA ASSESSMENT PROCEDURES

The field- and laboratory-generated data will be assessed for the PARCC parameters. Both quantitative and qualitative procedures will be used for these assessments. The criterion for assessment of field measurements will be that the measurements were taken properly using calibrated instruments. Assessment of the sampling data with respect to field performance will be based on the criteria that the samples were properly collected and handled. Field QC check sample results will also be considered in assessing the representativeness and comparability of the samples collected. The project manager will have overall responsibility for data assessment and integration of that assessment into data use and interpretation.

The laboratory will calculate and report the precision, accuracy, and completeness of the analytical data. Precision will be expressed as the relative percent difference (RPD) between values for duplicate samples. Accuracy will be expressed as percent recoveries (%R) for surrogate standards and matrix spike compounds. The precision and accuracy results will be compared to the prescribed QC acceptance criteria. The QC acceptance criteria prescribed for each test method will be presented in the laboratory QAPP (Appendix A). For the organic and inorganic parameters, the QC acceptance criteria conform to control limits established in the CLP SOWs. Completeness is expressed as the percentage of valid data, based on the total amount of data intended to be collected.

Rigorous QA/QC procedures will be followed for the collection of samples. The SAP sampling protocols will be strictly adhered to in order to maintain consistency in sampling and representativeness and comparability of the samples.

The assessment of data representativeness with respect to laboratory performance will be based on sample handling and analyses with respect to holding times and also on the method blank results. Data comparability will be assessed based on laboratory performance with respect to USEPA analytical protocols.

13.0 CORRECTIVE ACTION

The QA/QC program contained in this QAPP will enable problems to be identified, controlled, and corrected. Potential problems may involve non-conformance with the SOPs and/or analytical procedures established for the project, or other unforseen difficulties. Any persons identifying an unacceptable condition will notify the field geologist, where applicable, and/or the project manager. The project manager, with assistance from the project QA/QC manager, will be responsible for developing and initiating appropriate corrective action and verifying that the corrective actions will be documented for a Corrective Action report.

Corrective actions may include repeating measurements, resampling and/or reanalysis of samples, and amending or adjusting project procedures. If warranted by the severity of the problem (*e.g.*, if monitoring wells require resampling or if the project schedule may be affected), the project coordinator and USEPA remedial project manager will be notified. Additional work, which is dependent upon an unacceptable activity, will not be performed until the problem has been eliminated.

The laboratory maintains an internal closed-loop corrective action system and this will be described in the laboratory QAPP (Appendix A).

14.0 QUALITY ASSURANCE REPORTS

Regular QA reporting throughout the duration of the project, as well as reporting on an as-needed basis will include the following:

- Monthly progress reports will be submitted to the USEPA remedial project manager. At a minimum these reports will include the following: a description of the activities that have taken place during the month; all validated results of sampling, tests, analytical data, and interpretations received; a description of all data anticipated and activities scheduled for the next month; and a description of any problems encountered or anticipated.

- Conference calls and/or meetings to be scheduled if requested by the project coordinator or by the USEPA remedial project manager to discuss any concerns that may arise during the course of the CP RI field program that might require significant corrective actions, changes in the scope of work, or departures from the approved project SOPs.

- Serious deficiencies in sampling and/or monitoring data will be reported to the USEPA as soon as practicable after such deficiencies have been noted.

The laboratory's internal QA reporting will be described in the laboratory QAPP (Appendix A).

SECTION III: HEALTH AND SAFETY PLAN

TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION III-1

2.0 RESPONSIBILITIES III-1

3.0 PLANNED FIELD ACTIVITIES III-2

4.0 PERSONNEL TRAINING III-2

5.0 HAZARD EVALUATION III-2

5.1 Physical Hazards III-2
5.2 Chemical Hazards III-3

6.0 AIR MONITORING III-3

7.0 ACTION LEVELS III-4

8.0 LEVELS OF PROTECTION III-4

9.0 SITE CONTROL III-5

10.0 PERSONNEL DECONTAMINATION III-6

11.0 GENERAL WORK PRACTICES III-6

11.1 Heat Stress III-7

12.0 TRAINING III-8

13.0 EMERGENCY PROCEDURES III-9

13.1 Personal Injury III-9
13.2 Fire/Explosion III-9
13.3 Emergency Telephone Numbers III-9
13.4 Route to the Hospital III-10

14.0 REFERENCES III-10

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed to address the potential physical and chemical hazards that field personnel may face while performing the Contamination Pathways Remedial Investigation (CP RI) at the Volney Landfill. 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 (29 CFR 1910.120), "Hazardous Waste Operations and Emergency Response." It is intended for the protection of the workers and establishes procedures to minimize workers' exposures through the use of personal protective equipment and safe work practices. All reasonable precautions will be taken by Barton & Loguidice, P.C. (Barton & Loguidice), and their subcontractors to ensure the safety and health of workers and the general public. Subcontractors will be provided copies of this HASP and will be required to follow it or develop their own equivalent HASP.

2.0 RESPONSIBILITIES

The field geologist and/or field engineer are designated as the site safety officers (SSOs) who will be responsible for implementing the safe work practices and procedures that are established in this HASP. Whenever the SSO must leave the site while the work is in progress, an alternate SSO will be designated to ensure that the HASP will continue to be followed. The SSO will report all health and safety matters to the project manager who has responsibility for overseeing the planned field activities. The project manager for this investigation has overall responsibility for assuring that the HASP is implemented properly.

3.0 PLANNED FIELD ACTIVITIES

The following field tasks will be performed during the CP RI:

- Installation of piezometers and groundwater monitoring wells.
- Water-level measurements.
- Groundwater, surface water, sediment and soil sampling.

4.0 PERSONNEL TRAINING

Anyone entering the work zone during the CP RI field programs will be required to have completed an OSHA-required initial health and safety training course (24 or 40 hours). In addition, the project manager will have completed the 8-hour required supervisor and manager's class. Each worker must also have completed the 8-hour refresher course, as required.

5.0 HAZARD EVALUATION

The potential physical and chemical hazards associated with the CP RI field program were evaluated based on the existing data base and the field tasks that will be performed during the CP RI.

5.1 Physical Hazards

The physical hazards associated with the planned field activities include the potential for workers being struck by falling objects while working near the drill rig; being splashed with liquids during well installation and well sampling; slips or falls; and noise exposure during the installation of monitoring wells. Heat stress is another potential physical hazard that may occur during the summer months. Underground utilities will be marked out before drilling begins and measures will also be taken to monitor for the potential presence of landfill gas.

5.2 Chemical Hazards

The potential chemical hazard of greatest concern with respect to the planned field activities is the possible inhalation of vapors containing volatile organic compounds (VOCs). VOCs were detected in low parts per billion (ppb) range in the groundwater from some of the monitoring wells and in the leachate during the most recent sampling conducted in January of 1998 in support of monthly groundwater monitoring activities carried on by the County of Oswego. Notwithstanding the low detection of VOCs, protective measures will be followed to ensure worker and community health and safety during the CP RI field program.

6.0 AIR MONITORING

Air monitoring for VOCs and the Lower Explosive Limit (LEL) will be conducted at this site during the installation of monitoring wells and also during pumping tests, to ensure that the workers are adequately protected from the potential inhalation of vapors containing VOCs and explosion hazard. A flame ionization detector (FID) such as an Organic Vapor Analyzer (OVA) and a photo ionization detector, such as an Organic Vapor Meter (OVM), will be used for monitoring VOCs. These instruments are designed to measure VOCs in air in the low parts per million (ppm) range. The PID will be calibrated each morning before use (see Appendix F of the SAP). Calibration records will be maintained. In order to quantify specific compounds, Draeger tubes will also be used (see Sub-Section 7.0 of this HASP). A combustible gas indicator will be used to monitor the air inside each boring as drilling proceeds to determine the explosion potential in each boring.

7.0 ACTION LEVELS

VOCs were detected in some of the on-site groundwater monitoring wells, and leachate during the most recent sampling activities conducted in January of 1998. As stated in the Section 8.0 of this HASP, work will be conducted under Level D protection. However, protective measures will be followed to minimize the exposure of field personnel to the potential air in the breathing zone for VOCs using a PID. A summary of the VOCs that were found at this site, the maximum concentrations detected, and their current occupational exposure limits is presented in Table 3-2 of the RD HASP. Refer to Table 4-2 of the RD HASP for action levels and PPE requirements.

Measurements will be taken during the drilling of each boring for the presence of explosive vapors using a combustible gas indicator. Work will be discontinued if the meter readings are 10 percent of the LEL or greater at the borehole opening. Work will not resume until the meter reading drops below 10 percent of the LEL. If the reading does not drop below 10 percent within a reasonable period of time (*e.g.*, one-half hour), then water will be added to the borehole to suppress the explosive vapors.

8.0 LEVELS OF PROTECTION

Based upon the hazard evaluation results, all tasks will be performed in Level D protection. In the event that the established action level for vinyl chloride and/or benzene is exceeded, the level of protection will be upgraded to Level C (see Sub-Section 7.0 of this HASP). The following is a description of the personal protective equipment required for each level:

LEVEL D

Hard hat.

Disposable coveralls (optional).

Safety glasses, goggles, or face shield.

Steel-toe and shank, chemical-resistant boots.

Chemical-resistant gloves (optional except when handling soil, sediment or surface water).

Hearing protection, NRR of 35 decibels (mandatory during drilling).

LEVEL C

Full face air purifying respirator equipped with organic vapor cartridges.

Hard hat.

Disposable coveralls (optional).

Safety glasses, goggles, or face shield.

Steel-toe and shank, chemical-resistant boots.

Chemical-resistant gloves (optional except when handling soil, sediment or surface water).

Hearing protection, NRR of 35 decibels (mandatory during drilling).

If the noise levels are found to be disrupting to the community, noise reduction measures will be implemented.

9.0 SITE CONTROL

Prior to the start of the field activities, the SSO will be responsible for the designation of the work, support, and clean zones. The work zone will be an area surrounding the immediate work being performed where the greatest potential hazards exist. Only the necessary workers required to perform the work will be permitted in this zone. A support zone will be established for equipment storage and personnel decontamination. A clean zone will be established for site control of visitors, equipment deliveries, and communications.

For the off-site work activities, the SSO will take additional measures to secure the work area by the area and/or sign posting, in order to deter unauthorized personnel from entering the work area.

10.0 PERSONNEL DECONTAMINATION

A personnel decontamination station will be established in the support zone. Personnel decontamination will consist of washing potentially contaminated items, such as boots and gloves with a mild soap and water solution and a water rinse. All personnel leaving the work zone will go through the decontamination process before leaving the work area.

11.0 GENERAL WORK PRACTICES

The following work practices will be employed at the site:

- The edges of excavations will be avoided by all personnel. Personnel must stay at least 2.5 feet away from the excavation edge. Sampling will be performed from land surface, using remote equipment where possible.

- A supply of personal protective equipment, such as disposable coveralls, outer boots, gloves, etc., will be kept in the clean zone. This will ensure that personnel will have the necessary equipment to conduct their duties in a safe manner.

- Sources of ignition, such as smoking or open flames, are not permitted on the site except in designated areas. Designated areas will be first tested with the air-monitoring equipment to confirm the absence of explosive or toxic vapors, as discussed in the Air Monitoring section of this HASP.

A copy of this HASP will be kept on site at all times for reference.

Pre-entry, tailgate safety meetings will be conducted for each new phase of the job in order to discuss the associated hazards and the necessary equipment. This will be the responsibility of the Site Safety Officer (SSO).

The SSO will inform all subcontractors of the potential hazards associated with this site. A copy of the HASP will be made available for their review.

Eating or drinking will not be permitted in the work areas.

In the event of hazardous weather, work at the site will cease as quickly as practical.

A water spray will be used to control airborne particulate matter, if needed.

Visitors to the site will be required to sign in on a site visitors log.

11.1 Heat Stress

As portions of this job may be conducted during the summer months when ambient temperatures may be high, the following procedures will be followed to recognize and prevent heat stress:

The SSO will monitor the activities of the workers and the conditions of the work environment.

The SSO will monitor the workers for initial signs of heat stress, which include dizziness, nausea, inability to concentrate, impaired performance, and loss of coordination.

The number of rest periods will be increased. The SSO will designate rest areas in shaded areas and when possible in air conditioned environments, such as trailers and cars.

Potable water will be available and all workers will be encouraged to drink throughout the day.

Adjustment of the work schedule will be made, when possible, to conduct labor-intensive tasks during the early morning or later afternoon hours.

12.0 TRAINING

Barton & Loguidice employees attend an initial 40-hour health and safety training course, annual 8-hour refresher training, and 8-hour training for managers for conducting work at hazardous waste sites. These courses satisfy the initial and follow-up training requirements of 29 CFR 1910.120 (OSHA regulation of hazardous waste site activities).

Prior to initiating site work, site personnel (Barton & Loguidice and subcontractors) will be required to attend a training session given by the SSO. This session will include, but is not limited to, the following topics:

- Site history
- Specific hazards
- Hazard recognition
- Standard Operation Procedures
- Decontamination (personnel and equipment)
- Emergency procedures

13.0 EMERGENCY PROCEDURES

The Oswego County Health Department (Evan Walsh) and Office Safety Manager shall be notified of any on-site emergencies, injuries, or illnesses. The SSO will be responsible for ensuring that the appropriate procedures are followed. Emergency services can readily be summoned from cellular telephone(s) that will be located at the site. OSHA Form No. 101 will be completed by the SSO. The following standard emergency procedures will be used by on-site personnel:

13.1 Personal Injury

If personal injury should occur, appropriate first aid will be administered and, if necessary, the injured individual will be sent to the designated medical facility. If the injury does not affect the performance of site personnel; if the cause of the accident has been identified; and if corrective actions have been completed, operations may continue.

13.2 Fire/Explosion

In the event a fire or explosion occurs at the site, the fire department shall be alerted and all personnel moved to a safe distance from the area. A portable fire extinguisher with an ABC rating be available on the site in the event of a small fire where it can be determined that staying in the area to extinguish the fire will not be a hazard to the worker.

13.3 Emergency Telephone Numbers

Emergency telephone numbers and directions to the nearest medical facility are shown below and will be kept by field personnel while on-site. These telephone numbers should be posted next to the closest telephone.

Name	Telephone Number
Oswego County Health Department (Evan Walsh)	(315) 349-3561
Fire Department	(315) 695-2085 (315) 342-1333 (315) 343-8571
Ambulance	(315) 343-1313
Police Department	(315) 598-2111
State Police	(315) 595-1223
Sheriff	(315) 343-5490

Hospital
A.L. Lee Memorial Hospital
South 4th Street
Fulton, New York
(315) 592-2224

13.4 Route to the Hospital

From the landfill, take Silk Road south to Howard. Turn right (west) on Howard. Go to Route 176 (Whitaker Road) and turn left (south). Go through a stop sign and 2 stop lights. At the next stop sign, turn right on Broadway. Go to a stop light and turn left on South 4th Street. The Hospital is about 3 blocks down the street on the right side.

14.0 REFERENCES

American Conference of Governmental Industrial Hygienists (ACGIH). 1991. 1991-1992 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. ACGIH, Cincinnati, Ohio.

CDM Federal Program Corporation. 1991. Volney Landfill Leachate Treatability Report. USEPA Contract No: 68-W9-0024. September 1991.

National Institute for Occupational Safety and Health (NIOSH). 1990. Pocket Guide to Chemical Hazards. Publication No. 90-117. June 1990.

NIOSH/OSHA/USCG/EPA. 1985. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. October 1985.

OSHA. 1991. General Industry: OSHA Safety and Health Standards (29 CFR 1910). U.S. Department of Labor, Washington, D.C. July 1, 1991.

USEPA. 1988. Standard Operating Safety Guidelines. USEPA, Washington, D.C. July 1988.