SITE INVESTIGATION/
FEASIBILITY STUDY WORK PLAN

Parcel 2 - Seneca Street
Buffalo, New York

Prepared By:

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AUGUST 2000
REF. NO. 15867 (1)
This report is printed on recycled paper.

TABLE OF CONTENTS

LIST OF FIGURES
(Following Report)

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

Phase I and Phase II Environmental Site Assessments (ESAs) of the property located at 2137 Seneca Street, Buffalo, New York (Site) were performed between June and August 1999. The Site Assessments were performed by The Fourth River Company on behalf of a prospective purchaser of the property, Walnut Capital Partners. The Site is owned by Franchise Finance Corporation of America (FFCA).

The results of the ESAs, which are summarized in Section 3, indicate that volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals were present in soil and groundwater on the Site at concentrations which exceeded the relevant New York State standards.

On behalf of FFCA, representatives of Hodgson, Russ, Andrews, Woods & Goodyear (HRAWG) and Conestoga-Rovers & Associates (CRA) met with representatives of the New York State Department of Environmental Conservation (NYSDEC) on April 14, 2000. The parties agreed that additional investigative activities are necessary to determine the nature and extent of the presence of chemicals and metals in on-Site soil and groundwater. Therefore, FFCA is undertaking a voluntary Site Investigation/Feasibility Study (SI/FS) to gather the data necessary to further evaluate the conditions at the Site, determine the necessity for remedial action, and select an appropriate remedial alternative. Design and implementation of the selected remedial alternative will proceed following concurrence of the NYSDEC with the selection.

This report presents a summary of the results of the ESAs and a Work Plan for the SI/FS. The Work Plan has been prepared in accordance with the NYSDEC Technical and Administrative Guidance Memoranda (TAGM) 4025, "Guidelines for Remedial Investigations/Feasibility Studies", dated March 1989 which references United States Environmental Protection Agency (USEPA) Remedial Investigation (RI) and FS guidance.

The Work Plan is organized as follows:

i) <u>Section 1.0 - Introduction:</u> The introduction presents an overview of the project to date;

ii) <u>Section 2.0 - Site Location and Description:</u> Descriptions of the Site location, physical condition, and current and historic use are presented in Section 2;

iii) <u>Section 3.0 - Environmental Site Assessment Results:</u> A summary of the results of the ESAs is presented in Section 3;

iv) Section 4.0 - Proposed Site Investigation: The Work Plan for the proposed SI is presented in Section 4;

v) Section 5.0 - Feasibility Study: The components of the FS are described in Section 5.0; and

vi) Section 6.0 - Schedule: A preliminary project schedule is presented in Section 5.

The Field Sampling and Analysis Plan (FSP), Health and Safety Plan (HASP), and Quality Assurance Project Plan (QAPP) for the SI are contained in Appendices C through E.

2.0 SITE LOCATION AND DESCRIPTION

The following information was compiled during the Phase I ESA conducted in June 1999 and will be verified during the SI.

2.1 SITE LOCATION

The Site is located at 2137 Seneca Street in Buffalo, Erie County, New York, and includes the properties at 2137 through 2153 Seneca Street, excluding 2151 Seneca Street. The location of the Site within the City of Buffalo is shown on Figure 2.1.

2.2 SITE DESCRIPTION

The Site comprises approximately 0.5-acre of relatively flat property located on the southwest corner of Seneca Street and Kingston Place. One building, a former restaurant, is currently located on the Site and the majority of the ground surface surrounding the building is paved parking lot.

The Site is located in an urban area and is surrounded by commercial and residential properties. Commercial properties are located adjacent to the Site to the north, east, and west and residential/commercial properties are located to the south.

The ESA reports describe the historic uses of the Site as residential dwellings, a pharmacy, a retail tire establishment, automotive service building, offices, and a dry cleaning establishment. Gasoline filling stations were reportedly located on a adjacent properties (2151 and 2157 Seneca Street). Underground storage tanks were believed to have been present at both these locations. Other uses of properties in the vicinity of the Site were reported to include a printing facility, a metal fabrication shop, a bank, and other retail establishments.

A Site Plan is presented on Figure 2.2.

3.0 ENVIRONMENTAL SITE ASSESSMENT RESULTS

A Phase II ESA was conducted in July 1999. The Phase II ESA consisted of the installation of 12 geoprobe borings with sampling and analyses of on-Site subsurface soil and shallow groundwater. Six borings were advanced near the former dry cleaners, three borings on the property line adjacent to the former gasoline station, two borings near the former automotive service garage, and one boring in the southwest corner of the property. The ESA sample locations are shown on Figure 2.2. Copies of the borehole logs and the tabulated analytical results are presented in Appendices A and B, respectively. Tables 3.1 through 3.3 present summaries of the compounds detected in each environmental media with comparisons to applicable NYSDEC standards.

The following subsections present brief descriptions of the results of the Phase II ESA.

3.1 SUBSURFACE SOIL

One soil sample for chemical analysis was collected from each of nine of the twelve borings installed. The concentrations of the compounds detected in the soil samples are presented in Tables 3.1 and 3.2.

VOCs, primarily trichloroethene (TCE) and tetrachloroethene (PCE), were detected in the three soil samples collected from adjacent to the former dry cleaners (SB-1B, SB-3, and SB-4), with PCE reported at a concentration of 12,000 micrograms per kilogram (μg/Kg) in the sample from SB 3. These soil samples were collected from depths which were below the water table elevation. Further, the borehole logs do not indicate any evidence (HNU readings, visual observations, etc.) of the presence of a source of VOCs, in particular PCE, in the unsaturated soils at these locations. These observations suggest that the detected VOCs are attributable to contaminated groundwater rather than contaminated soil.

Soil samples (SB-9) collected from boreholes SB-6, SB-8, and SB-9 located near the former automotive services center were found to contain polyaromatic hydrocarbons (PAHs) at concentrations exceeding the NYSDEC standards for petroleum contaminated soils.

Elevated concentrations of aromatic hydrocarbons (benzene, toluene, ethylbenzene, and xylenes [BTEX]) were also detected in the soil samples collected from the boreholes located near the automotive services center (SB-6 through SB-10).

3.2 GROUNDWATER

Groundwater was encountered in 9 of the 12 borings installed. The elevation of the water table surface ranged from 10 to 16 feet below ground surface (BGS). Groundwater samples were collected directly from two borings: SB-1B located near the former dry cleaners and SB-6 located near the former automotive service garage.

TCE and PCE were detected at elevated concentrations in the groundwater sample from SB-1B but were not detected in the sample collected from SB-6. Lead was detected in both samples at a concentration of approximately 2,000 micrograms per liter (μg/L). A summary of the concentrations of the compounds detected in the groundwater samples is presented in Table 3.3.

4.0 PROPOSED SITE INVESTIGATION

4.1 PURPOSE

The primary objective of the SI is to gather the data necessary to characterize the on-Site nature and extent of chemical presence in soil and groundwater. The proposed investigation is focussed on those areas where concentrations of chemicals which exceed applicable NYSDEC standards have been identified and in specific areas where contamination may be present as a result of historic Site use.

This Work Plan has been prepared in accordance with the NYSDEC regulations and applicable guidance, including the "Technical and Administrative Guidance Memoranda" prepared by NYSDEC's Division of Hazardous Waste Remediation.

4.2 PROPOSED TASKS

4.2.1 REVIEW AND VERIFICATION OF BACKGROUND INFORMATION

The following activities will be completed to obtain the information necessary to verify the background information presented in the ESA reports and to interpret the environmental data.

i) Sanborn fire insurance maps of the Site and adjacent properties will be obtained and reviewed;

ii) City directory listings for the Site and adjacent properties will be reviewed;

iii) The extent and layout of utility services at and in the vicinity of the property will be determined;

iv) A survey of groundwater users located within a 0.5-mile radius of the Site will be conducted by contacting the Erie County and New York State Health Departments. To the extent possible, residential, commercial, municipal, and industrial groundwater users will be identified; and

v) To the extent possible, as-built drawings of existing and prior buildings at the Site will be obtained and reviewed for pertinent features (e.g., underground storage tanks, sumps, etc.).

If new information regarding previous activities at the Site is obtained before the completion of the SI, specific investigative activities may be modified accordingly.

4.2.2 PREPARATION OF DETAILED WORK PLANS

4.2.2.1 FIELD SAMPLING PLAN

This Work Plan provides a general discussion of the field sampling efforts to be conducted. The FSP contained in Appendix C presents the detailed procedures for the performance of the investigative field activities. The FSP contains specific information regarding numbers of samples, and the frequency, type, and location of samples and field procedures.

4.2.2.2 QUALITY ASSURANCE PROJECT PLAN

A QAPP has been prepared in accordance with appropriate NYSDEC guidance documents. The QAPP describes protocols necessary to achieve specified data quality objectives and is contained in Appendix D.

4.2.2.3 HEALTH AND SAFETY PLAN

A SI HASP has been prepared in accordance with 29 CFR Part 1910 and has been approved by a certified health and safety professional. The plan specifies protective measures and procedures to be followed during the field activities to minimize exposure of workers and the surrounding community to hazardous Site-related materials. The HASP is contained in Appendix E.

4.2.3 SITE SURVEY

The Site will be surveyed and mapped by a licensed land surveyor. The survey will include the Site boundary, existing building and surface features (i.e., manholes, etc.), and surface cover characteristics.

4.2.4 HYDROGEOLOGIC INVESTIGATION

4.2.4.1 MONITORING WELL INSTALLATION

Groundwater monitoring wells will be installed as part of the SI to assess the horizontal and vertical extent of the presence of chemicals in on-Site groundwater. A total of six groundwater monitoring wells will be installed at the approximate locations shown on Figure 2.2 and described below. The actual locations of monitoring well installation will be dependent upon access conditions and the presence of overhead or underground interferences.

i) one shallow groundwater monitoring well (MW-1) screened in the upper 5 to 10 feet of the water table will be installed along the southern Site boundary in the vicinity of ESA borings SB-5 and SB-6;

ii) one shallow groundwater monitoring well (MW-2) will be installed in the approximate center of the Site near ESA boring SB-4;

iii) one shallow groundwater monitoring well (MW-3) will be installed along the northern Site boundary in the vicinity of ESA boring SB-10;

iv) one shallow groundwater monitoring well (MW-5) will be installed along the western site boundary between ESA borings SB-9 and SB-10; and

v) a pair of monitoring wells (MW-4/4A), one screened in the shallow interval and one screened at the top of the till or other confining layer, will be installed along the northern Site boundary in the vicinity of ESA borings SB-1B and SB-3.

All drilling and monitoring well installation protocols will be as described in the FSP.

Upon completion of the monitoring well installations, a field survey will be completed to establish the horizontal location and vertical elevation of each well. The survey will be tied to the Site base map and elevations will be established based on a nearby United States Geological Survey (USGS) datum.

Following installation, each monitoring well will be developed by bailing or pumping and surging in accordance with the protocols contained in the FSP.

4.2.4.2 HYDRAULIC CONDUCTIVITY TESTING

In-situ tests will be completed on each of the monitoring wells to estimate the hydraulic conductivity of the surrounding aquifer. The testing will consist of water level recovery tests conducted immediately following well development and rising and/or falling head slug tests. Rising or falling head test methods will be employed which instantaneously evacuate a known volume of water to decrease the water level in the well or which instantaneously add a slug to raise the water level in the well. In both tests, the aquifer response will be recorded through the monitoring of water levels.

Detailed descriptions of the test methods are provided in the FSP.

4.2.4.3 HYDRAULIC MONITORING

Water level measurements will be collected from all of the monitoring wells on at least two occasions to allow estimation of the direction of groundwater flow across the Site. To allow the wells to equilibrate, the first water level monitoring event will be conducted no sooner than 7 days following the completion of well development.

The first hydraulic monitoring event will be conducted immediately prior to the commencement of the well purging activities associated with groundwater sampling.

Water level measurement techniques are presented in the FSP.

4.3 SAMPLE COLLECTION AND ANALYSES

4.3.1 GROUNDWATER

Groundwater samples will be collected from each of the monitoring wells on one occasion. To allow the wells to equilibrate, the groundwater sampling event will be conducted no sooner than 7 days following the completion of well development.

Prior to initiating the well purging and sampling activities, a complete set of static water levels will be measured to evaluate groundwater flow direction and to calculate the volume of water present in each well. To reduce the possibility of cross-contamination, the wells will be purged and sampled proceeding from those along the southern Site boundary toward those at the northern Site boundary.

Wells will be purged using the following types of equipment:

i) peristaltic pump with dedicated tubing; or
ii) bottom-loading stainless steel or teflon bailer with dedicated polypropylene rope.

All VOC samples will be collected with well-dedicated or precleaned bottom-loading stainless steel and/or teflon bailers and dedicated polypropylene rope.

Detailed sampling protocols are presented in the FSP.

Groundwater samples will be analyzed by a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) and Contract Laboratory Program (CLP) certified laboratory. Samples will be analyzed for the United States Environmental Protection Agency (USEPA) Target Compound List (TCL) VOCs, NYSDEC Spill Technology and Remediation Series (STARS) program semi-volatile organic compounds (SVOCs), and USEPA Target Analyte List (TAL) metals. Analyses will be for the USEPA Target Compound List (TCL) VOCs, NYSDEC Spill Technology and Remediation Series (STARS) program SVOCs, and USEPA Target Analyte List (TAL) metals. All analyses will be performed in accordance with the NYSDEC Analytical Services Protocols (ASP), 1995 revision. Field measurements of turbidity, pH, specific conductance, and temperature will also be taken for all samples collected. These measurements will be recorded on the groundwater sampling field logs.

4.3.2 SOIL

Analytical soil samples will be collected from nine borings and analyzed as described below.

At least one soil sample will be collected from the unsaturated soils in each of the five shallow monitoring well boreholes. Boreholes will be advanced with continuous split spoon samples collected in advance of the augers beginning with a top or surface soil sample at each location. All samples collected will be subject to modified head space analyses. Analytical samples will be selected based on the results of the head-space analyses and other observations (i.e., color, odor, etc.). The samples selected shall be analyzed for the USEPA TCL VOCs, NYSDEC STARS program SVOCs, and USEPA TAL metals.

Two borings, SB-14 and SB-15, will be installed between the north side of the existing building and Kingston Street. These borings will extend to the water table surface and analytical samples from these boreholes will be selected as described previously for the monitoring well borehole samples. Samples will be analyzed for TCL VOCs, STARS SVOCs, and TAL metals. At least one soil sample will be collected from the unsaturated soils in each of these borings.

Three boreholes, SB-11 through SB-13, will be installed surrounding ESA borings SB-8 and SB-9 in the vicinity of the former automotive repair shop to delineate the horizontal and vertical extent of elevated PAH and metal analytes identified in the Phase II ESA. These boreholes will extend to the water table surface. At least one analytical sample will be selected from each borehole and analyzed for the STARS SVOCs and TAL metals. Samples will be selected based upon visual and olfactory evidence of chemical presence. The SVOC and metals data obtained from the boring for MW-5 will be combined with the data from borings SB-11 through SB-13 for the delineation of the extent of the presence of the SVOCs and metals in this area.

The approximate locations of all soil borings are shown on Figure 2.2. Detailed protocols for the collection of soil samples are presented in the FSP.

Soil samples will be analyzed by an ELAP and CLP certified laboratory in accordance with the NYSDEC ASP, 1995 revision.

4.4 DATA VALIDATION

Analytical data collected during the SI will be validated to demonstrate the usability of the data to support the conclusions of the SI. Data will be validated in accordance with the NYSDEC Division of Environmental Remediation "Guidance for the Development of Data Usability Summary Reports" (DUSRs).

All analytical work will be subcontracted to an ELAP and CLP certified laboratory(s). All analytical data generated by the subcontract laboratory(s) will be assessed and validated by an independent Data Validator.

4.5 EXPOSURE ASSESSMENT

An exposure assessment will be performed to identify the potential pathway(s) for exposure of human or ecological receptors to Site-related chemicals. The assessment will consider both on- and off-Site exposure pathways.

4.6 FISH AND WILDLIFE IMPACT ANALYSIS

A field and recovery survey will be performed during the SI to identify land use and land cover in the immediate vicinity of the Site including wetlands, wood lots, drainage courses, and other major wildlife habitats. The need for a more comprehensive assessment of fish and wildlife habitat will be assessed based upon the initial results of the SI in addition to the results of the initial land use/cover survey.

If necessary, an evaluation of sediments will be performed in accordance with the NYSDEC "Technical Guidance for Screening Contaminated Sediments" dated November 1993.

4.7 SITE INVESTIGATION REPORT

Following completion of the SI activities, a draft report will be prepared presenting the results of the SI. The SI report will include all background information, the analytical and testing data collected during ESA and SI, the DUSRs for the SI, an evaluation of the current Site condition, exposure assessment results, fish and wildlife impact analysis, and recommendations for additional work, if deemed necessary. Data will be presented in both tabulated and graphic forms.

The draft SI Report will be submitted to the NYSDEC. Comments by the NYSDEC regarding the draft report will be addressed and the final report will be revised accordingly. The revised SI Report will then be submitted to NYSDEC.

4.8 CITIZEN PARTICIPATION PLAN

FFCA will work cooperatively with NYSDEC in the development and implementation of an acceptable Citizen Participation Plan.

5.0 FEASIBILITY STUDY

A Feasibility Study (FS) will be performed concurrently with the preparation of the SI Report. The components of the FS are:

i) identification of remedial alternatives;

ii) screening of remedial alternatives; and

iii) selection of remedial alternatives.

Each of these components is outlined in the following subsections.

5.1 IDENTIFICATION OF REMEDIAL ALTERNATIVES

The first step in the FS will be the development of potential remedial alternatives. The objective of the development of alternatives will be to identify a range of remedial alternatives that are reflective of appropriate waste management options and which are protective of human health and the environment.

The first step in the development of alternatives will be the development of RAOs which identify the contaminants and media of interest, pathways of exposure, and preliminary remediation goals. Remedial action objectives (RAOs) will be assessed based upon human health and environmental concerns identified in the SI, and upon New York State and Federal requirements that are potential Specific Contaminant Goals (SCGs) given the conditions at the Site. The identification of SCGs will be an iterative process which will continue throughout the SI/FS. SCGs will be identified and modified through the SI/FS as a better understanding of Site conditions, contaminants, and RAOs is gained.

The second step in the development of alternatives will be the development of general response actions. General response actions are media-specific actions (e.g., containment, treatment) which satisfy the RAOs.

In the third step in the development of alternatives, the volumes or areas of contaminated media will be identified based on the Site conditions defined by the SI, the nature and extent of contamination, potential exposure routes, and the level of protectiveness specified by the RAOs.

The fourth step in the development of alternatives will be the identification and screening of remedial technologies and process options. Remedial technology types and process options which address the Site-specific problems will be identified and screened on the basis of technical implementability. Site contaminant information and physical characteristics will be used to evaluate the technical feasibility of identified process options. Infeasible process options will not be considered further.

The fifth step in the development of alternatives will be the evaluation of process options. Each of the process options remaining after the initial screening will be evaluated in greater detail based on the following criteria:

i) Effectiveness: the evaluation of effectiveness addresses the potential effectiveness of process options in handling the estimated areas or volumes of contaminated media and meeting the potential RAOs, the effectiveness of process options in protecting human health and the environment during construction and implementation, and how proven and reliable the process options are relative to Site conditions;

ii) Implementability: implementability includes the technical and administrative feasibility of implementing a process option under such institutional constraints as the availability of treatment, storage, and disposal services, special permitting requirements, and the need and availability of equipment and skilled workers; and

iii) Cost: the capital and operation and maintenance (O&M) costs of each process option will be evaluated relative to the other process options of each technology type.

The sixth and final step of the development of alternatives will be the assembly of remedial alternatives. In this step, general response actions and technology process options which passed the screening will be assembled into alternatives such that the Site impacts are addressed. The alternatives will be developed to represent a range of treatment and containment combinations. For source control actions, a range of alternatives will be developed that utilize, as their principal element, treatment technologies which reduce the toxicity, mobility, or volume of materials. The range of alternatives will include various levels of treatment from those that require no long-term O&M to those requiring extensive management.

5.2 SCREENING OF REMEDIAL ALTERNATIVES

The second phase of the FS will be the screening of alternatives. The objective of this task is to screen the remedial alternatives such that a refined range of the most promising alternatives is identified. The screening of alternatives consists of three steps. The first step will be the refinement of the alternatives as appropriate by incorporating updated information generated in the Remedial Investigation. In the second step, the alternatives will be screened based on effectiveness, implementability, and cost considerations. Third, a decision will be made as to which alternatives should be considered further.

The intent of this task is to reduce the range of alternatives to a manageable number prior to the detailed analysis of alternatives. This task may, therefore, not be necessary if the number of alternatives identified is reasonable. This Work Plan assumes that screening will be required to reduce the number of alternatives initially identified.

The remedial alternatives will be screened utilizing the following criteria:

i) Effectiveness: this criterion relates to the protectiveness an alternative will provide for human health and the environment, both in the short-term and long-term, and the reductions in toxicity, mobility, or volume it will achieve. Alternatives which result in a permanent reduction in the toxicity, mobility, or volume of hazardous constituents shall be considered more effective than those that do not accomplish permanent reductions. Alternatives which would result in an increase in the toxicity, mobility, or volume of hazardous constituents will not be considered further;

ii) Implementability: this criterion relates to the technical and administrative feasibility of implementing the remedial alternative. Technical feasibility involves the ability to construct, operate, and maintain the alternative, as well as monitoring of technical components of an alternative. Administrative feasibility refers to the ability to obtain approvals; the availability of treatment, storage, and disposal services; and the requirements for and availability of specific equipment and specialists; and

iii) Cost: cost estimates will be developed for each of the alternatives. The cost estimates will include capital, O&M, and present worth costs. An alternative whose costs far exceeds that of other alternatives which provide similar results would be eliminated from further consideration. Cost will not be used as the sole deciding factor when comparing alternatives which provide very different health or environment results.

Remedial alternatives with favorable evaluations will be analyzed in detail as outlined in the next subsection.

5.3 SELECTION OF REMEDIAL ALTERNATIVES

The objective of this task will be to evaluate the most promising remedial alternatives in detail to provide the basis for selection of a remedy. The detailed evaluation will include a technical assessment of remedial action alternatives and a cost analysis, as presented below. Prior to the evaluation of alternatives, a detailed description of each alternative will be prepared including any refinements resulting from the acquisition of additional data.

The alternatives will be evaluated based on specific regulatory requirements, technical, cost and institutional considerations, and community and support agency acceptance. The detailed evaluation will consist of an assessment of each alternative against the evaluation criteria described below. The evaluation will also include a comparative analysis identifying the relative performance of each alternative against the criteria. The following criteria will be used to evaluate the alternatives in detail:

i) Overall Protection of Human Health and the Environment: the analysis of each alternative with respect to the overall protection of human health and the environment will provide an evaluation of whether each alternative achieves and maintains adequate protection of human health and the environment and a description of how Site risks are eliminated, reduced, or controlled through treatment, engineering, or institutional controls;

ii) Compliance with SCGs: each alternative will be evaluated to determine whether it will attain Federal and State SCGs;

iii) Long-Term Effectiveness and Permanence: the evaluation of long-term effectiveness and permanence will address the magnitude of residual risk remaining at the Site from untreated material or treatment residuals after alternative implementation and the adequacy and reliability of controls used to manage untreated materials or treatment residuals. The magnitude of residual risks remaining after the implementation of a remedial alternative will be assessed in terms of the amounts and concentrations of the remaining hazardous materials considering the persistence, toxicity, and mobility of the hazardous substances with respect to human health and fish and wildlife resources. Long-term management controls include engineering controls (e.g., containment technologies), institutional controls, monitoring, and O&M. The potential need for replacement of the remedy will also be evaluated;

iv) Reduction of Toxicity, Mobility, or Volume: the degree to which the alternatives employ treatment that reduces toxicity, mobility, or volume of the hazardous materials will be evaluated. The factors that will be considered include:

a) the treatment technologies utilized and the materials they would treat,

b) the amount of hazardous materials that would be destroyed or treated,

c) the expected degree of reduction of toxicity, mobility, or volume of the hazardous materials,

d) the degree to which treatment is irreversible,

e) the type and quantity of residuals that would remain following treatment of hazardous materials. This will include consideration of the persistence, toxicity, and mobility of the residuals, and

f) the results of treatability studies, if performed;

v) Short-Term Effectiveness: the short-term effectiveness of each alternative will be evaluated with respect to the protection of workers and the community during construction and implementation of the alternative, environmental effects resulting from implementation of the alternative, and the time required to achieve remedial objectives;

vi) Implementability: the ease or difficulty of implementing each alternative will be evaluated. The following factors will be considered:

a) the degree of difficulty in constructing the technologies associated with the alternative,

b) the expected reliability of the technologies associated with the alternative,

c) the need to coordinate with or obtain permits and approvals from government agencies in order to implement the alternative,

d) the availability of necessary equipment and specialists,

e) the available capacity and location of treatment, storage, and disposal services necessary for implementation,

f) the availability of prospective technologies that are under consideration,

g) the ability to monitor the effectiveness of the remedy, and

h) the ease of undertaking additional remedial actions, if required;

vi) Costs: The costs that will be evaluated include:

a) capital costs,

b) O&M costs,

c) present worth of capital costs and O&M costs,

d) potential future remedial action costs, and

e) services and materials;

vii) Community Acceptance: community positions on specific alternatives that are documented during preparation of the SI/FS will be addressed during the detailed analysis of alternatives; and

viii) Regulatory Acceptance: regulatory acceptance will be addressed following the public comment period.

The detailed analysis of each of the alternatives will be compiled and the alternatives will be compared to each other based on the evaluation criteria. Particular attention will be paid to the relationship between protectiveness and costs of remedial alternatives.

The results of the detailed analysis of alternatives will be the identification of one alternative which is preferred over the others. In accordance with Superfund Amendments and Reauthorization Act (SARA), the preferred alternative must be protective of human health and the environment, cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The preferred alternative should also attain Federal and State SCGs unless circumstances dictate otherwise. The preferred alternative should represent the best balance of the evaluation criteria.

5.4 FEASIBILITY STUDY REPORT

The objective of this task will be to develop a report which presents the results of the FS. The FS Report will generally follow the outline below:

i) introduction;

ii) development of alternatives;

iii) screening of alternatives;

iv) detailed analysis of alternatives (in accordance with Section 5.2.4 of NYSDEC TAGM 4030, "Selection of Remedial Actions at Inactive Hazardous Waste Sites");

v) selection of remedy;

vi) conceptual design;

vii) tables;

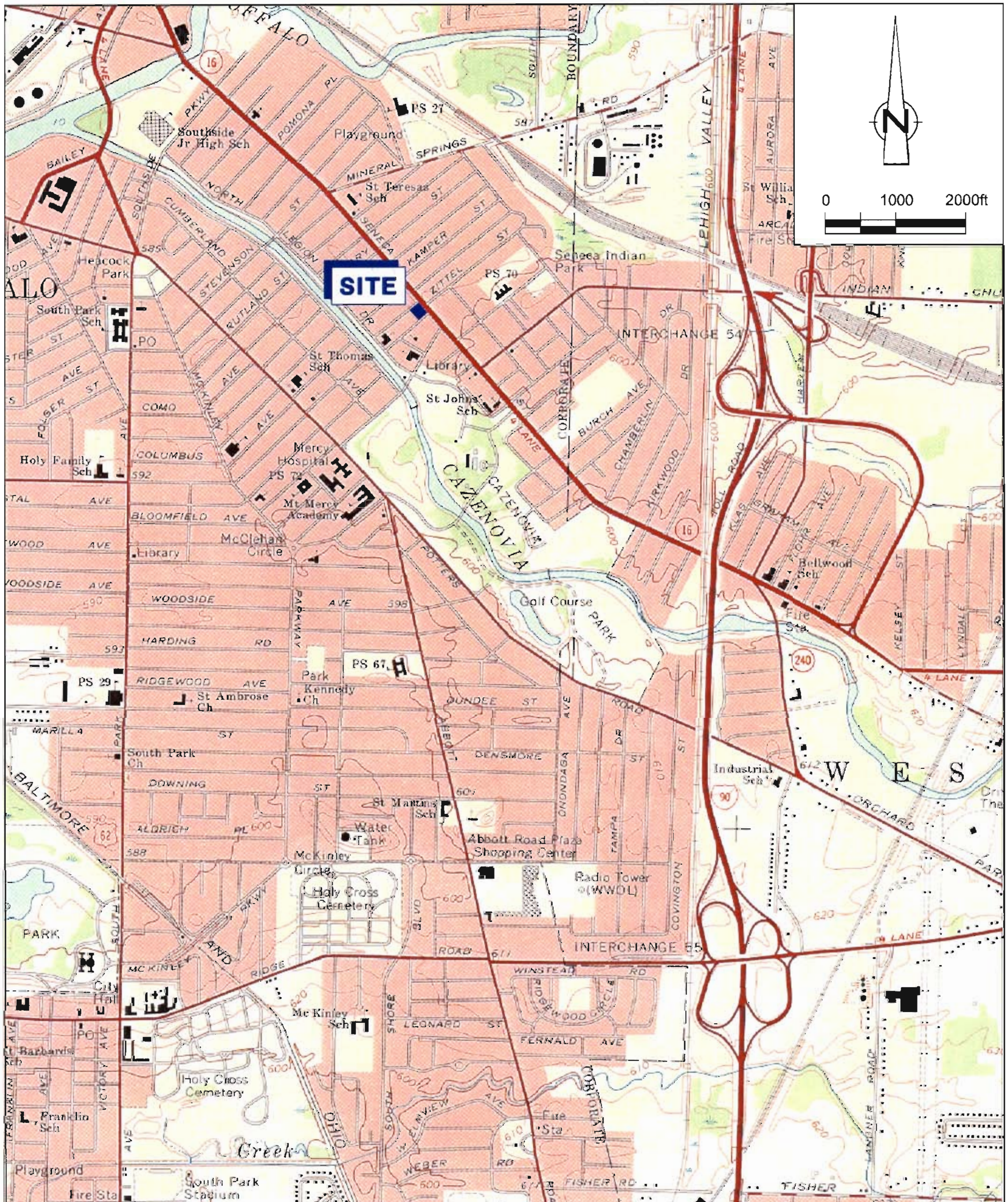
viii) figures; and

ix) appendices.

The development and evaluation of the remedial alternatives will be summarized in a draft FS Report submitted to NYSDEC. Comments by the NYSDEC on the draft report will be addressed and the draft report will be revised accordingly. The revised FS Report will then be submitted to the NYSDEC.

6.0 PROJECT SCHEDULE

The tentative schedule for the SI/FS is presented on Figure 6.1.



SOURCE:

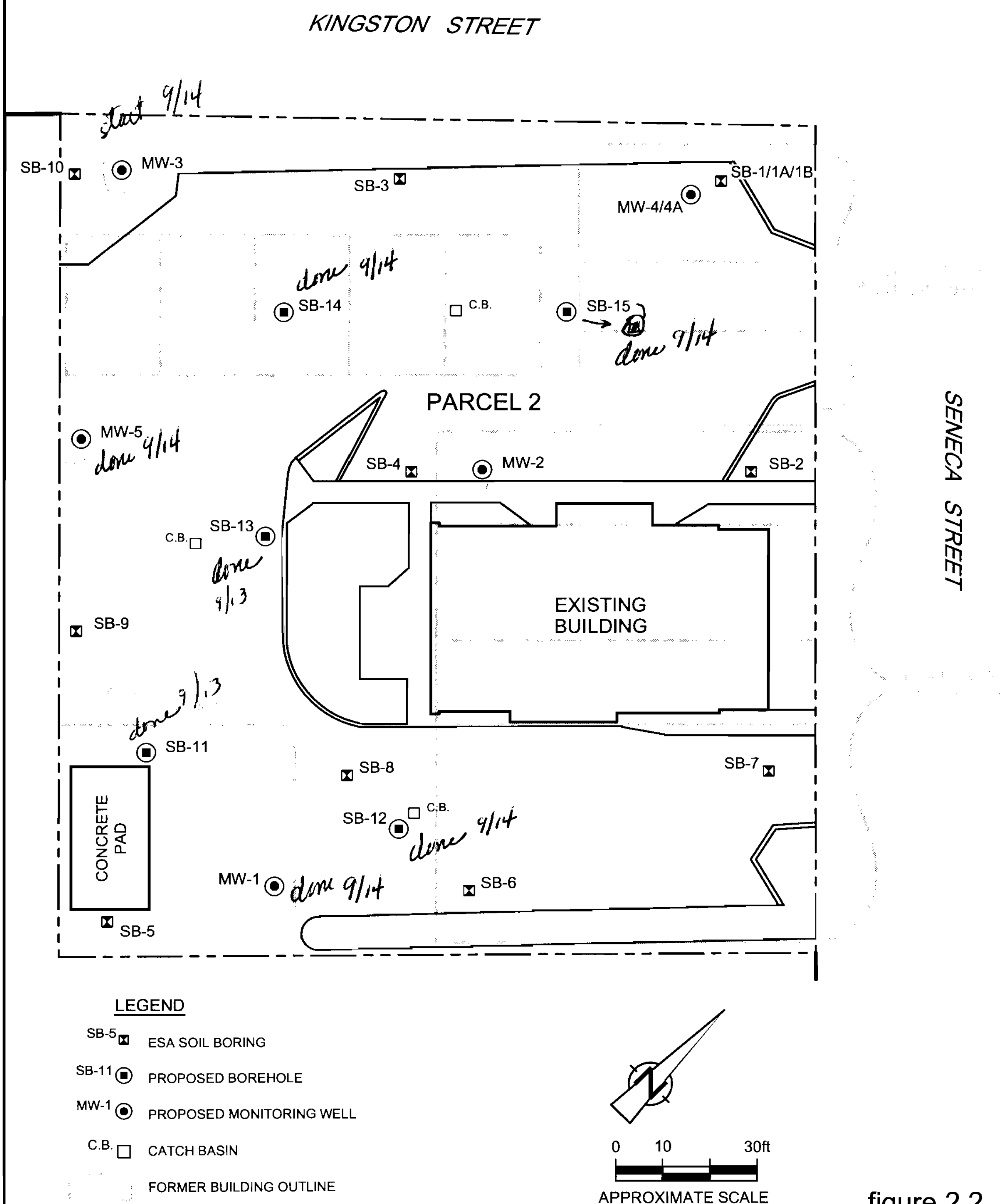
USGS BUFFALO SE, NY
QUADRANGLE, 1965.

figure 2.1

SITE LOCATION PLAN
PARCEL 2, SENECA STREET
Buffalo, New York

CRA

15867-00(001)GN-NF001 AUG 16/2000



NOTE:

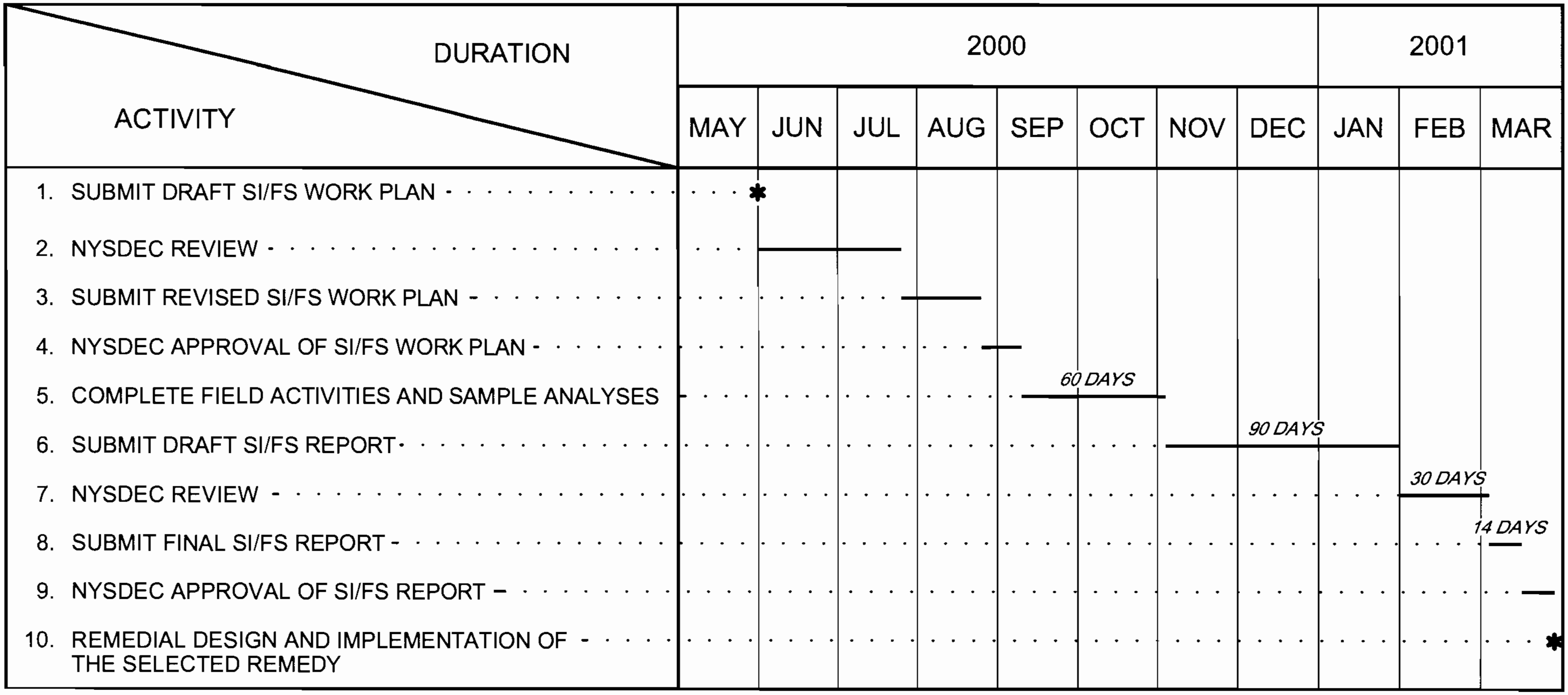
SOURCE OF BUILDING OUTLINES ARE SANBORN FIRE INSURANCE MAPS.

figure 2.2

SITE PLAN AND SAMPLE LOCATIONS
PARCEL 2, SENECA STREET
Buffalo, New York

CRA

15867-00(001)GN-NF003 AUG 16/2000



LEGEND

* MILESTONE EVENT

—— CONTINUOUS ACTIVITY

NOTE:

SCHEDULE WILL BE UPDATED FOLLOWING COMPLETION OF THE RI AND FS REPORTS TO REFLECT ADDITIONAL WORK ACTIVITIES.

figure 6.1

PROPOSED PROJECT SCHEDULE
PARCEL 2, SENECA STREET
Buffalo, New York

CRA

15867-00(001)GN-NF008 AUG 16/2000

TABLE 3.1

VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

		Sample Location:	*SB-1B*	*SB-3*	*SB-4*	*SB-6*	*SB-7*	*SB-8*	*SB-9*	*SB-10*
		Sample Depth (feet BGS):	*8-12*	*12-16*	*12-16*	*8-12*	*8-12*	*4-8*	*0-4*	*8-12*
		Sample Date:	*7/21/99*	*7/21/99*	*7/21/99*	*7/21/99*	*7/21/99*	*7/21/99*	*7/21/99*	*7/21/99*
Compound	*Units*	*Recommended Cleanup* (1)								
Methylene chloride	ug/Kg	100	20	7	3	NA	NA	NA	NA	NA
Acetone	ug/Kg	200	ND 100	ND 100	25	NA	NA	NA	NA	NA
Trichloroethene	ug/Kg	700	2	54	12	NA	NA	NA	NA	NA
Tetrachloroethene	ug/Kg	1400	15	12000	421	NA	NA	NA	NA	NA
Toluene	ug/Kg	1500	3	ND 5	ND 5	1.5	2.7	7.0	1.9	5.9
m,p-xylene	ug/Kg	1200	2	ND 5	ND 5	ND 2.8	ND 2.8	7.5	ND 2.8	7.6
o-xylene	ug/Kg	1200	ND 5	ND 5	ND 5	ND 1.7	ND 1.7	ND 1.7	ND 1.7	ND 1.7
Benzene	ug/Kg	60	ND 5	ND 5	ND 5	ND 1	ND 1	5.1	ND 1	ND 1
Ethylbenzene	ug/Kg	5500	ND 5	ND 5	ND 5	ND 1	ND 1	1.8	ND 1	ND 1

Notes:
(1) "Determination of Soil Cleanup Objectives and Cleanup Levels", NYSDEC Technical and Administrative Guidance Memorandum 4046, April 1995.
BGS Below Ground Surface.
NA Not Analyzed.
NDx Non-detect at associated value.

TABLE 3.2

SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

		Guidance Values [1]		Sample Location:	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10
				Sample Depth (feet BGS):	12-18	8-12	8-12	4-8	0-4	8-12
				Sample Date:	07/21/99	07/21/99	07/21/99	07/21/99	07/21/99	07/21/99
Compound	*Units*	*Soil* [2]	*Groundwater* [3]							
Anthracene	ug/Kg	20000000	1000		ND 330	ND 330	ND 330	164	ND 330	ND 330
Fluorene	ug/Kg	3000000	1000		ND 330	ND 330	ND 330	89	ND 330	ND 330
Phenanthrene	ug/Kg	NV	1000		ND 330	160	ND 330	979	ND 330	ND 330
Pyrene	ug/Kg	2000000	1000		ND 330	242	ND 330	1340	12600	ND 330
Benzo(a)anthracene	ug/Kg	220	0.04		ND 330	89	ND 330	450	6340	ND 330
Fluoranthene	ug/Kg	3000000	1000		ND 330	258	ND 330	1280	8330	ND 330
Benzo(b)fluroanthene	ug/Kg	220	0.04		ND 330	157	ND 330	513	6280	ND 330
Benzo(k)fluroanthene	ug/Kg	220	0.04		ND 330	87	ND 330	475	4080	ND 330
Benzo(a)pyrene	ug/Kg	61	0.04		ND 330	87	ND 330	520	6080	ND 330
Dibenzo(a,h)anthracene	ug/Kg	14	1000		ND 330	ND 330	ND 330	ND 330	1690	ND 330
Benzo(g,h,i)perylene	ug/Kg	NV	0.04		ND 330	ND 330	ND 330	328	3420	ND 330
Indeno(1,2,3-cd)pyrene	ug/Kg	NV	0.04		ND 330	ND 330	ND 330	275	3180	ND 330
Chrysene	ug/Kg	NV	0.04		ND 330	129	ND 330	514	6670	ND 330

Notes:
(1) STARS Memo #1, Petroleum Contaminated Soil Guidance Policy, August 1992.
(2) For demonstration of human health protection.
(3) For demonstration of groundwater protection.
BGS Below Ground Surface.
ND Non-detect at associated value.
NV No Value.

TABLE 3.3

COMPOUNDS DETECTED IN GROUNDWATER
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

		Sample Location:	*SB-1B*	*SB-6*
		Sample Depth (feet BGS):	*10*	*12*
		Sample Date:	*07/21/99*	*07/21/99*
Compound	*Units*	*Standard* [(1)]		
Trichloroethene	ug/L	5	537	ND 5
Tetrachloroethene	ug/L	5	12600	ND 5
Ethylbenzene	ug/L	5	7.1	ND 1.3
m,p-xylene	ug/L	5	2.3	ND 2.8
o-xylene	ug/L	5	2.3	ND 1.7
Lead	ug/L	25	2280	1820

Notes:
No semi-volatile organic compounds (SVOCs) detected in groundwater.
(1) 6NYCRR 703.5, "Surface Water and Groundwater Quality Standards and Groundwater Effluent Limits, September 1999.
BGS Below Ground Surface.
NDx Non-detect at associated value.

APPENDIX A

STRATIGRAPHIC LOGS

Boring Log
The Fourth River Company

Project No:	1240
Boring No:	SB - 1
Page No:	1 / 1
Date Begun:	07/21/99
Date Finished:	07/21/99
Well Installed:	no

Client:	Walnut Capital	Location:	Buffalo, NY	
Driller:	Zebra Environmental	Engineer:	jch	
Method:	Geoprobe	Elevation:	n/a	ground
Diameter:	2"	Elevation:	n/a	TOC/TOR

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
	0			1	brown SILT, some Clay (TOPSOIL), little Grass, trace Sand	
				2		
				3	refusal @ 2' on suspected concrete	
				4		
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

Boring Log
The Fourth River Company

Client:	*Walnut Capital*	Location:	*Buffalo, NY*
Driller:	*Zebra Environmental*	Engineer:	*jch*
Method:	*Geoprobe*	Elevation:	*n/a* ground
Diameter:	*2"*	Elevation:	*n/a* TOC/TOR

Project No:	*1240*
Boring No:	*SB - 1A*
Page No:	*1 / 1*
Date Begun:	*07/21/99*
Date Finished:	*07/21/99*
Well Installed:	*no*

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
					ASPHALT	
	0			*1*	*grey SAND, GRAVEL and SLAG (FILL)*	
				2	*refusal @ 1.5' on suspected concrete*	
				3		
				4		
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

Boring Log

The Fourth River Company

Project No:	1240
Boring No:	SB - 1B
Page No:	1 / 1
Date Begun:	07/21/99
Date Finished:	07/21/99
Well Installed:	no

Client:	Walnut Capital	Location:	Buffalo, NY
Driller:	Zebra Environmental	Engineer:	jch
Method:	Geoprobe	Elevation:	n/a ground
Diameter:	2"	Elevation:	n/a TOC/TOR

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
	42		0.5	0–4	brown SILT, some Clay, little Grass (TOPSOIL) (to 1) brown f SAND and CLAYEY SILT (2–4) brown and grey SILTY CLAY	
	48		0.5	4–8	brown CLAYEY SILT and f SAND	damp @ 8'
SB-1B, 3	46		0.5	8–12	brown SAND and SILT, some Rock fragments, some Wood	wet @ 10'
	42		0.5	12–16	(12–14) brown SAND and SILT, some Clay (14–16) grey SAND and GRAVEL, some Clay	wet
				16–20	boring terminated @ 16' SB-1B GW sampled	

Boring Log
The Fourth River Company

Client:	Walnut Capital	Location:	Buffalo, NY	Project No:	1240
Driller:	Zebra Environmental	Engineer:	jch	Boring No:	SB - 2
Method:	Geoprobe	Elevation:	n/a ground	Page No:	1 / 1
Diameter:	2"	Elevation:	n/a TOC/TOR	Date Begun:	07/21/99
				Date Finished:	07/21/99
				Well Installed:	no

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
	0			1 2	ASPHALT grey SLAG, SAND and GRAVEL (FILL)	
				3 4 5 6 7 8 9 10 11 12	refusal @ 2' on suspected concrete	
				13 14 15 16 17 18 19 20		

Boring Log
The Fourth River Company

Client:	*Walnut Capital*	Location:	*Buffalo, NY*
Driller:	*Zebra Environmental*	Engineer:	*jch*
Method:	*Geoprobe*	Elevation:	*n/a* ground
Diameter:	*2"*	Elevation:	*n/a* TOC/TOR

Project No:	*1240*
Boring No:	*SB - 3*
Page No:	*1 / 1*
Date Begun:	*07/21/99*
Date Finished:	*07/21/99*
Well Installed:	*no*

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
	42		*0*	1, 2, 3, 4	*brown SILT, some Clay, some Grass (TOPSOIL)*; *brown SILTY CLAY, some f Sand*	*tree root @ 3'*
	48		*0.5*	5, 6, 7, 8	*brown SILTY CLAY, some f Sand, trace Roots*	
	42		*0.5*	9, 10, 11, 12	*brown f SAND, some Silt, trace Gravel, rock fragments*	*wet @ 10'*
SB-3, 4	*18*		*6*	13, 14, 15, 16	*brown f SAND and GRAVEL, trace rock fragments*	*wet*
	36		*2*	17, 18, 19, 20	*brown c SAND and GRAVEL, trace Silt*	*wet*

boring terminated @ 20'

Boring Log
The Fourth River Company

Project No:	1240
Boring No:	SB - 4
Page No:	1 / 1
Date Begun:	07/21/99
Date Finished:	07/21/99
Well Installed:	no

Client:	Walnut Capital	Location:	Buffalo, NY	
Driller:	Zebra Environmental	Engineer:	jch	
Method:	Geoprobe	Elevation:	n/a	ground
Diameter:	2"	Elevation:	n/a	TOC/TOR

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
	42		0.5	1 2 3 4	ASPHALT grey SLAG, GRAVEL and SAND (FILL) brown SILTY CLAY	
	42		0.5	5 6 7 8	brown SILTY CLAY, some Clayey Silt, trace Sand, trace Gravel, trace Wood @ 8'	damp @ 8'
	48		0.5	9 10 11 12	brown c SAND, some Gravel, some brown to grey Silt, trace Clay	wet @ 10'
SB - 4, 4	24		1.5	13 14 15 16	brown c SAND and GRAVEL, some brown to grey Silt, trace Wood	wet
				17 18 19 20	boring terminated @ 16'	

Boring Log
The Fourth River Company

Client:	Walnut Capital	**Location:**	Buffalo, NY	**Project No:**	1240
Driller:	Zebra Environmental	**Engineer:**	jch	**Boring No:**	SB - 5
Method:	Geoprobe	**Elevation:**	n/a ground	**Page No:**	1 / 1
Diameter:	2"	**Elevation:**	n/a TOC/TOR	**Date Begun:**	07/21/99
				Date Finished:	07/21/99
				Well Installed:	no

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
	42		0.5	1–2	grey SLAG and SAND, some Mulch	
				3–4	brown to grey SILTY CLAY	
	48		0.5	5–8	brown w/light grey mottling SILTY CLAY, trace Slag	
	48		0.5	9–12	brown w/light grey SILTY CLAY, trace Sand and Gravel	
SB - 5, 4	48		0.5	13–16	brown SILTY CLAY, some grey mf Sand, trace Gravel	damp
	48		0.5	17–20	grey SILTY CLAY, some f Sand, trace Gravel	wet @ 16'

boring terminated at 20'

Boring Log
The Fourth River Company

Project No: 1240
Boring No: SB - 6
Page No: 1 / 1
Date Begun: 07/21/99
Date Finished: 07/21/99
Well Installed: no

Client: Walnut Capital
Driller: Zebra Environmental
Method: Geoprobe
Diameter: 2"

Location: Buffalo, NY
Engineer: jch
Elevation: n/a ground
Elevation: n/a TOC/TOR

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
	42		0.5	1	brown MULCH, some Sand and Gravel (FILL)	
				2		
				3	brown SILT and CLAY, trace Gravel	
				4		
	48		0.5	5	brown SILT and CLAY, some Clayey Silt, trace Gravel	
				6		
				7		
				8		
SB - 6, 3	48		0.5	9	brown SILT and CLAY, some Clayey Silt, trace Gravel	
				10		
				11		
				12		wet @ 12'
	48		0.5	13	brown to grey SILTY CLAY, some c Sand and Gravel, trace Wood	
				14		wet
				15		
				16		
				17	boring terminated @ 16' SB-7 GW sampled	
				18		
				19		
				20		

Boring Log

The Fourth River Company

Client:	Walnut Capital	Location:	Buffalo, NY	Project No:	1240
Driller:	Zebra Environmental	Engineer:	jch	Boring No:	SB - 7
Method:	Geoprobe	Elevation:	n/a ground	Page No:	1 / 1
Diameter:	2"	Elevation:	n/a TOC/TOR	Date Begun:	07/21/99
				Date Finished:	07/21/99
				Well Installed:	no

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
					ASPHALT	
				1	grey SLAG, SAND and GRAVEL (FILL)	
	44		0.5	2	brown to black SILT and CLAY	
				3		
				4		
				5	brown SILT, some mf Sand, some Silty Clay	
	48		0.5	6		
				7		
				8		
				9	brown SILT, some mf Sand, some Silty Clay, trace Gravel	
SB - 7, 3	48		0.5	10		wet @ 10'
				11		
				12		
				13	grey mf to c SAND, some Silt, trace Gravel, trace Clay, trace Wood	
	48		0.5	14		wet
				15		
				16		
				17	boring terminated @ 16'	
				18		
				19		
				20		

Boring Log
The Fourth River Company

Project No:	1240
Boring No:	SB - 8
Page No:	1 / 1
Date Begun:	07/21/99
Date Finished:	07/21/99
Well Installed:	no

Client:	Walnut Capital	Location:	Buffalo, NY		
Driller:	Zebra Environmental	Engineer:	jch		
Method:	Geoprobe	Elevation:	n/a	ground	
Diameter:	2"	Elevation:	n/a	TOC/TOR	

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
					ASPHALT	
				1	grey SLAG, SAND and GRAVEL (FILL)	
	42		0.5	2	brown to grey SILT and CLAY, trace Sand	
				3		
				4		
				5	brown to grey SILT and CLAY, some Sand and Gravel (FILL)	
SB - 8, 2	48		1	6		
				7		
				8		damp @ 8'
				9	brown m SAND, some Gravel, some brown to grey Silt and Clay	
	24		0.5	10		damp to wet
				11		
				12		
				13	brown to grey SILT, some Sand and Gravel, trace Clay	
	24		0.5	14		wet
				15		
				16		
					boring terminated @ 16'	
				17		
				18		
				19		
				20		

Boring Log
The Fourth River Company

Client:	*Walnut Capital*	**Location:**	*Buffalo, NY*	**Project No:**	*1240*
Driller:	*Zebra Environmental*	**Engineer:**	*jch*	**Boring No:**	*SB - 9*
Method:	*Geoprobe*	**Elevation:**	*n/a* ground	**Page No:**	*1 / 1*
Diameter:	*2"*	**Elevation:**	*n/a* TOC/TOR	**Date Begun:**	*07/21/99*
				Date Finished:	*07/21/99*
				Well Installed:	*no*

Sample Number	Recovery (in)	Blows per 6-inch	HNu (ppm)	Depth	Classification	Notes
					ASPHALT	
				1	*grey SAND, GRAVEL and SLAG (FILL)*	
SB - 9, 1	*44*		*1.5*	2		*oil or tar-like substance @ 2'*
				3	*dark brown SILT and SAND*	
				4		
				5	*brown and grey SILT and CLAY, trace Sand and Gravel*	
	48		*0.5*	6		
				7		
				8		
				9	*brown mf SAND, some Silt, some Gravel, trace Clay*	
	24		*0.5*	10		
				11		*wet @ bottom*
				12		
				13	*brown to grey m SAND, some Silt and Clay, some Gravel, trace Wood @ 14'*	
	48		*0.5*	14		*wet*
				15		
				16		
					boring terminated @ 16'	
				17		
				18		
				19		
				20		

APPENDIX B

PHASE II ESA ANALYTICAL DATA

Table 1
Analytical Results for USEPA Target Compound List VOCs
Seneca Street at Kingston Place
Buffalo, New York
FRC Project number 1240

	Sample	SB-1B,3	SB-3,4	SB-4,4	Sample	SB1B-GW	SB6-GW
	Depth (ft.)	8 to 12	12 to 16	12 to 16	Depth (ft.)	10	12
	Medium	soil	soil	soil	Medium	water	water
Compound	Units	7/21/99	7/21/99	7/21/99	Units	7/21/99	7/21/99
Volatiles SW-846							
Chloromethane	ug/Kg	<10	<10	<10	ug/L	<10	<10
Bromomethane	ug/Kg	<10	<10	<10	ug/L	<10	<10
Vinyl chloride	ug/Kg	<10	<10	<10	ug/L	<10	<10
Chloroethane	ug/Kg	<10	<10	<10	ug/L	<10	<10
Methylene chloride	ug/Kg	**20**	**7**	**3**	ug/L	<5	<5
Acetone	ug/Kg	<100	<100	**25**	ug/L	<100	<100
Carbon disulfide	ug/Kg	<5	<5	<5	ug/L	<5	<5
1,1-Dichloroethene	ug/Kg	<5	<5	<5	ug/L	<5	<5
1,1-Dichloroethane	ug/Kg	<5	<5	<5	ug/L	<5	<5
Trans-1,2-dichloroethene	ug/Kg	<5	<5	<5	ug/L	**2**	<5
Chloroform	ug/Kg	<5	<5	<5	ug/L	<5	<5
2-butanone	ug/Kg	<100	<100	<100	ug/L	<100	<100
1,2-Dichloroethane	ug/Kg	<5	<5	<5	ug/L	<5	<5
1,1,1-Trichloroethane	ug/Kg	<5	<5	<5	ug/L	<5	<5
Carbon tetrachloride	ug/Kg	<5	<5	<5	ug/L	<5	<5
Vinyl acetate	ug/Kg	<50	<50	<50	ug/L	<50	<50
Bromodichloromethane	ug/Kg	<5	<5	<5	ug/L	<5	<5
1,2-dichloropropane	ug/Kg	<5	<5	<5	ug/L	<5	<5
cis-1,3-dichloropropene	ug/Kg	<5	<5	<5	ug/L	<5	<5
Tricholorethene	ug/Kg	**2**	**54**	**12**	ug/L	**537**	<5
Benzene	ug/Kg	<5	<5	<5	ug/L	<5	<5
Dibromochloromethane	ug/Kg	<5	<5	<5	ug/L	<5	<5
trans-1,3-dichloropropene	ug/Kg	<5	<5	<5	ug/L	<5	<5
1,1,2-trichloroethane	ug/Kg	<5	<5	<5	ug/L	<5	<5
2-chloroethylvinyl ether	ug/Kg	<10	<10	<10	ug/L	<10	<10
Bromoform	ug/Kg	<5	<5	<5	ug/L	<5	<5
4-methyl-2-pentanone	ug/Kg	<50	<50	<50	ug/L	<50	<50
2-hexanone	ug/Kg	<50	<50	<50	ug/L	<50	<50
Tetrachloroethene	ug/Kg	**15**	**12000**	**421**	ug/L	**12600**	<5
1,1,2,2-tetrachloroethane	ug/Kg	<5	<5	<5	ug/L	<5	<5
Toluene	ug/Kg	**3**	<5	<5	ug/L	<5	<5
Chlorobenzene	ug/Kg	<5	<5	<5	ug/L	<5	<5
Ethylbenzene	ug/Kg	<5	<5	<5	ug/L	<5	<5
Styrene	ug/Kg	<5	<5	<5	ug/L	<5	<5
m,p-xylene	ug/Kg	**2**	<5	<5	ug/L	<5	<5
o-xylene	ug/Kg	<5	<5	<5	ug/L	<5	<5

Values in bold indicate the presence of the compound above the method detection limit.

Table 2
Analytical Results for NYSDEC Petroleum-Contaminated Soil Guidance Policy VOCs, SVOCs and Lead
Seneca Street at Kingston Place
Buffalo, New York
FRC Project number 1240

Compound	Sample	SB-5,4	SB-6,3	SB-7,3	SB-8,2	SB-9,1	SB-10, 3	Sample	SB1B-GW	SB6-GW
	Depth (ft.)	12 to 16	8 to 12	8 to 12	4 to 8	0 to 4	8 to 12	Depth (ft.)		
	Medium	soil	soil	soil	soil	soil	soil	Medium	water	water
	Units	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	7/21/99	Units	7/21/99	7/21/99
Volatiles - TCLP 8021 - NYDEC										
Methyl-t-butylether	ug/Kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	ug/L	<5.0	<5.0
Benzene	ug/Kg	<1.0	<1.0	<1.0	**5.1**	<1.0	**2.7**	ug/L	<0.7	<0.7
Toluene	ug/Kg	<1.0	**1.5**	**2.7**	**7**	**1.9**	**5.9**	ug/L	<1.0	<1.0
Ethylbenzene	ug/Kg	<1.3	<1.3	<1.3	**1.8**	<1.3	<1.3	ug/L	**7.1**	<1.3
m,p-xylene	ug/Kg	<2.8	<2.8	<2.8	**7.5**	<2.8	**7.6**	ug/L	**5.3**	<2.8
o-xylene	ug/Kg	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	ug/L	**2.3**	<1.7
Isopropylbenzene	ug/Kg	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	ug/L	<1.6	<1.6
n-propylbenzene	ug/Kg	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	ug/L	<1.7	<1.7
1,3,5-trimethylbenzene	ug/Kg	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	ug/L	<1.7	<1.7
tert-butylbenzene	ug/Kg	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	ug/L	<3.6	<3.6
1,2,4-trimethylbenzene	ug/Kg	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	ug/L	<1.4	<1.4
sec-butylbenzene	ug/Kg	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	ug/L	<2.2	<2.2
p-isopropyltoluene	ug/Kg	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	ug/L	<1.8	<1.8
n-butylbenzene	ug/Kg	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	ug/L	<2.8	<2.8
Naphthalene	ug/Kg	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	ug/L	<1.6	<1.6
Metals										
Lead	mg/Kg	10.6	16	14.3	13.2	488	11.9	mg/l	2.28	1.82
TCLP 8270 - NYDEC BN List										
Anthracene	ug/Kg	<330	<330	<330	**164**	<330	<330	ug/L	<10	<10
Fluorene	ug/Kg	<330	<330	<330	**89**	<330	<330	ug/L	<10	<10
Phenanthrene	ug/Kg	<330	**160**	<330	**979**	**2330**	<330	ug/L	<10	<10
Pyrene	ug/Kg	<330	**242**	<330	**1340**	**12600**	<330	ug/L	<10	<10
Acenaphthene	ug/Kg	<330	<330	<330	<330	<330	<330	ug/L	<10	<10
Benzo(a)anthracene	ug/Kg	<330	**89**	<330	**450**	**6340**	<330	ug/L	<10	<10
Fluoranthene	ug/Kg	<330	**258**	<330	**1280**	**8330**	<330	ug/L	<10	<10
Benzo(b)fluoranthene	ug/Kg	<330	**157**	<330	**513**	**6280**	<330	ug/L	<10	<10
Benzo(k)fluoranthene	ug/Kg	<330	**87**	<330	**475**	**4080**	<330	ug/L	<10	<10
Benzo(a)pyrene	ug/Kg	<330	**87**	<330	**520**	**6080**	<330	ug/L	<10	<10
Dibenzo(a,h)anthracene	ug/Kg	<330	<330	<330	<330	**1690**	<330	ug/L	<10	<10
Benzo(g,h,i)perylene	ug/Kg	<330	<330	<330	**328**	**3420**	<330	ug/L	<10	<10
Indeno(1,2,3-cd)pyrene	ug/Kg	<330	<330	<330	**275**	**3180**	<330	ug/L	<10	<10
Napthalene	ug/Kg	<330	<330	<330	<330	<330	<330	ug/L	<10	<10
Chrysene	ug/Kg	<330	**129**	<330	**514**	**6670**	<330	ug/L	<10	<10

Values in bold indicate the presence of the compound above the method detection limit

APPENDIX C

FIELD SAMPLING PLAN

TABLE OF CONTENTS

LIST OF FIGURES
(Following Appendix C)

LIST OF TABLES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

1.1 SITE BACKGROUND

Phase I and Phase II Environmental Site Assessments (ESAs) of the property located at 2137 Seneca Street, Buffalo, New York (Site) were performed between June and August 1999. The ESAs were performed by The Fourth River Company on behalf of a prospective purchaser of the property, Walnut Capital Partners. The Site is owned by Franchise Finance Corporation of America (FFCA).

The results of the ESAs indicate that volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals are present in soil and groundwater on the Site at concentrations which exceeded the relevant New York State standards.

This Field Sampling Plan (FSP) has been prepared to present a description of the field investigatory efforts associated with the Site Investigation. A detailed description of the Site is presented in Section 2.0 of the Work Plan.

1.2 SAMPLING OBJECTIVES

The primary objective of the Site Investigation is to gather the data necessary to characterize the on-Site nature and extent of chemical presence in soil and groundwater. The proposed investigation is focussed on those areas where concentrations of chemicals which exceed applicable NYSDEC standards have been identified and in specific areas where contamination may be present as a result of historic Site use.

Existing information indicates that VOCs, primarily tetrachloroethene (PCE) and trichloroethene (TCE), are present in on-Site groundwater and that some SVOCs and metals are present in on-Site soils at elevated concentrations. Soil borings and groundwater monitoring wells will be installed and sampled to gather the data necessary to assess the vertical and horizontal extent of chemical presence on the Site.

2.0 GROUNDWATER

2.1 MONITORING WELL INSTALLATION AND DEVELOPMENT

A total of six groundwater monitoring wells will be installed at the approximate locations shown on Figure C2.1 and described below.

i) one shallow groundwater monitoring well (MW-1) screened in the upper 5 to 10 feet of the water table will be installed along the southern Site boundary in the vicinity of ESA borings SB-5 and SB-6;

ii) one shallow groundwater monitoring well (MW-2) will be installed in the approximate center of the Site near ESA boring SB-4;

iii) one shallow groundwater monitoring well (MW-3) will be installed along the northern Site boundary in the vicinity of ESA boring SB-10

iv) one shallow groundwater monitoring well (MW-5) will be installed along the Western Site boundary between ESA borings SB-9 and SB-10; and

v) a pair of monitoring wells (MW-4/4A), one screened in the shallow interval and one screened at the top of the till or other confining layer, will be installed along the northern site boundary in the vicinity of ESA borings SB-1B and SB-3.

A summary of the proposed monitoring well details is presented in Table C2.1. The actual locations and depths of monitoring well installation will be dependent upon the field conditions.

Subsequent to installation, the wells will be developed by bailing or pumping and surging.

Drill cuttings and spoils generated during completion of the monitoring wells will be handled in accordance with all applicable regulations

Drilling equipment will be decontaminated before use at each drilling location.

Detailed protocols for monitoring well installation, development, waste material handling and equipment decontamination are presented in Section 6. Health and safety procedures are presented in the Health and Safety Plan (HASP) contained in Appendix E of the Work Plan.

2.2 HYDRAULIC CONDUCTIVITY TESTING

In situ hydraulic conductivity tests will be completed in each of the monitoring wells to estimate the hydraulic conductivity of the surrounding aquifer.

2.2.1 RECOVERY TESTS

Recovery tests will be performed in each monitoring well immediately following well development. The recovery testing will consist of the monitoring of water level drawdown and recovery during and following well development. Monitoring will be performed using either an electronic water level probe or pressure transducer system. A detailed description of the water level measurement procedure is presented in Section 6.5.

2.2.2 SLUG TESTING

Slug testing will be performed in each monitoring well. Rising and/or falling head methods will be employed by evacuating the well through bailing or adding a slug to raise the water level in the well. Aquifer response to these tests will be recorded using either an electronic water level probe or a pressure transducer system. Detailed descriptions of these test methods are provided in Section 6.4.1.

2.3 HYDRAULIC MONITORING

Water level measurements will be collected from all of the monitoring wells on at least two occasions to allow estimation of the direction of groundwater flow across the Site. To allow the wells to equilibrate, the first water level monitoring event will be conducted no sooner than 7 days following the completion of well development. A detailed description of these water level measurement procedure is provided in Section 6.5.

2.4 GROUNDWATER SAMPLING

Groundwater samples will be collected from each of the monitoring wells on one occasion. To allow the wells to equilibrate, the groundwater sampling event will be conducted no sooner than 7 days following the completion of well development.

Prior to initiating the well purging and sampling activities, a complete set of static water levels will be measured to evaluate groundwater flow direction and to calculate the volume of water present in each well. To reduce the possibility of cross-contamination, the wells will be purged and sampled proceeding from those along the southern Site boundary toward those at the northern Site boundary.

Wells will be purged using the following types of equipment:

i) peristaltic pump with dedicated tubing; or

ii) bottom-loading stainless steel or teflon bailer with dedicated polypropylene rope.

All VOC samples will be collected with well-dedicated or pre-cleaned bottom-loading stainless steel and/or teflon bailers and dedicated polypropylene rope.

Groundwater samples will be analyzed by a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) and Contract Laboratory Program (CLP) certified laboratory. Analyses will be for the United States Environmental Protection Agency (USEPA) Target Compound List (TCL) VOCs, New York State Department of Environmental Conservation (NYSDEC) Spill Technology and Remediation Series (STARS) program SVOCs, and USEPA Target Analyte List (TAL) metals. All analyses will be performed in accordance with the NYSDEC Analytical Services Protocols (ASP), 1995 revision. Field measurements of turbidity, pH, specific conductance, and temperature will also be taken for all samples collected. These measurements will be recorded on the groundwater sampling field logs. A summary of the groundwater sampling program is presented in Table C2.2.

Decontamination of purging or sampling equipment, if necessary, will be performed prior to use at each well.

Detailed protocols for sample collection, handling and analysis as well as equipment decontamination are presented in Section 6.6. Health and safety procedures are presented in the HASP contained in Appendix E of the Work Plan.

3.0 SOIL

3.1 SUBSURFACE SOIL

Analytical soil samples will be collected from nine borings and analyzed as described below.

At least one soil sample will be collected from the unsaturated soils in each shallow monitoring well borehole. Boreholes will be advanced with continuous split spoon samples collected in advance of the augers beginning with a top or surface soil sample at each location. All samples collected will be subject to modified head space analyses. Analytical samples will be selected based on the results of the head-space analyses and other observations (i.e., color, odor, etc.). The samples selected shall be analyzed for the USEPA TCL VOCs, NYSDEC STARS program SVOCs, and USEPA TAL metals.

Two borings, SB-14 and SB-15, will be installed between the north side of the existing building and Kingston Street. These borings will extend to the water table surface and the samples will be selected as described previously for the monitoring well borehole samples. Samples will be analyzed for TCL VOCs, STARS SVOCs, and TAL metals. At least one soil sample will be collected from the unsaturated soils in each of these borings.

Three boreholes, SB-11 through SB-13, will be installed surrounding ESA borings SB-8 and SB-9 in the vicinity of the former automotive repair shop to delineate the horizontal and vertical extent of elevated PAH and metal analytes identified in the Phase II ESA. These boreholes will extend to the water table surface. At least one analytical sample will be selected from each borehole and analyzed for the STARS SVOCs and TAL metals. Samples will be selected based upon visual and olfactory evidence of chemical presence. The SVOC and metals data obtained from the boring for MW-5 will be combined with the data from borings SB-11 through SB-13 for the delineation of the extent of the presence of the SVOCs and metals in this area.

Soil samples will be analyzed by an ELAP and CLP certified laboratory in accordance with the NYSDEC ASP, 1995 revision. A summary of the soil sampling program is presented in Table C2.2.

Sampling equipment will be decontaminated prior to use at each sample location.

Detailed protocols for sample collection, handling and analysis as well as equipment decontamination are presented in Section 6.1 and 6.7. Health and safety procedures are presented in the HASP contained in Appendix E of the Work Plan.

4.0 SAMPLE DESIGNATION

A unique sample numbering system will be used to identify each collected sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example:	S-121695 - AA-XXX
Where:	S - Designates sample Type (S = Soil)
121695:	Date of collection (mm/dd/yy)
AA:	Sampler initials
XXX:	Unique sample number

QC samples will also be numbered with a unique sample number.

5.0 DATA VALIDATION

Analytical data collected during the Site Investigation will be validated to demonstrate the usability of the data to support the conclusions of the Site Investigation. Data will be validated in accordance with the NYSDEC Division of Remediation "Guidance for the Development of Data Usability Summary Reports" (DUSRs).

All analytical work will be subcontracted to an ELAP and CLP certified laboratory(s). All analytical data generated by the subcontract laboratory(s) will be assessed and validated by an independent Data Validator.

6.0 FIELD PROCEDURES

All monitoring and sampling activities described in this document shall be conducted in accordance with the protocols detailed in this section as well as the standards and criteria set forth in the Work Plan, Quality Assurance Project Plan (QAPP), and HASP.

Site dedicated equipment will be used whenever possible.

6.1 BOREHOLE DRILLING/SOIL SAMPLING

Borehole drilling for the geologic logging and sampling of subsurface soils will be performed using the hollow stem auger technique. The borehole will be advanced using approximately 4-inch inside diameter (ID) (8-inch outside diameter [OD]) hollow-stem augers from ground surface to the desired depth of installation. Soil samples will be collected from the specified depth intervals by the standard penetration test method (American Society for Testing and Materials [ASTM] -1586-84) using split spoon samplers of appropriate length and diameter. Sampling equipment will be cleaned between samples in accordance with the protocols described in Section 6.7. All soil samples collected will be described and classified according to the Unified Soil Classification System (USCS).

In locations which are covered by asphalt, the asphalt and granular sub-base will be penetrated to the original ground surface prior to commencement of continuous sampling or augering for sample collection. After the borehole has been completed and the sample has been obtained, either a monitoring well shall be installed as described in Section 6.2 or the borehole shall be backfilled as follows:

i) boreholes in areas covered with asphalt shall be backfilled to within approximately 6 inches of the ground surface using a cement/bentonite grout. The remainder of the borehole shall be filled with asphalt or concrete; or

ii) boreholes in areas not covered with asphalt (i.e., gravel or soil surfaces) shall be backfilled to within 1 foot of the ground surface using cement/bentonite grout. The remainder of the borehole will be filled with material similar to the surrounding ground surface.

A typical borehole installation is shown on Figure C6.1.

6.1.1 ANALYTICAL SAMPLE COLLECTION

Each soil sample will be collected using a precleaned continuous soil sampling system or a split spoon sampler in conjunction with the hollow-stem augering technique described previously.

Soil samples for chemical analysis will be collected in the following manner:

i) upon retrieval of the split spoon, the sampler will be laid on a surface which has been covered with plastic or aluminum foil and shall be carefully opened to avoid sample disturbance;

ii) using a precleaned stainless steel knife, a thin section will be removed from the top and bottom of the sample and discarded as shown on Figure C6.2;

iii) the remainder of the core will then be cut longitudinally with a clean cutting tool. Two continuous soil sample (one for head space analysis and one for possible analysis) will be taken from the center of the core using a clean stainless steel spatula;

iv) analytical samples shall be placed into precleaned sample jars provided by the analytical laboratory. Sample homogenization or splitting will be performed in the analytical laboratory;

v) head space screening samples will either be placed in glass jars covered with aluminum foil or in zip-lock bags and left at room temperature for ½ hour. If sampling is conducted during cold weather the samples will be moved to a heated vehicle or building before testing. The bag or aluminum foil cover will then be punctured with the OVA probe tube and the headspace gases drawn through the instrument. Peak readings will be recorded and analytical samples selected. If necessary, the head space will be used for metals analysis; and

vi) the remainder of the core not used for chemical analysis will be retained in precleaned jars for geologic record.

A clean pair of disposable latex gloves and a new piece of plastic or foil will be used to handle each sample.

Samples will be placed on ice or cooler packs in laboratory supplied coolers immediately after collection and labeling. Samples will be delivered to the laboratory by courier under approved chain of custody procedures in accordance with the requirements of the QAPP.

6.2 MONITORING WELL INSTALLATION

Monitoring wells shall be installed in the completed boreholes as follows:

i) install a 2-inch diameter well consisting of 5-foot long stainless steel well screen (#10 slot) and 2-inch diameter black or stainless steel pipe of threaded or welded construction with lockable cap and lock. The well screen and riser pipe shall be steam cleaned and inspected for any foreign matter including greases or coatings adhering to surfaces prior to well construction;

ii) backfill each well installation with a measured sandpack around the well screen (Montery, filter No. 20 [12x20] sand) placed to a minimum of 2.0 feet above top of screen and a 2.0-foot measured bentonite pellet seal over the sandpack;

iii) wait ½ hour after the placement of the bentonite seal and then grout the remaining annular space between the well pipe and borehole by positive displacement using a tremie tube. The grout shall consist of Portland cement, bentonite, and clean water. The grout shall be mixed in the proportion of not less than 5 nor more than 6 gallons of water to one bag (94) of cement. Bentonite powder shall be added at a ratio of 3 percent by volume. Hydrated lime, up to 10 percent by volume, may be added to facilitate pumping; and

iv) flush-mount wells shall be set 3 inches below ground surface (BGS) and an approved protective curb box (12-inch minimum length) casing will be grouted in place around the well for protection. The flush-mount casings will be raised slightly above ground surface to allow the sealing grout to be sloped away from the well to prevent surface water run-in.

A typical monitoring well installation is shown on Figure C6.3.

6.3 WELL DEVELOPMENT

All new monitoring wells will be developed no sooner than 48 hours following installation.

Well development will be accomplished by either pumping or bailing accompanied by surging. Well development will continue until the purged water exhibits a turbidity of 50 nephelometric turbidity units (NTUs) or lower or for a maximum of 1 hour. Groundwater removed from the wells will be collected or advance approval will be obtained for direct discharge to the municipal wastewater treatment system.

Equipment placed in a monitoring well will be cleaned following decontamination procedures as described in Section 6.7.

6.4 IN SITU HYDRAULIC CONDUCTIVITY TESTING

6.4.1 SLUG TESTING

In situ hydraulic conductivity tests in new wells will be performed by slug testing. Using a precleaned slug of known volume attached to well-dedicated polypropylene rope, the water level within the well will be instantaneously raised. The return of the water level to static will be monitored by manual collection of water levels at frequent intervals or by use of a pressure transducer system for continuous measurement. Following return of the water level to static, the slug will be quickly removed from the well lowering the water level. The return of the water level to static will again be monitored. All equipment will be precleaned following the decontamination procedures described in Section 6.7 prior to use in each well.

Data from tests conducted on unconfined aquifers will be evaluated using the Bouwer and Rice Method, "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells".

6.5 WATER LEVEL MEASUREMENT

Each well shall have a permanent easily identified reference point on the well casing from which its water level elevation is taken. The reference point will be marked on the well and described in the field notebook. The reference points shall be established by a licensed surveyor in relation to an established United States Geological Survey (USGS) datum.

An electric tape water level measuring device sufficiently sensitive to reliably provide a measurement accurate to 0.01 feet shall be used to determine the depth to groundwater. The water level probe and wire will be cleaned in accordance with the protocols described in Section 6.7 before use each day and between wells.

Data shall be recorded in a bound notebook and shall include the following:

i) well number;

ii) date;

iii) time;

iv) top of casing (measuring point) elevation;

v) measured depth to water; and

vi) initials of person taking the measurement.

6.6 GROUNDWATER SAMPLING

The sampling procedures for the groundwater monitoring wells are described below. These procedures are used to maintain consistent and reproducible methods in obtaining groundwater samples.

The initial step at each well will be to measure the static water level. This will be accomplished following the procedures described in Section 6.5.

All purging and sampling equipment will either be well-dedicated or will be cleaned in accordance with the procedures contained in Section 6.7 prior to use in each well.

6.6.1 PURGING

Two criteria for purging requirements have been developed. For wells in which sufficient groundwater is readily available, a minimum of three to a maximum of five well volumes of groundwater will be removed from the well prior to sampling. Turbidity, temperature, pH, and specific conductance will be measured after the removal of each well volume of water. A goal of 50 NTUs will be used as a criteria for purging. Wells with slow groundwater recovery will be evacuated to dryness once prior to sample collection.

A well volume is defined as the volume of groundwater (at static condition) contained within the open cavity (i.e., casing and open section of rock) of a well. This volume must be calculated prior to each well purging event as the static water level will vary according to seasonal conditions. To assist in the calculation of well volume, the following volumes of water per foot of submerged cavity are provided:

i) 2-inch diameter cavity = 0.163 gallons per foot;

ii) 3-inch diameter cavity = 0.367 gallons per foot;

iii) 4-inch diameter cavity = 0.653 gallons per foot; and

iv) 6-inch diameter cavity = 1.469 gallons per foot.

The groundwater shall be purged from the wells to be sampled by one of the methods listed below:

i) bailing with a bottom loading teflon or stainless steel bailer; or

ii) purging with a peristaltic pump fitted with well-dedicated tubing. When used, the pump will be staged from the top of the water column downward to ensure removal of stagnant water. Peristaltic pumps will not be used for VOC sample collection.

6.6.2 SAMPLE COLLECTION

Wells will be sampled as soon after purging as possible. In the case of slow recovery wells, sampling will be conducted as soon as the recovered volume of water is adequate to provide the full sample volume or 100 percent of the well volume, whichever occurs first. If a full sample volume cannot be obtained over a maximum of 4 days, the well will be considered to be non-sampleable.

A well-dedicated teflon or stainless steel bailer will be used for VOC sample collection in order to minimize the stripping of volatile compounds from the groundwater samples and adsorption of trace constituents and eliminate the potential for cross-contamination of wells. If a non-dedicated bailer is used for sample collection, the first bailer volume of sample will be discarded to acclimate the bailer.

Groundwater turbidity will be measured and recorded when groundwater samples are collected. If the turbidity is >50 NTUs and metals analyses are required, both filtered and unfiltered samples will be submitted for analysis.

For all unfiltered samples, groundwater will be poured directly into laboratory supplied sample containers from the bailer.

Samples will be placed on ice or cooler packs in laboratory supplied coolers immediately after collection and labeling. Samples will be delivered to the laboratory by courier under approved chain of custody procedures in accordance with the QAPP and Section 6.0 of this FSP.

6.6.3 RECORDKEEPING

A bound logbook will be used to record all pertinent sampling data including:

i) date(s) and time(s) of well purging and sampling;
ii) sounded depth of well;
iii) names of sampling personnel;
iv) calculation of well volume;
v) volume of water purged;
vi) methods of purging and sampling;
vii) initial and final water quality descriptions;
viii) water quality measurements;
ix) sample volume collected and analyses requested;
x) sample identification number; and
xi) chain of custody number.

Field log books will be numbered and maintained in a safe location. Entries will be made only in indelible ink. Any corrections will be marked through with a single line so as to remain legible and will be initialed.

6.7 DECONTAMINATION OF SAMPLING AND DRILLING EQUIPMENT

Decontamination procedures will be applicable to all drilling, sampling, and testing activities. Drilling and well construction equipment mobilized to the Site will receive an initial decontamination prior to use. Decontamination will consist of steam cleaning of the drill rig and associated equipment to the satisfaction of the Site Representative. The rear portion of the drill rig will also be decontaminated by steam cleaning between monitoring well installations. In addition, equipment entering a well but not used for sample collection (e.g., augers) will be decontaminated using a high pressure steam cleaner to remove soil and volatilize organics. Drilling equipment will be decontaminated prior to removing the equipment from the Site.

One sample will be collected from each source used to supply decontamination water. This sample will be analyzed for TCL VOCs.

The field sampling equipment (including soil and groundwater sampling equipment) decontamination procedures will be as follows:

i) non-phosphate detergent wash;
ii) tap water rinse;
iii) distilled water rinse;
iv) isopropanol rinse;
v) air dry; and
vi) distilled water rinse

When practicable, sampling equipment will be wrapped in a material that will prevent it from becoming contaminated. When cleaning pressure transducer and water level measurement equipment the isopropanol rinse shall not be used. Field decontamination wastes will be handled in accordance with all applicable regulations.

6.8 WASTE HANDLING

Borehole cuttings, wastewater and cleaning solvents shall be placed in separate containers and covered. At the end of every day, all containers will be securely covered and full containers will be transferred to an on-Site staging area. All containers will be properly labeled as to contents in conformance with all Federal and State regulations.

Following characterization, waste material will be disposed in accordance with the appropriate regulations.

6.9 SAMPLE PREPARATION AND PRESERVATION

Immediately after collection, samples will be transferred to properly labeled sample containers and properly preserved. Table C2.2 lists the proper container materials, volume requirements, and preservation needed for the Site analyses. Samples requiring refrigeration for preservation will be immediately transferred to coolers packed with ice and/or ice packs. Samples will be shipped within 24 hours of being collected and will arrive at the laboratory no later than 48 hours after sample collection. Proper chain of custody documentation will be maintained as discussed in the QAPP.

6.10 WELL ABANDONMENT

Should an installed monitoring well require abandonment, the procedures will be in accordance with the NYSDEC "Decommissioning Procedures" dated April 1993. A copy of the Decommissioning Procedures document is contained in Attachment C1 of this FSP.

APPENDIX C

FIGURES

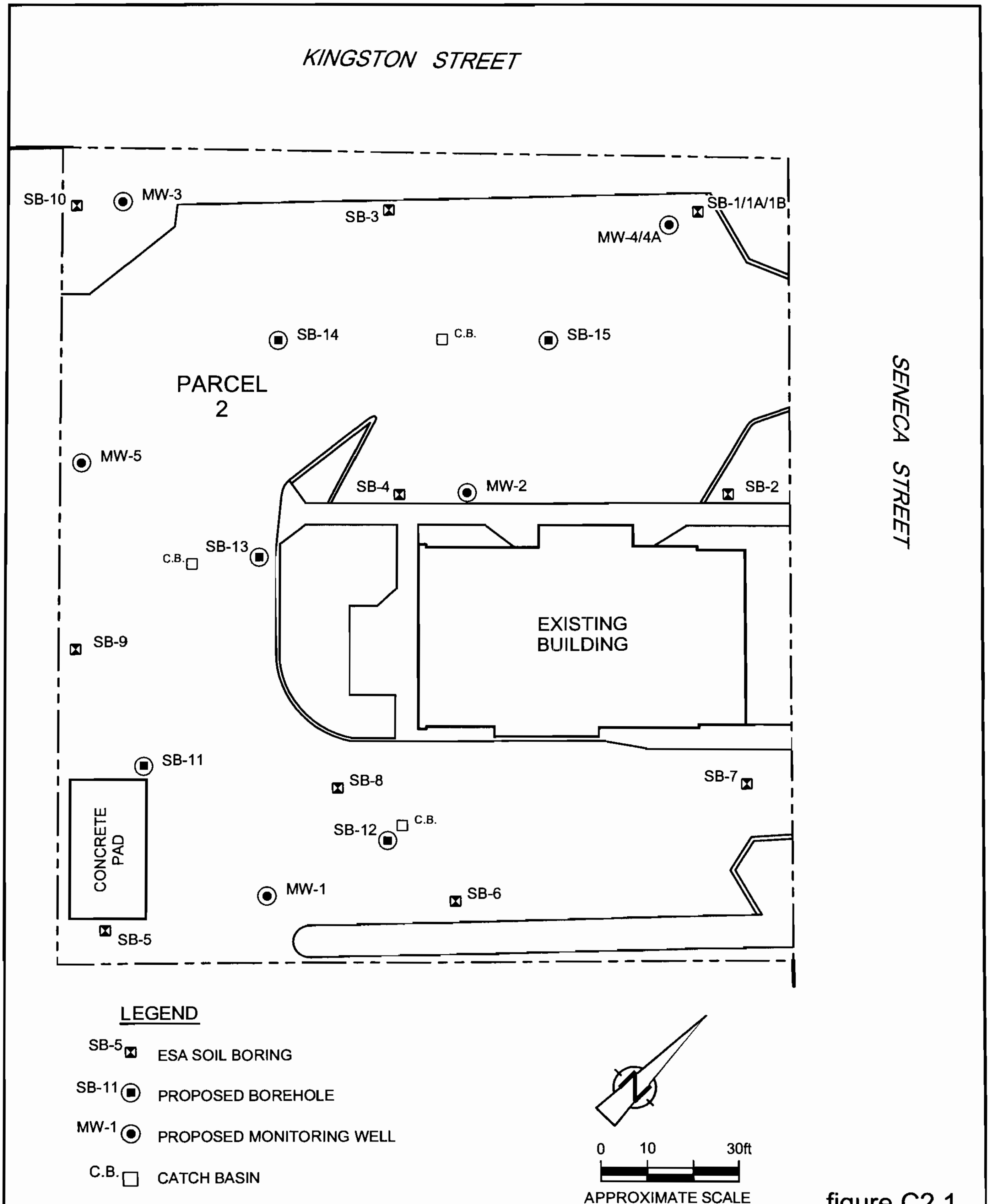


figure C2.1

SITE PLAN AND SAMPLE LOCATIONS
PARCEL 2, SENECA STREET
Buffalo, New York

CRA

15867-00(001)GN-NF007 AUG 09/2000

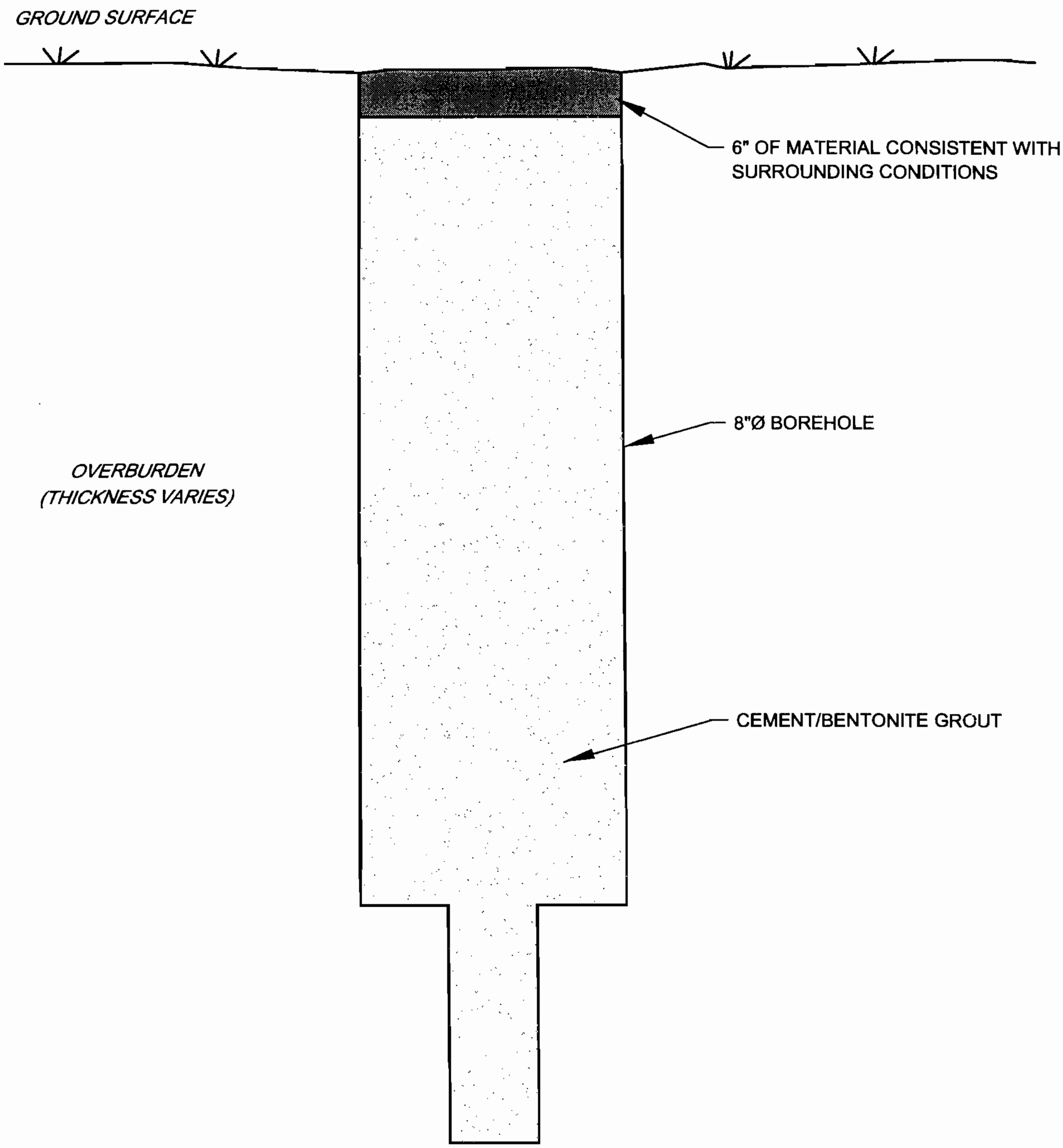
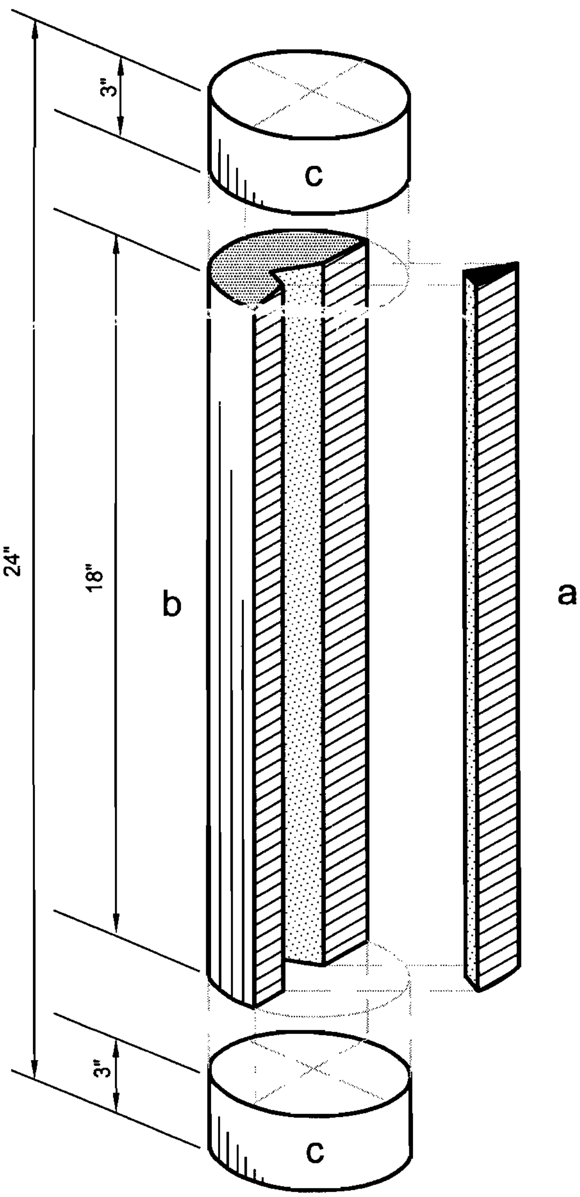


figure C6.1

TYPICAL BOREHOLE
PARCEL 2, SENECA STREET
Buffalo, New York

CRA

15867-00(001)GN-NF006 MAY 17/2000



TYPICAL SOIL CORE

a

PORTION OF SAMPLE FOR CHEMICAL ANALYSIS

-CONTACT WITH UNSTERILIZED MATERIALS IS NOT ACCEPTABLE

-CONTAINER - PRECLEANED GLASS

-GASKET - TEFLON

-STORAGE - REFRIGERATED (4°C)

-SHIPPING - ON ICE BY COURIER TO DESIGNATED LAB

b

PORTION OF SAMPLE TO BE RETAINED FOR GEOLOGIC RECORDS

-CONTACT WITH UNSTERILIZED MATERIALS IS NOT A PROBLEM

-CONTAINER: - CLEAN GLASS JAR
- CLEAR GLASS IS SUITABLE

-GASKET - ANY SUITABLE GASKET

-STORAGE - IN STANDARD SHIPPING CARTON
- NO REFRIGERATION REQUIRED

c

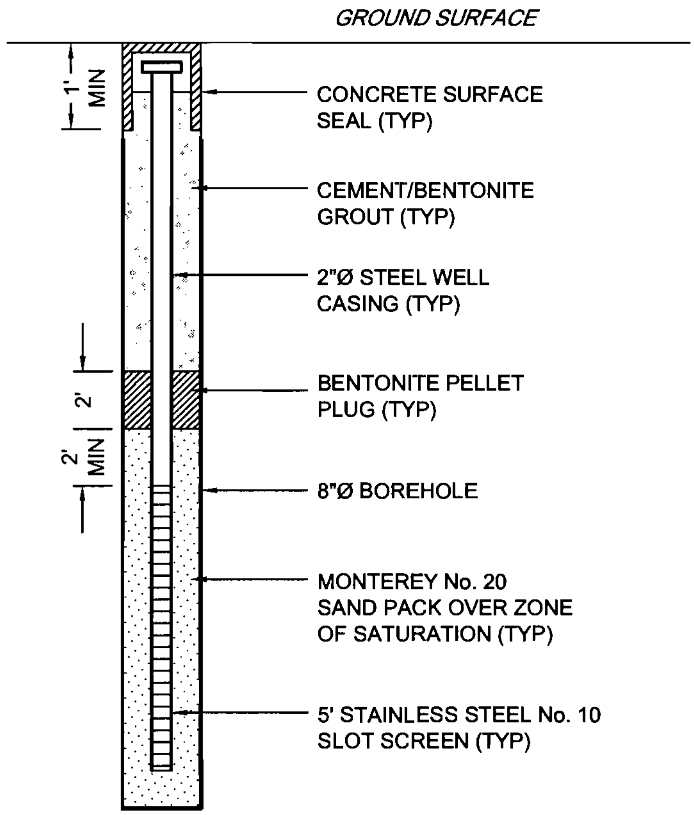
PORTION OF SAMPLE TO BE DISCARDED

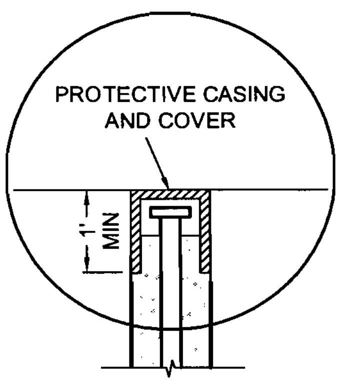
figure C6.2

BOREHOLE SOIL SAMPLE COLLECTION DETAIL
PARCEL 2, SENECA STREET
Buffalo, New York

CRA

15867-00(001)GN-NF005 MAY 17/2000





FLUSH WITH GROUND
WELL INSTALLATION

figure C6.3

TYPICAL MONITORING WELL INSTALLATION
PARCEL 2, SENECA STREET
Buffalo, New York

CRA

15867-00(001)GN-NF004 MAY 17/2000

APPENDIX C

TABLES

TABLE C2.1

PROPOSED MONITORING WELL DETAILS
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

Well No.	*Estimated Depth* [(1)] *(Feet BGS)*	*Estimated Screened Interval* [(1)] *(Feet BGS)*	*Estimated Sandpack Interval* [(1)] *(Feet BGS)*
MW-1	21	16-21	14-21
MW-2	17	12-17	10-17
MW-3	17	12-17	10-17
MW-4	17	12-17	10-17
MW-4A	35	30-35	28-35
MW-5	22	17-22	15-22

Notes:
(1) Actual depths will be adjusted based on field conditions to insure that the sandpack is placed entirely in the saturated interval.
BGS Below Ground Surface.

TABLE C2.2

SAMPLE COLLECTION AND ANALYSIS SUMMARY
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

Matrix	*Location*	*Sample Analyses*	*Sample Containers*	*Sample Preservation*
Groundwater	MW-1, MW-2, MW-3, MW-4, MW-4A, MW-5	TCL VOCs	2 - 40 mL glass vial with Teflon lined septum	HC1 to pH<2, cool to 4°C
		STARs SVOCs	1 Liter amber glass jar	Cool 4°C
		TAL Metals	1 - 500 mL plastic	HNO_3 to pH<2, cool to 4°C
Soil	MW-1, MW-2, MW-3, MW-4, MW-4A, MW-5, SB-14, SB-15	TCL VOCs	1 - 4 oz. glass jar with Teflon-lined septum	Cool 4°C
		STARS SVOCs	1 - 8 oz. wide mouth glass jar	Cool 4°C
		TAL Metals	1 - 8 oz. wide mouth glass jar	Cool 4°C
	SB-11, SB-12, SB-13	STARS SVOCS	1 - 8 oz. wide mouth glass jar	Cool 4°C
		TAL Metals	1 - 8 oz. wide mouth glass jar	Cool 4°C

Notes:
STARS Spill Technology and Remediation Series
SVOCs Semi-Volatile Organic Compounds.
TAL Target Analyte List.
TCL Target Compound List.
VOCs Volatile Organic Compounds.

ATTACHMENT C1

MONITORING WELL DECOMMISSIONING PROCEDURES

DECOMMISSIONING PROCEDURES

New York State Superfund Standby Contract
Work Assignment D002852-3
NYSDEC Monitoring Well Decommissioning

Prepared for:

New York State
Department of Environmental Conservation
Division of Hazardous Waste Remediation

April, 1993

Malcolm Pirnie, Inc.
Albany, New York

1.0 RATIONALE

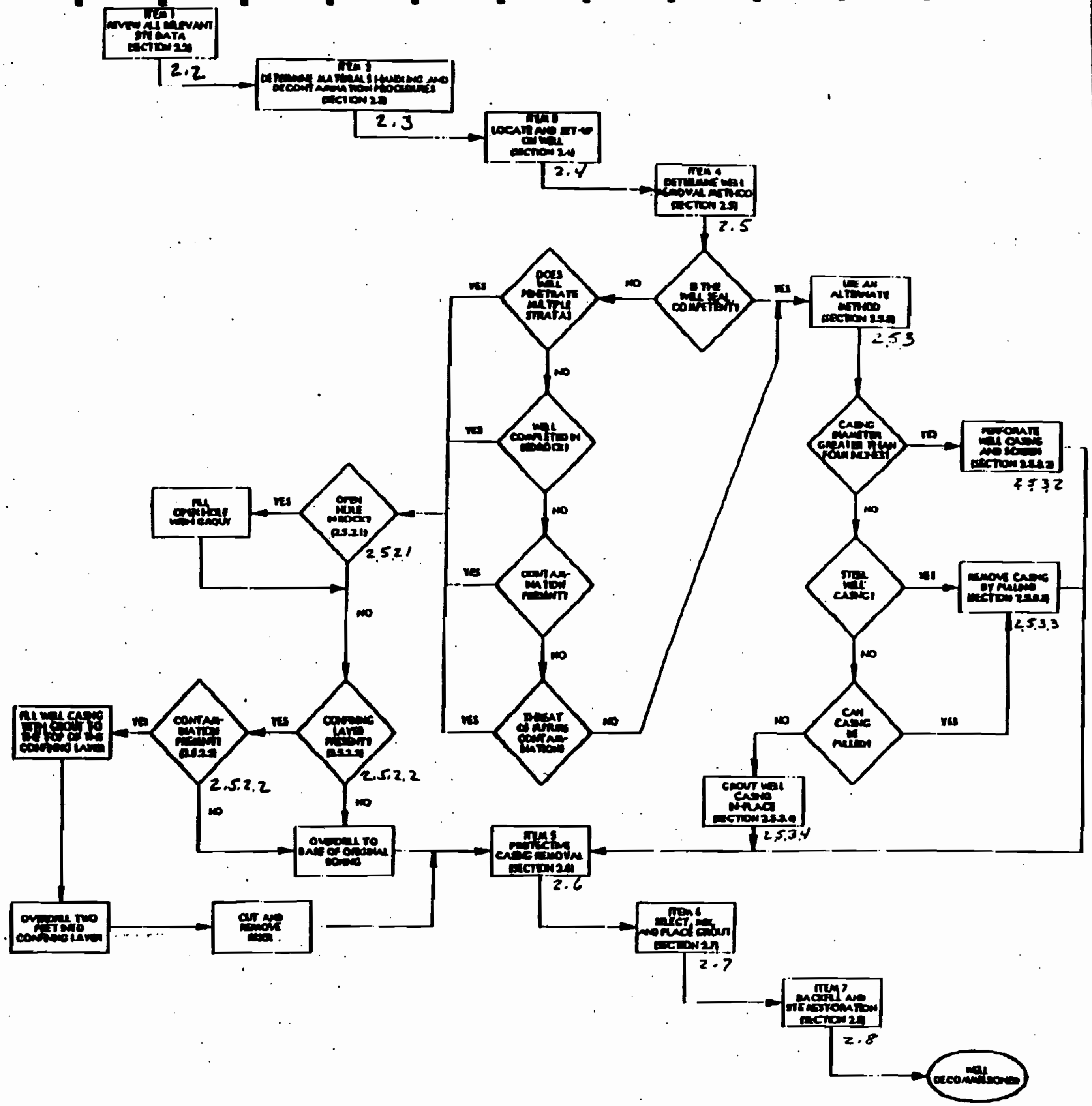
These monitoring well decommissioning procedures have been developed by Malcolm Pirnie, Inc. for the New York State Department of Environmental Conservation (NYSDEC) under the New York State Superfund Standby Contract. The procedures were designed to successfully decommission wells that are no longer used for monitoring. A well is successfully decommissioned when:

- The well does not allow migration of existing or future contaminants into an aquifer or between aquifers
- The well does not allow migration of existing or future contaminants in the vadose zone
- The potential for vertical or horizontal migration of fluids in the well or adjacent to the well is minimized
- aquifer yield and hydrostatic head are conserved, and
- The possibility that the well is used for purposes other than intended is eliminated

Malcolm Pirnie developed these procedures by performing an extensive literature search, consulting industry officials, and consulting the NYSDEC. The literature search included a review of sources from the National Ground Water Association, American Society for Testing and Materials (A.S.T.M.), State and EPA guidance documents, Malcolm Pirnie decommissioning procedures, and various other technical sources. A complete listing of references is included at the end of these procedures. The industry officials that were consulted included drilling contractors, equipment suppliers and manufacturers, and A.S.T.M. members on Soil and Rock (D-18) and Water (D-19) committees.

These procedures are performance oriented. They describe the conditions that must be met to satisfactorily decommission a well without specifying the method. Performance-oriented procedures are best suited for well decommissioning for two reasons. Firstly, there are often several acceptable methods that can be used to accomplish the same end result. Secondly, procedures of this type encourage the development of innovative and cost-saving techniques by the drilling contractor.

To allow these procedures to afford the greatest degree of protection to humans and the environment, Malcolm Pirnie and the NYSDEC decided during development of the procedures that they would be based on two assumptions: 1) well seals are not competent unless documentation is provided that proves otherwise, and 2) any material returned to the surface during the decommissioning process will be treated as a non-hazardous waste. Disposal methods for these materials are contained in the specifications and are dependent on information gleaned from site investigation reports. Unless these assumptions are shown to be invalid, a procedure is followed that is appropriate for the physical and hydrologic setting of the well, and is the most protective of the environment.



MALCOLM PIRNIE

WELL DECOMMISSIONING PROCEDURE DECISION FLOWCHART
NYSDEC WELL DECOMMISSIONING PROJECT

MALCOLM PIRNIE, INC.

FIGURE 1

2.0 WELL DECOMMISSIONING PROCEDURES

2.1 Description

This section describes the process that is used to determine which *decommissioning method* and which *group of procedures* to use to properly decommission a well. and then presents the procedures.

There are four *decommissioning methods*:

1) Overdrilling,
2) Casing Perforation,
3) Casing Pulling, and
4) Grouting the Well Casing In-Place.

For each decommissioning method there is a *group of procedures* that must be followed. The specific procedures contained in the group are determined by the physical and chemical nature of the materials surrounding the well and by the design of the well. For example, overdrilling a well that penetrates a confining layer can require a different group of procedures than overdrilling an unconfined water table well. Each group of procedures consists of seven items:

1) Reviewing Site Data
2) Determining Materials Handling and Decontamination Procedures
3) Locating and Setting-Up on the Well
4) Selecting the Well Decommissioning Method
5) Removing the Protective Casing
6) Selecting, Mixing, and Placing Grout
7) Backfilling and Site Restoration

The proper method and group of procedures to use to successfully decommission a well are selected by using a flow chart (Figure 1). The flow chart also references the relevant sections in the text. The structure of the flow chart is based on the assumptions discussed in Section 1 of this document.

2.2 Item 1 - Reviewing Site Data

The first item of the flow chart consists of reviewing all pertinent site information, including boring and well logs, field inspection sheets, and laboratory analytical results performed on site soil and ground water samples. These data will be used to make decisions throughout the flow chart. If site data is incomplete, or of insufficient reliability to enable its use, it is recommended that field verification of the characteristics and conditions of the wells be conducted. A sample Monitoring Well Field Inspection Log, indicating information which could be obtained during field verification activities, is included herein.

All of the sites where well decommissioning is scheduled have been delisted. It is therefore assumed that none of the sites contain hazardous materials.

2.3 Item 2 - Determining Materials Handling and Decontamination Procedures

2.3.1 Description

After all available site data have been reviewed, the procedures for handling all materials generated during decommissioning, and decontaminating the drilling rig and tools, must be selected. The specific procedures followed for both materials handling and decontamination are dependent on three factors: 1) whether the site is located within or near a closed Part 360 landfill, 2) the presence and type of contamination (if present) at the well to be decommissioned, and 3) the use of the land surrounding the well.

2.3.2 Materials Handling Procedures

To determine the proper materials handling procedure to use for a particular well:

1) Determine whether the site is located within or near a Part 360 landfill. If the well is located *near* a closed Part 360 landfill, the materials can be disposed of on the ground surrounding the well. If the well is located *within* a closed Part 360 landfill, the materials must be disposed of at an active Part 360 landfill. If the well is not located on or near a Part 360 landfill, see (2) below.

2) Determine the presence and type of contamination (if present) at the well by reviewing available well data (Section 2.2). From the data, place the well into one of the following categories: a) wells containing contamination in concentrations exceeding the ground water standard, or b) wells containing no contamination. If a determination cannot be made from the existing data, a meeting with the NYSDEC will occur to determine how to obtain the necessary data.

   For wells in the contamination category, all materials returned to the surface must either be disposed of in a Part 360 landfill, or can be left at the surface near the former well. See (3) below to determine which of these options is applicable. For all uncontaminated wells, the materials can be left at the surface, near the former well, unless disposing the materials in this manner would be inconsistent with the surrounding land use, see (3) below.

3) Determine the surrounding land use. If the well is located in an urbanized area, where it is feasible that people could be exposed to the materials left on the surface, or if the leaving the materials at the surface would not be consistent with the intended use of the land, then the materials must be disposed of in a Part 360 landfill.

2.3.3 Decontamination Procedures

The drill rig and all tools must be decontaminated with a pressurized steam cleaner after decommissioning a contaminated well (as determined in 2.3.2 above). Decontamination will take place at each former well location whenever possible. If site conditions preclude performing decontamination activities at the well location, a more suitable location must be selected.

The procedures for handling and disposal of decontamination fluids are the same as for materials returned to the surface, see Section 2.3.2.

2.4 Item 3 - Locating and Setting-Up on the Well

Perform the following tasks to locate the well to be decommissioned:

- Notify property owner prior to site mobilization whenever possible.
- Review information about the well contained in the site file. This information may include one or more of the following: the site map, well boring log, well construction diagram. field inspection log, well photograph, and proposed well decommissioning procedure.
- Verify the well location and identification by locating the identifying marker.
- Verify the depth of the well by sounding with a weighted tape and compare the measurement with the well construction log.

When the well has been located, set the drilling rig up over the well. Consider the selected decommissioning procedures when setting-up over the well.

2.5 Item 4 - Selecting the Well Decommissioning Method

2.5.1 General

The well removal method used to decommission a well depends primarily on the integrity of the well seal. If it can be documented that the seal is competent, one of the three decommissioning methods other than overdrilling can be used. (These three methods are referred to hereafter as *alternate* decommissioning methods.) If no such documentation exists, the well seal is assumed *not* to be competent. In cases where the well seal is not competent, the well must be overdrilled whenever any *one* of the following conditions is true:

- The well penetrates multiple hydraulic strata,
- The well is a bedrock well, and
- The well is located in an area where a significant threat of chemical/biological contamination exists.

If none of these conditions are true, the well can be decommissioned by a method other than overdrilling, even though it cannot be documented that the well seal is competent.

Procedures for all four decommissioning methods are presented below.

2.5.2 Overdrilling

2.5.2.1 Determine if the Well is Constructed as an Open-Hole in Rock

Open-hole wells have no well casing, sand pack, or bentonite seal installed inside the bedrock borehole. Overlying unconsolidated deposits, where present, are usually cased off by grouting a casing into the bedrock before further drilling of the bedrock is performed. Decommissioning wells of this type requires that the hole in rock be filled with sealing grout before overdrilling of the cased portion of the borehole is begun. (If bedrock occurs at the land surface, no overdrilling is required.) This prevents the rock hole from filling with cuttings which would have to be flushed out. The grout must be mixed and placed according to the grouting procedures contained in Section 2.7. After the rock hole is grouted, the cased portion of the well is overdrilled according to the procedures contained in Section 2.5.2.3.

2.5.2.2 Determine Whether a Confining Layer and Contamination Exist

Review site data to determine whether a confining layer is present and, if so, whether contamination was detected during installation or sampling of the well. If a confining layer and contamination are found to exist, then extra care must be used to prevent cross contamination between the water-bearing zones above and below the confining layer.

One acceptable procedure for decommissioning wells where both a confining layer and contamination exist is to: 1) fill the well casing with grout to the top of the confining layer; and 2) overdrill the well according to the overdrilling procedure contained in Section 2.5.2.3 until two feet of the confining layer have been penetrated. If the confining layer is less than two-feet thick, this procedure may not be possible. When overdrilling is completed, the borehole must be grouted according to the procedure contained in Section 2.7. Other acceptable procedures may exist, however they must receive Department approval prior to implementation.

2.5.2.3 Overdrill the Well

This section describes the requirements common to all overdrilling procedures, regardless of whether a well penetrates a confining layer or bedrock.

Select a drilling method that:

1. follows the original well bore,

2. creates a borehole of the same or greater diameter than the original boring, and,

3. removes all of the well construction materials.

Acceptable methods for overdrilling include: 1) using an overreaming tool with a pilot bit which is nearly the same size as the inside diameter of the casing and a reaming bit which has a slightly larger diameter than the original borehole diameter. This method can be used for wells with steel casings. 2) using a hollow stem auger equipped with outward facing carbide cutting teeth with a diameter two to four inches larger than the casing. It is important to use outward facing cutting teeth in order that the cutting tool does not sever the casing and drift off center. An alternative is to install a steel guide pipe inside the casing so that the augers remain centered. The casing guides the cutter head and remains inside the auger. This temporary working pipe should be firmly attached to the inside of the casing by use of a packer, or other type of expansion or friction device. When the full diameter and length of the well has been penetrated, the casing and screen can be retrieved from the center of the auger (American Society for Testing and Materials, Standard D 5299-92, 1992).

After overdrilling is completed, the borehole must be grouted according to the procedures contained in Section 2.7

2.5.3 Alternate Decommissioning Methods

2.5.3.1 General

There are three alternate decommissioning methods: casing perforation, casing pulling, and grouting the casing in-place. A series of decisions are required to determine which of these methods will be used for a particular well (See Figure 1.) The first criterion to determine is whether the inside diameter of the well casing is four inches or greater. If it is determined that the diameter is four inches or greater, casing perforation is selected as the alternate decommissioning method. This is because casing perforation is the most desirable of the alternate decommissioning methods, but it is not practical to perforate casings with a diameter of less than four inches.

If it is determined that the inside diameter of well casing is less than four inches, it must be decided whether the well casing is able to be removed by pulling. This determination is made based on review of the site specific data. If it is determined that the casing can be pulled, casing pulling is selected as the alternate decommissioning method. Casing pulling is the next most desirable alternate decommissioning method.

If it is determined that the casing cannot be pulled, then grouting the casing in-place is the alternate decommissioning method to be used. This is the least desirable alternate decommissioning method.

The procedures for each alternate method are presented below.

2.5.3.2 Casing Perforation

This method consists of perforating the well casing and screen using a suitable tool and grouting the well. A wide variety of commercial equipment is available for perforating casings and screens in wells with four-inch or larger inside diameters. This method should not be used for wells with inside diameters less than four inches. Due to the diversity of application, experienced contractors must recommend a specific technique based on site specific conditions. A minimum of four rows of perforations several inches long and a minimum of five perforations per linear foot of casing or screen is recommended (American Society for Testing and Materials, Standard D 5299-92, 1992).

After perforating is completed, the borehole must be grouted according to the procedures contained in Section 2.7.

2.5.3.3 Casing Pulling

This method consists of removing the well casing by lifting. The method used to remove the casing must allow grout to be added during pulling to fill the space occupied by the material being withdrawn. Grout mixing and placement must be performed according to the procedures contained in Section 2.7.

An acceptable method to remove steel casing consists of puncturing the bottom of the casing, filling the casing with grout tremied from the bottom of the well, using jacks to free casing from the hole, and lifting the casing out by using a drill rig, backhoe, crane, or other suitable equipment of sufficient capacity. Additional grout must be added to the casing as it is withdrawn.

PVC and other low tensile strength materials may not be able to be removed by pulling in certain conditions. Excessive deformation or breakage of the well casing may preclude removal by pulling deep wells in extremely cohesive soils. If pulling a PVC casing is recommended by an engineer or drilling contractor, the pulling method must be approved in advance by the Department.

2.5.3.4 Grouting the Casing In-Place

Grouting the casing in place is the simplest, but least protective of all the decommissioning procedures. The procedure consists of filling the casing with grout to a level of five feet below the land surface, cutting the well casing at a depth of five feet below the land surface, and removing the casing and associated well materials from the ground. The casing must be grouted according to the procedures contained in Section 2.7.

2.6 Item 5 - Removing the Protective Casing

2.6.1 General

The protective casing of a well must be removed in a manner that will not interfere with or compromise the integrity of decommissioning activities performed at the well.

The procedure for removing the protective casing of a well depends upon the decommissioning method used. When a well is being decommissioned by the overdrilling or casing pulling method, the protective casing will, in most cases, be removed before continuing with the decommissioning activity. When the decommissioning procedure calls for the well casing to be perforated or left in place, the protective casing should be removed after grout is added to the well. The protective casing must be disposed of in a manner consistent with solid waste regulations.

2.6.2 Removing the Protective Casing Prior to Sealing the Well Bore

When overdrilling is required, the protective casing must be removed first, unless the drilling tools used to overdrill the well have an inside diameter that is larger than the protective casing. The many different types of protective casings available preclude developing a specific removal procedure. In all cases, however, the specific procedure used must minimize the risk of:

1. Breaking the well casing off below ground, and
2. Allowing foreign material to enter the well casing.

When casing pulling is required, the determination of when to remove the protective casing is not critical. For this reason, the determination can be made by the drilling contractor.

An acceptable method of removing a protective casing consists of breaking up the concrete seal surrounding the casing and jacking or hoisting the casing out of the ground.

A check should be made during pulling to insure that the inner well casing is not being pulled up with the protective casing. If this occurs, the well casing should be cut off above ground after the base of the protective casing is lifted above the land surface.

2.6.3 Removing the Protective Casing After Sealing the Well

If a decommissioning method is used that allows well casing to remain in the ground, the protective casing should be removed after the well has been filled to the proper level with grout. This will insure that the well is properly sealed even if problems arise when removing the protective casing. Since the well casing must be removed to a depth of five feet below the land surface, this procedure will enable the upper five feet of casing and the protective casing to be removed in one operation if a casing cutter is used. If the height of the protective casing makes working conditions at the well awkward, the casing can be cut off at a lower level as long as the inner well casing remains above ground and is not damaged in a way that prevents the well from being filled with grout.

2.7 Item 6 - Selecting, Mixing, and Placing Grout

2.7.1 Selecting Grout Mixture

There are two types of grout mixes that may be used to seal wells: a standard mix and a special mix. Both mixes use Type 1 Portland Cement and six percent bentonite by weight. The difference between the two mixes is the volume of water used. The special mix uses less water and is used in situations where excessive loss of the standard grout mix is possible, for example in highly-fractured bedrock or coarse gravels.

2.7.1.1 Standard Grout Mixture

For most boreholes, the following standard mixture will be used:

- One 94-pound bag type I Portland cement
- 5.6 pounds powdered bentonite
- 9.1 gallons potable water

This mixture results in a grout with a bentonite content of six percent by weight, and will be used in all cases except in boreholes where excessive use of grout is anticipated. In these cases a special mixture will be used (see Section 2.7.1.2).

See Section 2.7.2 for grout mixing procedures.

2.7.1.2 Special Mixture

In cases where excessive use of grout is anticipated, such as high permeability formations and highly fractured or cavernous bedrock formations, the following special mixture will be used:

- One 94-pound bag type I Portland cement
- 5.6 pounds powdered bentonite
- 6-9 gallons potable water (depending on desired thickness)

The special mixture also results in a grout with a bentonite content of six percent by weight, but the amount of added water is decreased to produce a thicker mixture. The least amount of water that can be added for the mixture to be readily pumpable is six gallons per 94-pound bag of cement.

See Section 2.7.2 for grout mixing procedures.

2.7.2 Grout Mixing Procedure

Calculate the volume of grout required to fill the borehole before beginning to mix the grout. If possible, the grout basin should be large enough to hold all of the grout necessary for the borehole. Tall cylindrical and long shallow basins should not be used as it is difficult to obtain a homogeneous mixture in these types of basins.

Mix grout until a smooth, homogeneous mixture is achieved. No lumps or dry clots should be present. Grout can be mixed manually or with a mechanized mixer. One acceptable type of mixer is a vertical paddle grout mixer. Colloidal mixers should not be used as they tend to excessively decrease the thickness of the grout for the above recipes.

See Section 2.7.3 for grout placement procedures.

2.7.3 Grout Placement

Grout will be placed in the borehole from the bottom to the top. This will be accomplished by using a tremie pipe of not less than 1-inch diameter. Grout will then be pumped into the borehole at a rate of 5-10 gpm until the grout appears at the land surface. The only exception to this is when open hole in bedrock is being grouted. With this situation the grout level must reach above the bedrock surface. At this time the rate of settling should be observed. When the grout level stabilizes, casing or augers will be removed from the hole. As each section is removed, grout will be added to keep the level just below land surface. If the grout level cannot be maintained near the land surface, this will imply excessive loss of grout and an alternate grouting method must be used. One possibility is to grout in stages, whereby the first batch of grout is allowed to partially cure before a second batch of grout is added. Upon completion of grouting, it is important to make sure the final grout level is approximately five feet below land surface. A ferrous metal marker will be embedded in the top of the grout to indicate the location of the former monitoring well.

2.8 Item 7 - Backfilling and Site Restoration

The uppermost five feet of the borehole at the land surface will be filled with a material appropriate to the intended use of the land. The materials used are to be physically similar to the natural soils. No materials will be used that will limit the use of the property in any way. The surface of the borehole will also be restored to the condition of the area surrounding the borehole. For example, concrete or asphalt will be patched with concrete or asphalt of the same type and thickness, grassed areas will be seeded, and topsoil will be used in other areas. All solid waste materials generated during the decommissioning process will be disposed of properly. In summary, the site will be left in a condition equivalent to the pre-well condition.

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SITE NAME: ______________________

WELL I.D.: ______________

MONITORING WELL FIELD INSPECTION LOG
NYSDEC WELL DECOMMISSIONING PROGRAM

DATE/TIME: ______________

INSPECTOR'S NAME: ______________

ITEM	YES	NO
WELL VISIBLE? (If not, provide directions below)		
WELL I.D. VISIBLE?		
WELL LOCATION MATCH SITE MAP? (If not, sketch actual location on back)		

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL: ______________

	YES	NO
SURFACE SEAL PRESENT?		
SURFACE SEAL COMPETENT? (If cracked, heaved etc., describe below)		
PROTECTIVE CASING IN GOOD CONDITION? (If damaged, describe below)		

HEADSPACE READING (ppm) AND INSTRUMENT USED ______________

TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (If applicable) ______________

PROTECTIVE CASING MATERIAL TYPE: ______________

MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches): ______________

	YES	NO
LOCK PRESENT?		
LOCK FUNCTIONAL?		
DID YOU REPLACE THE LOCK?		
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes, describe below)		
MEASURING POINT VISIBLE?		

MEASURE WELL DEPTH FROM MEASURING POINT (Feet): ______________

MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet): ______________

MEASURE WELL DIAMETER (Inches): ______________

WELL CASING MATERIAL: ______________

PHYSICAL CONDITION OF VISIBLE WELL CASING: ______________

ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE ______________

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.); ADD SKETCH OF LOCATION ON BACK, IF NECESSARY. :

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED. :

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g. Gas station, salt pile, etc.):

REMARKS:

APPENDIX D

QUALITY ASSURANCE PROJECT PLAN

TABLE OF CONTENTS

Page

TABLE OF CONTENTS

Page

LIST OF TABLES
(Following Appendix D)

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is Site-specific and has been prepared for the Site Investigation of Parcel 2, Seneca Street, Buffalo, New York (Site).

The objectives of this QAPP are to provide additional data and documentation to determine the nature and extent of the presence of chemicals in on-Site soil and groundwater. This QAPP provides comprehensive information regarding the project personnel responsibilities, and sets forth specific procedures to be used during sampling of relevant environmental matrices and analyses of data.

2.0 PROJECT BACKGROUND

2.1 GENERAL

This QAPP provides Quality Assurance/Quality Control (QA/QC) criteria for work efforts associated with soil and groundwater sample analyses. Methods for sample analyses have been selected to provide results which characterize the samples, such that the sampling objectives can be met.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

A brief description of the duties of the key project personnel is presented below.

Project Director

i) provides overall project management;

ii) ensures professional services by the Contractor are cost effective and of highest quality;

iii) ensures all resources of the Contractor are available on an as-required basis;

iv) participates in key technical negotiations; and

v) provides managerial and technical guidance to the Contractor's Coordinator.

Project Manager

i) provides day-to-day project management;

ii) provides managerial guidance to the QA/QC Officer - Sampling and Analytical Activities;

iii) prepares and reviews reports;

iv) conducts preliminary chemical data interpretation and assessment; and

v) responsible for overall project completion in accordance with the approved design.

QA/QC Officer - Sampling and Analytical Activities

i) oversees and reviews laboratory activities;

ii) determines laboratory data corrective action;

iii) performs analytical data validation and assessment;

iv) reviews laboratory QA/QC;

v) assists in preparation and review of final report;

vi) provides technical representation for analytical activities;

vii) oversees and reviews field activities;

viii) provides managerial and technical guidance to the Field Sampling Supervisor;

ix) performs field sampling performance audit(s);

x) ensures that field and Chain of Custody records are properly maintained; and

xi) determines field procedure corrective actions.

Field Sampling Supervisor

i) provides immediate supervision of all on-Site activities;

ii) provides field management of sample collection and field QA/QC;

iii) provides technical representation for field activities; and

iv) is responsible for maintenance of the field equipment.

Laboratory - Project Manager, Analytical Contractor

i) ensures resources of laboratory are available on an as-required basis;

ii) coordinates laboratory analyses;

iii) supervises laboratory's in-house Chain of Custody;

iv) schedules analyses of samples;

v) oversees review of data;

vi) oversees preparation of analytical reports; and

vii) approves final analytical reports.

Laboratory - Quality Assurance/Quality Control Officer, Analytical Contractor

i) overviews laboratory QA/QC;

ii) overviews QA/QC documentation;

iii) conducts detailed data review;

iv) decides laboratory corrective actions, if required; and

v) provides technical representation for laboratory QA/QC procedures.

Laboratory - Sample Custodian - Analytical Contractor

i) receives and inspects the sample containers;

ii) records the condition of the sample containers;

iii) signs appropriate documents;

iv) verifies Chain of Custody and their correctness;

v) notifies laboratory Project Manager and laboratory QA/QC Officer of sample receipt and inspection;

vi) assigns a unique laboratory identification number correlated to the field sample identification number, and enters each into the sample receiving log;

vii) initiates transfer of samples to the appropriate lab sections with assistance from the laboratory project manager; and

viii) controls and monitors access to and storage of samples and extracts.

The analytical laboratories selected to perform the analyses will be full-service chemical analytical laboratories certified by the New York State Department of Health (NYSDOH) through the Environmental Laboratory Approval Program (ELAP) and the Contract Laboratory Program (CLP) for the appropriate categories of analysis.

4.0 PROJECT OBJECTIVES

4.1 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for sample collection and analyses which will provide data with an acceptable level of accuracy and precision.

Quality assurance measures for this project will begin with sample containers. Sample containers will be purchased from a certified manufacturer and will be precleaned (I-Chem Series 200 or equivalent).

4.2 LABORATORY QUALITY ASSURANCE

The following subsections define the QA goals required to meet the Data Quality Objectives (DQOs) of the project.

4.2.1 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSES

The fundamental QA objective with respect to the accuracy, precision, and sensitivity of analytical data is to meet the QC acceptance criteria of each analytical protocol. Analytical methods and targeted detection limits listed have been specified to meet DQOs.

A summary of the targeted detection limits is provided in Table D4.1. It should be noted that these limits are targeted detection limits only; limits are highly matrix dependent and may not always be achieved.

The method accuracy (percent recovery) will be determined by spiking selected samples (matrix spikes) with the method recommended spiking compounds. Accuracy will be reported as the percent recovery of the spiking compound(s) and will compare with the criteria given in the appropriate methods, as identified in Section 7.0.

The method(s) precision (reproducibility between duplicate analyses) will be determined based on the duplicate analysis of matrix spike samples for organic parameters and duplicate sample analyses for inorganic parameters. Precision will be reported as Relative Percent Differences (RPDs) between duplicate analyses; acceptance criteria will be as specified in the appropriate methods identified in Section 7.0.

4.2.2 COMPLETENESS, REPRESENTATIVENESS AND COMPARABILITY

A completeness requirement of 90 percent will be targeted for the program (see Section 13.1.3 for definition of completeness).

The quantity of samples to be collected has been estimated in an effort to effectively represent the population being studied. A summary of the sampling and analysis program is presented in Table D4.2.

4.3 FIELD MEASUREMENT QUALITY ASSURANCE

Measurement data will be generated during field activities. These activities include, but are not limited to, the following:

i) documenting time and weather conditions; and

iii) observation of sample appearance and other conditions.

The general QA objective for measurement data is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the use of standardized procedures.

5.0 SAMPLING PROCEDURES

The sample collection procedures are described in the Field Sampling Plan contained in Appendix C of the Site Investigation/Feasibility Study Work Plan.

The sample container, preservation, shipping, and packaging requirements are identified in Table D5.1 and in Section 6.3.

6.0 SAMPLE CUSTODY AND DOCUMENT CONTROL

The following documentation procedures will be used during sampling and analysis to provide Chain of Custody control during transfer of samples from collection through storage. Record keeping documentation will include use of the following:

i) field log books (bound with numbered pages) to document sampling activities in the field;

ii) labels to identify individual samples;

iii) Chain of Custody record sheet to document analyses to be performed; and

iv) laboratory sample custody log book.

6.1 FIELD LOG BOOK

In the field, the sampler will record the following information in the field log book (bound) for each sample collected:

i) project number;

ii) sample matrix;

iii) name of sampler;

iv) sample source;

v) time and date;

vi) pertinent data (e.g., depth);

vii) analysis to be conducted;

viii) sampling method;

ix) appearance of each sample (i.e., color, evidence of soil staining);

x) preservation added, if any;

xi) number of sample bottles collected; and

xii) pertinent weather data.

Each field log book page will be signed by the sampler.

6.2 SAMPLE NUMBERING

A unique sample numbering system will be used to identify each collected sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example:	S-121695 - AA-XXX
Where:	S - Designates sample Type (S = Soil)
121695:	Date of collection (mm/dd/yy)
AA:	Sampler initials
XXX:	Unique sample number

QC samples will also be numbered with a unique sample number.

6.3 CHAIN OF CUSTODY RECORDS

Chain of Custody forms will be completed for all samples collected during the program.

The Chain of Custody form will document the transfer of sample containers. Custody seals will be placed on each cooler. The cooler will then be sealed with packing tape. Sample container labels will include sample number, place of collection and date and time of collection. All samples will be refrigerated using wet ice at 4°C (±2°C) and delivered to the analytical laboratory within 24 to 48 hours of collection. All samples will be delivered to the laboratory by commercial courier or Contractor personnel. All samples will be stored at 4°C (±2°C) at the laboratory.

The Chain of Custody record, completed at the time of sampling, will contain, but not be limited to, the sample number, date and time of sampling, and the name of the sampler. The Chain of Custody document will be signed, timed, and dated by the sampler when transferring the samples.

Each sample cooler being shipped to the laboratory will contain a Chain of Custody form. The Chain of Custody form will consist of four copies which will be distributed as follows: The shipper will maintain a copy while the other three copies will be enclosed in a waterproof envelop within the cooler with the samples. The cooler will then be sealed properly for shipment. The laboratory, upon receiving the samples, will complete the three remaining copies. The laboratory will maintain one copy for their records. One copy will be returned to the QA/QC Officer-Sampling and Analytical

Activities upon receipt of the samples by the laboratory. One copy will be returned with the data deliverables package.

Upon receipt of the cooler at the laboratory, the shipping cooler and the custody seal will be inspected by the Sample Custodian. The condition of the cooler and the custody seal will be noted on the Chain of Custody record sheet by the Sample Custodian. The Sample Custodian will record the temperature of one sample (or temperature blank) from each cooler and the temperature will be noted on the Chain of Custody. If the shipping cooler seal is intact, the sample containers will be accepted for analyses. The Sample Custodian will document the date and time of receipt of the container, and sign the form.

If damage or discrepancies are noticed (including sample temperature exceedances), they will be recorded in the remarks column of the record sheet, dated and signed. Any damage or discrepancies will be reported to the Laboratory Project Manager and Laboratory QA/QC Officer before samples are processed.

6.4 SAMPLE DOCUMENTATION IN THE LABORATORY

Each sample or group of samples shipped to the laboratory for analysis will be given a unique identification number. The Sample Custodian will record the client name, number of samples and date of receipt of samples in the Sample Control Log Book. Samples removed from storage for analyses will be documented in the Sample Control Log Book.

The laboratory will be responsible for maintaining analytical log books and laboratory data as well as a sample (on hand) inventory for submittal to the QA/QC Officer - Sampling and Analytical Activities on an "as required" basis. Raw laboratory data produced from the analysis of samples submitted for this program will be inventoried and maintained by the laboratory for a period of five years at which time the QA/QC Officer - Sampling and Analytical Activities will advise the laboratory regarding the need for additional storage.

6.5 STORAGE OF SAMPLES

After the Sample Custodian has completed the Chain of Custody forms and the incoming sample log, the Chain of Custody will be checked to ensure that all samples are stored in the appropriate locations. All samples will be stored within an access controlled custody room and will be maintained at 4°C (±2°C) until all analytical work is complete.

6.6 SAMPLE DOCUMENTATION

Evidentiary files for the entire project shall be inventoried and maintained by the QA/QC Officer - Sampling and Analytical Activities and shall consist of the following:

i) project related plans;
ii) project log books;
iii) field data records;
iv) sample identification documents;
v) Chain of Custody records;
vi) report notes, calculations, etc.;
vii) lab data, etc.;
viii) references, copies of pertinent literature;
ix) miscellaneous - photos, maps, drawings, etc.; and
x) copies of all final reports pertaining to the project.

The evidentiary file materials shall be the responsibility of the Project Manager with respect to maintenance and document removal.

7.0 ANALYTICAL PROCEDURES FOR CHEMICAL ANALYSES

Samples collected for laboratory chemical analyses will be analyzed for the parameters listed in Table D4.1, using the methods cited in Table D4.2. These methods have been selected to meet the DQOs for each sampling activity. All reporting and deliverables will be consistent with the Contract Laboratory Program-like (CLP-like) format and should include, but not be limited to, all items listed in Table D9.1.

All sample results will be calculated using external standards with the exception of the samples analyzed by gas chromatograph/mass spectrometer (GC/MS); these methods employ the use of internal standards or isotopic dilution for analyte quantitation. The specific procedures for target analyte quantitation are detailed in the appropriate analytical methods.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

Calibration of instrumentation is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits. Each instrument is calibrated with standard solutions appropriate to the type of instrument and the linear range established for the analytical method. The frequency of calibration and the concentration of calibration standards is determined by the manufacturers guidelines, the analytical method, or the requirements of special contracts.

A bound notebook will be kept with each instrument requiring calibration in which will be recorded activities associated with QA monitoring and repairs program. These records will be checked during periodic equipment review and internal and external QA/QC audits.

8.1 GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

It is necessary to establish that a given GC/MS meets the standard mass spectral abundance criteria prior to initiating any ongoing data collection. This is accomplished through the analyses of tuning compounds as specified in the analytical methods.

Calibration of the GC/MS system will be performed daily at the beginning of the day or with each 12 hours of instrument operating time. All method-specified calibration criteria must be met prior to sample analyses. All calibrations must be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of ≥ 0.995). Higher order fits will not be allowed.

8.2 HIGH RESOLUTION GAS CHROMATOGRAPHY/ HIGH RESOLUTION MASS SPECTROMETRY (HRGC/HRMS)

All calibration and quantitation will be in accordance with the cited method.

8.3 GAS CHROMATOGRAPHY (GC)

Quantification of samples that are analyzed by GC with element selective detectors shall be performed by external standard calibration. Standards containing the compounds of interest will be analyzed at a minimum of five concentrations to establish the linear range of the detector. Single point calibration will be performed at the beginning of each day and at every tenth injection. The response factors from the single point calibration will be checked against the average response factors from multi-level calibration. If deviations in response factors are greater than those allowed by the analytical method protocols, then system recalibration will be performed. Alternatively, fresh calibration standards will be prepared and analyzed to verify instrument calibration.

All method-specified calibration criteria must be met prior to sample analyses. All calibrations must be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of ≥0.995). Higher order fits will not be allowed.

8.4 INSTRUMENTATION FOR INORGANIC ANALYSES

Inductively coupled argon plasma (ICAP) instrumentation will be calibrated using a minimum of a blank and one standard. Mercury and cyanide instrumentation will be calibrated using a blank and a minimum of three calibration standards (four for mercury), with a correlation coefficient requirement of ≥0.995. All remaining method-specified calibration procedures will be performed and acceptance criteria will be met prior to sample analyses.

9.0 DATA REDUCTION, VALIDATION ASSESSMENT AND REPORTING

9.1 GENERAL

The contract laboratory will perform analytical data reduction and validation in-house under the direction of the Laboratory QA/QC Officer. The Laboratory QA/QC Officer will be responsible for assessing data quality and advising of any data which were rated "preliminary" or "unacceptable" or other qualifications based on the QC criteria outlined in the relevant methods, which would caution the data user of possible unreliability. Data reduction, validation and reporting by the laboratory will be conducted as detailed in the following:

i) raw data produced and checked by the responsible analysts is turned over for independent review by another analyst;

ii) the area supervisor reviews the data for attainment of quality control criteria presented in the referenced analytical methods;

iii) upon completion of all reviews and acceptance of the raw data by the laboratory operations manager, a computerized report will be generated and sent to the Laboratory QA/QC Officer;

iv) the Laboratory QA/QC Officer will complete a thorough inspection of all reports;

v) the Laboratory QA/QC Officer and area supervisor will decide whether any sample reanalysis is required; and

vi) upon acceptance of the preliminary reports by the Laboratory QA/QC Officer, final reports will be generated and signed by the Laboratory Project Manager.

Validation of the analytical data will be performed by the QA/QC Officer - Sampling and Analytical Activities. The data validation will be performed in accordance with the NYSDEC Division of Environmental Remediation's "Guidance for the Development of Data Usability Summary Reports (DUSRs).

Assessment of analytical data will include checks on data consistency by looking for comparability of duplicate analyses, comparability to previous data from the same sampling location (if available), adherence to accuracy and precision control criteria detailed in this QAPP and anomalously high or low parameter values. The results of these data validations will be reported to the Project Manager and the contract laboratory, noting any discrepancies and their effect upon acceptability of the data.

Raw data from field measurements and sample collection activities that are used in project reports will be appropriately identified and appended to the report. Where data have been reduced or summarized, the method of reduction will be documented in the report. Field data will be audited for anomalously high or low values that may appear to be inconsistent with other data.

9.2 LABORATORY REPORTING, DATA, PRESENTATION AND FINAL REPORT

Reporting and deliverables should be ASP Category B and shall include, but not be limited to, all items listed in Table D9.1.

All sample data and corresponding QA/QC data as specified in the analytical methods, shall be maintained accessible either in hard copy or on magnetic tape or disk (computer data files).

The laboratory will submit two (2) copies of the final analytical report within 21 calendar days of receipt of the final sample included in the sample delivery group (SDG).

9.3 DOCUMENT CONTROL SYSTEM

A document control system ensures that all documents are accounted for when the project is complete.

A project number will be assigned to the project. This number will appear on sample identification tags, log books, data sheets, control charts, project memos and analytical reports, document control logs, corrective action forms and logs, QA plans, and other project analytical records.

9.4 QC CHECK POINTS AND DATA FLOW

The following specific QC check points will be common to all metals, GC, and GC/MS analyses. They are presented with the decision points:

Chemist - bench level checks

i) systems check: sensitivity, linearity, and reproducibility within specified limits;

ii) duplicate analyses within control limits;

iii) matrix spike results within control limits;

iv) surrogate spike results within control limits (organics only); and

v) calculation/data reduction checks: calculations cross-checked, any discrepancies between forms and results evident, results tabulated sequentially on the correct forms.

<u>Laboratory Project Manager</u>

i) systems operating within limits;

ii) data transcription correct;

iii) data complete; and

iv) data acceptable.

<u>Sample Control</u>

i) samples returned to sample control following analysis.

<u>Laboratory QA/QC Officer</u>

i) QA objectives met;

ii) QC checks are completed; and

iii) final data and report package is complete.

10.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

10.1 QC FOR LABORATORY ANALYSES

Specific procedures related to internal laboratory QC samples are described in the following subsections.

10.1.1 REAGENT BLANKS

A reagent blank will be analyzed by the laboratory at a frequency of one blank per analytical batch. The reagent blank, an aliquot of analyte-free water or solvent, will be carried through the entire analytical procedure.

10.1.2 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)/DUPLICATE ANALYSES

An MS/MSD sample will be analyzed for organic parameters (except HRGC/HRMS) and a duplicate and matrix spike will be analyzed for inorganic parameters at a minimum frequency of one per analytical batch. Acceptable criteria and analytes that will be used for matrix spikes are identified in Table D91. Where method specified limits were not available, general control limits were used. Percent spike recoveries will be used to evaluate analytical accuracy while percent relative standard deviation or the RPD between duplicate analyses will be used to assess analytical precision.

10.1.3 SURROGATE ANALYSES

Surrogates are organic compounds which are similar to the analytes of interest, but which are not normally found in environmental samples. Surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Every blank, standard and environmental sample analyzed by GC or GC/MS, including MS/MSD samples, will be spiked with surrogate compounds prior to sample preparation.

The compounds that will be used as surrogates and the levels of recommended spiking are specified in the methods. Surrogate spike recoveries must fall within the control limits specified in the methods. If surrogate recoveries are excessively low (<10 percent), the laboratory will contact the QA/QC Officer - Sampling and Analytical Activities for further instructions. Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantification limit. Reanalysis of these samples is not required. Assessment of analytical quality in these cases will be based on the MS/MSD sample analysis results.

10.2 QC FOR FIELD SAMPLING

To assess the quality of data resulting from the field sampling program, field duplicate and field blank samples will be collected (where appropriate) and submitted to the analytical laboratory as samples.

10.2.1 FIELD (RINSE) BLANKS

Field blanks will be used during the sampling programs to detect contamination introduced through sample collection procedures and equipment, external field conditions, sample transport, sample container preparation, sample storage, and/or the analytical process.

10.2.2 FIELD DUPLICATE SAMPLES

Field duplicate samples will be collected and used to assess the aggregate precision of sampling techniques and laboratory analysis. For every twenty investigative samples, a field duplicate sample will be collected using standard sampling procedures. This duplicate will be packed and shipped to the laboratory for analysis.

11.0 PERFORMANCE AND SYSTEM AUDITS

For the purpose of external evaluation, performance evaluation check samples are analyzed periodically by the laboratory. Internally, the evaluation of data from these samples is done on a continuing basis over the duration of a given project.

The QA/QC Officer - Sampling and Analytical Activities may carry out performance and/or systems audits to insure that data of known and defensible quality are consistently produced during this program.

Systems audits are qualitative evaluations of all components of field and laboratory quality control measurement systems. They determine if the measurement systems are being used appropriately. The audits may be carried out before all systems are operational, during the program, or after completion of the program. Such audits typically involve a comparison of the activities given in the QA/QC plan described herein, with activities actually scheduled or performed. A special type of systems audit is the data management audit. This audit addresses only data collection and management activities.

The performance audit is a quantitative evaluation of the measurement systems used for a monitoring program. It requires testing the measurement systems with samples of known composition or behavior to quantitatively evaluate precision and accuracy. A performance audit may be carried out by or under the auspices of the QA/QC Officer - Sampling and Analytical Activities without the knowledge of the analyst during each sampling event for this program.

It should be noted, however, that any additional external QA audits will only be performed if deemed necessary.

12.0 PREVENTATIVE MAINTENANCE

This section applies to both field and laboratory equipment. Specific preventive maintenance procedures for field equipment will be consistent with the manufacturer's guidelines. Specific preventive maintenance protocols for laboratory equipment will be consistent with the contract laboratory's standard operating procedures.

All analytical instruments to be used in this project will be serviced by laboratory personnel at regularly scheduled intervals in accordance with the manufacturers' recommendations. Instruments may also be serviced at other times due to failure. Requisite servicing beyond the abilities of laboratory personnel will be performed by the equipment manufacturer or their designated representative.

Routine maintenance of the instruments will be performed as per manufacturers' recommendations. The Laboratory Project Manager is responsible for the preventive maintenance of the instruments.

13.0 SPECIFIC ROUTINE PROCEDURES USES TO ASSESS DATA PRECISION, ACCURACY AND COMPLETENESS

13.1 QA MEASUREMENT QUALITY INDICATORS

13.1.1 PRECISION

Precision will be assessed by comparing the analytical results between duplicate spike analyses. Precision as percent relative difference will be calculated as follows for values significantly greater than the associated detection limit:

$$\text{Precision} = \left| \frac{(D_2 - D_1)}{(D_1 + D_2)/2} \right| \times 100$$

D_1 = matrix spike recovery

D_2 = matrix spike duplicate spike recovery

For results near the associated detection limits, precision will be assessed based on the following criteria:

$$\text{Precision} = \left| \text{Original result - duplicate result} \right| < \text{CRDL}$$

13.1.2 ACCURACY

Accuracy will be assessed by comparing a set of analytical results to the accepted or "true" values that would be expected. In general, MS/MSD and check sample recoveries will be used to assess accuracy. Accuracy as percent recovery will be calculated as follows:

$$\text{Accuracy} = \frac{A - B}{C} \times 100$$

A = The analyte determined experimentally from the spike sample

B = The background level determined by a separate analysis of the unspiked sample

C = The amount of spike added

In some cases, MS and/or MSD recoveries may not be available due to elevated levels of the spiked analyte in the investigative sample. In such cases, accuracy will be assessed based on surrogate spike recoveries and/or laboratory control samples.

13.1.3 COMPLETENESS

Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under normal conditions.

To be considered complete, the data set must contain all QC check analyses verifying precision and accuracy for the analytical protocol. In addition, all data are reviewed in terms of stated goals in order to determine if the database is sufficient.

When possible, the percent completeness for each set of samples will be calculated as follows:

$$\text{Completeness} = \frac{\text{usable data obtained}}{\text{total data planned}} \text{ x 100 percent}$$

13.1.4 OUTLIERS

Procedures discussed previously will be followed for documenting deviations. In the event that a result deviates significantly from method established control limits, this deviation will be noted and its effect on the quality of the remaining data assessed and documented.

14.0 CORRECTIVE ACTION

The need for corrective action may be identified by system or performance audits or by standard QC procedures. The essential steps in the corrective actions system will be:

i) checking the predetermined limits for data acceptability beyond which corrective action is required;

ii) identifying and defining problems;

iii) assigning responsibility for investigating the problem;

iv) investigating and determining the cause of the problem;

v) determination of a corrective action to eliminate the problem (this may include reanalysis or resampling and analyses);

vi) assigning and accepting responsibility for implementing the corrective action;

vii) implementing the corrective action and evaluating the effectiveness;

viii) verifying that the corrective action has eliminated the problem; and

ix) documenting the corrective action taken.

For each measurement system, the laboratory QA/QC Officer will be responsible for initiating the corrective action and the Laboratory Project Manager will be responsible for implementing the corrective action.

15.0 QUALITY ASSURANCE REPORTS

Final reports will contain a discussion on QA/QC summarizing the quality of the data collected and/or used as appropriate for each phase of the project. The Project Manager who has responsibility for these summaries, will rely on written reports/memoranda documenting the data assessment activities, performance and systems audits and footnotes identifying qualifications to the data, if any.

Each summary of sampling activities will include a tabulation of the data including:

i) field blank and field duplicate sample results;

ii) maps showing well locations; and

iii) an explanation of any sampling conditions or quality assurance problems and their effect on data quality.

QA reports will be prepared by the QA/QC Officer - Sampling and Analytical Activities following receipt of all analytical data. These reports will include discussions of the following and their effects on the quality of the data reported:

i) sample holding times,

ii) laboratory/reagent blank data

iii) surrogate spike, matrix spike and matrix spike duplicate data;

iv) field QA/QC data;

v) pertinent instrument performance per method protocols; and

vi) audit results (if performed).

In addition, the QA reports will summarize all QA problems, and give a general assessment of QA results versus control criteria for such parameters as accuracy, precision, etc.

The QA reports will be forwarded to the Project Manager.

APPENDIX D

TABLES

TABLE D4.1

TARGET QUANTITATION LIMITS
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

	CAS Number	*Groundwater Quantitation Limits*	*Soil Quantitation Limits*
		µg/L	*µg/kg*
Volatiles			
Chloromethane	74-87-3	5	10
Bromomethane	74-83-9	5	10
Vinyl chloride	75-01-4	5	10
Chloroethane	75-00-3	5	10
Methylene chloride	75-09-2	5	10
Acetone	67-64-1	5	10
Carbon disulfide	75-15-0	5	10
1,1-Dichloroethylene	75-35-4	5	10
1,1-Dichloroethane	75-35-3	5	10
1,2-Dichloroethylene (total)	540-59-0	5	10
Chloroform	67-66-3	5	10
1,2-Dichloroethane	107-06-2	5	10
2-Butanone	78-93-3	5	10
1,1,1-Trichloroethane	71-55-6	5	10
Carbon tetrachloride	56-23-5	5	10
Bromodichloromethane	75-27-4	5	10
1,2-Dichloropropane	78-87-5	5	10
cis-1,3-Dichloropropene	10061-01-5	5	10
Trichloroethene	79-01-6	5	10
Dibromochloromethane	124-48-1	5	10
1,1,2-Trichloroethane	79-00-5	5	10
Benzene	71-43-2	5	10
trans-1,3-Dichloropropene	10061-02-6	5	10
Bromoform	75-25-2	5	10
4-Methyl-2-pentanone	108-10-1	5	10
2-Hexanone	591-78-6	5	10
Tetrachloroethene	127-18-4	5	10
Toluene	108-88-3	5	10
1,1,2,2-Tetrachloroethane	79-34-5	5	10
Chlorobenzene	109-90-7	5	10
Ethylbenzene	100-41-4	5	10
Styrene	100-42-5	5	10
Total xylenes	1330-20-7	5	10
STARS Semi-Volatiles			
Anthracene	120-12-7	10	330
Benzo(k)fluoranthene	207-08-9	10	330
Benzo(a)anthracene	56-55-3	10	330
Acenaphthene	83-32-9	10	330
Benzo(b)fluoranthene	205-99-2	10	330
Benzo(a)pyrene	50-32-8	10	330
Benzo(g,h,i)perylene	191-24-2	10	330

TABLE D4.1

TARGET QUANTITATION LIMITS
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

	CAS Number	*Groundwater Quantitation Limits*	*Soil Quantitation Limits*
		µg/L	*µg/Kg*
STARS Semi-Volatiles (Cont'd.)			
Dibenzo(a,h)anthracene	53-70-3	10	330
Chrysene	218-01-9	10	330
Fluoranthene	206-44-0	10	330
Fluorene	86-73-7	10	330
Naphthalene	91-20-3	10	330
Phenanthrene	85-01-8	10	330
Pyrene	129-00-0	10	330
Indeno(1,2,3-cd)pyrene	193-39-5	10	330
		µg/L	*mg/Kg*
Metals			
Aluminum	7429-90-5	200	20
Antimony	7440-36-0	60	6
Arsenic	7440-38-2	10	1
Barium	7440-39-3	200	20
Beryllium	7440-41-7	5	0.5
Cadmium	7440-43-9	5	0.5
Calcium	7440-70-2	5000	500
Chromium	7440-47-3	10	1
Cobalt	7440-48-4	50	5
Copper	7440-50-8	25	2.5
Iron	7439-89-6	100	10
Lead	7439-92-1	3	0.3
Magnesium	7439-95-4	5000	500
Manganese	7439-96-5	15	1.5
Mercury	7439-97-6	0.2	0.1
Nickel	7440-02-0	40	4
Potassium	7440-09-7	5000	500
Selenium	7782-49-2	5	0.5
Silver	7440-22-4	10	1
Sodium	7440-23-5	5000	500
Thallium	7440-28-0	10	1
Vanadium	7440-62-6	50	5
Zinc	7440-66-6	20	2

Notes:
CAS Chemical Abstract System.
STARS Spill Technology and Remediation Series.

TABLE D4.2

SAMPLING AND ANALYSIS SUMMARY
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

Sample Matrix	*Analytical Parameters*	*Analytical Method*	*Estimated Number of Samples*	*Field Duplicates*	*Trip Blanks*	*MS/MSD/Dup*
Soil	TCL VOCs	SW-846 8260	8	1	-	1/1/0
	STARS SVOCs	SW-846 8270	11	1	-	1/1/0
	TAL Metals	SW-846 6010/7471	11	1	-	1/0/1
Groundwater	TCL VOCs	SW-846 8260	6	1	1/day	1/1/0
	STARS SVOCs	SW-846 8270	6	1	-	1/1/0
	TAL Metals	SW-846 6010/7470	6	1	-	1/0/1

Notes:
Dup Laboratory Duplicate.
MS Matrix Spike.
MSD Matrix Spike Duplicate.
STARS Spill Technology and Remediation Series.
SVOCs Semi-Volatile Organic Compounds.
TAL Target Analyte List
TCL Target Compound List.
VOCs Volatile Organic Compounds.

TABLE D5.1

SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME PERIODS
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

Analyses	*Sample Containers*	*Preservation*	*Maximum Holding Time*	*Notes*
Soil				
TCL VOCs	1 - 4 oz. glass jar with Teflon lined septum	Cool 4°C	14 days from collection to analyses	Fill completely, little or no head space
STARS SVOCs	1 - 8 oz. wide mouth glass jar	Cool 4°C	14 days from collection to extraction 40 days from extraction to analysis	Fill completely
TAL Metals	1 - 8 oz. wide mouth glass jar	Cool 4°C	180 days (mercury 28 days) from collection to analysis	Fill completely
Water				
TCL VOCs	2 - 40 ml glass vial with Teflon-lined septum	HCl to pH <2, cool to 4°C	14 days from collection to analysis	Fill completely, no head space
STARS SVOCs	1 liter amber glass jar	Cool 4°C	7 days from collection to extraction 40 days from extraction to analysis	Fill completely
TAL Metals	1 - 500 ml plastic	HNO_3 to pH <2, cool 4°C	180 days (mercury 28 days) from collection to analysis	Fill completely

Notes:
STARS Spill Technology and Remediation Series.
SVOC Semi-Volatile Organic Compounds.
TAL Target Analyte List.
TCL Target Compound List.
VOCs Volatile Organic Compounds.

TABLE D9.1

LABORATORY REPORTING DELIVERABLES - FULL DATA PACKAGE
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

A detailed report narrative should accompany each submission, summarizing the contents and results.

A. Chain of Custody Documentation and Detailed Narrative [1]

B. Sample Information
   1. date collected
   2. date extracted or digested
   3. date analyzed
   4. analytical method and reference

C. Data (including all raw data and CLP-like summary forms)
   1. samples
   2. laboratory duplicates [2]
   3. method blanks
   4. spikes, spike duplicates [2] [3]
   5. surrogate recoveries [2]
   6. internal standard recoveries
   7. calibration
   8. any other applicable quality control (QC) data (e.g., serial dilution)
   9. tentatively identified compounds (TICs) (if applicable)

D. Miscellaneous
   1. method detection limits and/or instrument detection limits
   2. percent solids (where applicable)
   3. metals run logs
   4. standard preparation logs
   5. sample preparation logs

All sample data and its corresponding quality assurance/quality control (QA/QC) data shall be maintained accessible to CRA either in hard copy or on magnetic tape or disc (computer data files). All solid sample results must be reported on a dry-weight basis.

Notes:
(1) Any QC outliers must be addressed and corrective action taken must be specified.
(2) Laboratory must specify applicable control limits for all QC sample results.
(3) A blank spike must be prepared and analyzed with each sample batch.
(4) TICs.

APPENDIX E

HEALTH AND SAFETY PLAN

TABLE OF CONTENTS

TABLE OF CONTENTS

Page

LIST OF TABLES
(Following Appendix E)

LIST OF ATTACHMENTS

1.0 INTRODUCTION

The Health and Safety Plan (HASP) presented herein describes the health and safety procedures and emergency response guidelines to be implemented during the Site Investigation Program which will be implemented at the Parcel 2 Site (Site) located in Buffalo, New York. Figure 2.1 of the Work Plan presents the Site Location and Figure 2.2 presents the Site Layout.

The scope of work to be completed during the Site Investigation includes the following work activities:

i) mobilization and demobilization of labor, materials, and equipment to and from the Site;

ii) surveying activities;

iii) installation of soil borings and soil sampling activities;

iv) installation of groundwater monitoring wells and groundwater sampling activities;

v) hydraulic conductivity testing (slug testing); and

vi) decontamination activities.

During completion of the above field activities, personnel may come in contact with soils, groundwater, and surface water which potentially contains hazardous substances. This HASP has been developed to ensure the following:

i) that Site personnel are not adversely exposed to the chemical compounds of concern;

ii) that public health and the environment are not adversely impacted by contaminated materials which may potentially migrate off-Site during field activities at the Site;

iii) compliance with applicable governmental and non-governmental (American Conference of Governmental Industrial Hygienists [ACGIH]) regulations and guidelines. In particular, the amended rules of the Occupational Safety and Health Administration (OSHA) for Subpart H of Part 1910 (Title 29 Code of Federal Regulations [CFR] Part 1910.120) will be implemented for all Site work; and

iv) initiation of proper emergency response procedures to minimize the potential for any adverse impact to Site workers, the general public, or the environment.

For the purpose of this HASP, all field activities performed on Site involving contact with potentially contaminated materials will be considered contaminated operations requiring personal protection equipment (PPE). A detailed description of the PPE required is presented in Section 6.1. The applicability of this HASP extends to all personnel who will be on Site, including contractors, subcontractors, and State or Federal Agency personnel.

All field activities at the Site will be conducted in accordance with the provisions of this Site-specific HASP and employer-specific Standard Operating Procedures (SOPs). A copy of this HASP and applicable SOPs will be maintained on Site whenever field activities are in progress.

1.1 PROJECT ORGANIZATION

The Site Investigation Program will be organized as follows: Conestoga-Rovers & Associates (CRA) will direct the program and an environmental drilling firm will be subcontracted to provide drilling services. The CRA Site Representative will be responsible for ensuring compliance with the HASP.

2.0 SITE CHARACTERIZATION AND POTENTIALLY HAZARDOUS COMPOUNDS

Sections 1.0, 2.0, and 3.0 of the Work Plan provide background information on the Site including the location, description, and results of a Phase II Environmental Site Assessment (ESA).

The Phase II ESA detected the presence of chemicals on Site. Table E2.1 presents a list of the chemical compounds of concern at the Site. The exposure routes and acceptable exposure levels in air for these compounds of concern are listed in Table E2.2. These levels are set to protect the health of workers who may be exposed to these chemical substances.

3.0 BASIS FOR DESIGN

Regulations set forth by OSHA in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926) form the basis of this HASP. Emphasis is placed on Sections 1910.120 (Hazardous Waste Operations and Emergency Response), 1910 Subpart I (Personal Protective Equipment), 1910 Subpart Z (Toxic and Hazardous Substances), 1926 Subpart N (Cranes, Derricks, Hoists, Elevators and Conveyors), and 1926 Subpart O (Motor Vehicles, Mechanized Equipment and Marine Operations). In addition, current Threshold Limit Values (TLVs) formulated by the ACGIH have been considered in the development of the selection of PPE. Some of the specifications within this section are in addition to the OSHA regulations, and reflect the positions of the USEPA, the National Institute for Occupational Safety and Health (NIOSH), and the United States Coast Guard (USCG) regarding safe operating procedures at hazardous waste sites.

The health and safety of the public and Site personnel and the protection of the environment will take precedence over cost and schedule considerations for all field activities.

4.0 RESPONSIBILITIES AND ADMINISTRATION

The CRA Site Representative shall be responsible for all decision regarding operations and work stoppage due to health and safety considerations.

The on-Site Representative responsibilities include:

i) supervision and enforcement of safety equipment usage, including the required use of extra equipment if appropriate;

ii) supervision and inspection of personnel decontamination activities;

iii) supervision and inspection of equipment decontamination activities;

iv) conduct the on-Site personnel safety indoctrination training session with regard to potential hazards, personal hygiene principles, all other SOPs, safety equipment usage, emergency procedures, and location of first aid kits and identification of personnel trained in first aid and cardiopulmonary resuscitation (CPR);

v) maintain Exclusion Zone (EZ) and Contaminant Reduction Zone (CRZ) work area;

vi) review and modify the HASP as more information becomes available or conditions warrant;

vii) authority to suspend work activity due to unsafe working conditions;

viii) coordination of emergency procedures;

ix) be responsible for implementing the air monitoring program;

x) ensure that all on-Site personnel have obtained the required medical surveillance prior to arrival at the Site and have met the OSHA training and fit testing requirements; and

xi) maintain the on-Site Hazard Communication Program including copies of Material Safety Data Sheets (MSDSs).

5.0 WORKER TRAINING AND EDUCATION

Prior to commencing Site activities, a Health and Safety/Site Indoctrination Session will be presented. Attendance is mandatory for all personnel who will be or are expected to be involved with field activities at the Site.

The training program will stress the importance that each attendee understands the basic principles of personnel protection and safety, be able to perform their assigned job tasks in a safe and environmentally responsible manner and be prepared to respond in an appropriate manner to any emergency which may arise. A brief history of the Site will be included and the various components of the project HASP will be presented followed by an opportunity to ask questions to ensure that each attendee understands the HASP. Personnel not successfully completing this training program will not be permitted to enter or work in potentially contaminated areas of the Site. Personnel successfully completing this training program shall sign an acknowledgment form, a copy of which is presented in Attachment A.

This training will be given in addition to the basic training required under OSHA and is not intended to meet the requirements of 29 CFR 1910.120. Prior to working in or entering an EZ environment (as defined in Section 6.0), all personnel will be required to provide documentation to the Site Representative indicating successful completion of the training requirements of 29 CFR 1910.120. This includes a certificate for the initial 40 hours of training, a current eight hour refresher certificate, and additional eight hour certificates for managers or supervisors.

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

This section of the HASP describes the requirements for PPE and the specific levels of protection required for each work task to be conducted at the Site during field activities.

6.1 PROTECTION LEVELS

Personnel will wear protective equipment when field activities involve potential exposure to contaminants from vapors or particulates that may be generated on Site or when direct contact with potentially hazardous substances may occur. Chemical resistant clothing protects the skin from contact with skin-destructive and absorbable contaminants. Respirators protect lungs, the gastrointestinal tract, and if a full-face respirator is worn, the eyes, against airborne toxicants. Respiratory protection levels have been set based on a review of the potential known and unknown Site contaminants and the levels.

The specific protection levels to be employed at the Site for each work task are listed in Table E6.1. All field activities conducted at the Site will require the use of one of the following levels of PPE.

Level C:

1. Tyvek® coveralls (Polycoated Tyvek® coverall when handling or working with liquids.
2. Steel toe work boots and disposable boot covers or neoprene boots.
3. Disposable nitrile inner gloves.
4. Outer nitrile work gloves.
5. Half- or full-face air purifying respirator (APR), equipped with combination cartridges for organic vapors and particulates (P-100).
6. Hearing protection as necessary.
7. Hard hat.

Modified Level D:

1. Tyvek® coveralls (Polycoated Tyvek® coverall when handling or working with liquids).
2. Steel toe work boots.
3. Disposable nitrile inner gloves.

4. Outer nitrile work gloves.
5. Safety glasses.
6. Splash shields as necessary.
7. Hearing protection as necessary.
8. Hard hat.

Level D:

1. Standard work clothes.
2. Steel toe work boots.
3. Gloves as necessary.
4. Safety glasses.
5. Hearing protection as necessary.
6. Hard hat.

PPE will be maintained in a clean sanitary condition and ready for use. Disposable coveralls shall be discarded when torn and as personnel leave the contaminated work zone. Hard hats shall be thoroughly cleaned after leaving the contaminated work zone. Respirators shall be cleaned after each day's use and cartridges discarded. A sufficient quantity of potable water shall be supplied for washing, cleaning PPE and drinking. A potable water supply for washing and cleaning PPE will be maintained adjacent to the decontamination area described in Section 9.0. Fresh potable water for drinking will be supplied on a daily basis and be maintained at a location removed from the active work area.

6.2 REASSESSMENT OF PROTECTION LEVELS

Protection levels provided by PPE selection shall be upgraded or downgraded based upon a change in Site conditions or the review of the results of monitoring.

When a significant change occurs, the hazards should be reassessed. Some indicators of the need for reassessment are:

i) commencement of a new work phase;
ii) change in job tasks during a work phase;
iii) change of season/weather;

iv) when temperature extremes or individual medical considerations limit the effectiveness of PPE;

v) contaminants other than those expected to be encountered are identified;

vi) change in ambient levels of contaminants; and

vii) change in work scope which effects the degree of contact with potentially contaminated areas.

All proposed changes to protection levels and PPE requirements will be reviewed and approved prior to their implementation by the Site Representative.

6.3 DURATION OF WORK TASKS

The duration of field activities involving the usage of PPE will be established by the Site Representative or his designee based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE (heat stress, see Section 12.3 Environmental Control), and limitations of the protective equipment (i.e., ensemble permeation rates, life expectancy of air-purifying respirator cartridges, etc.). As a minimum, rest breaks will be observed at the following intervals:

i) 15 minutes midway between shift startup and lunch;

ii) one-half to one hour for lunch; and

iii) 15 minutes in the afternoon, between lunch and shift end.

All rest breaks will be taken in a clean area (e.g., Support Zone) after full decontamination and PPE removal. Additional rest breaks will be observed, based upon the heat stress monitoring guidelines presented in CRA's SOP which will be available on-Site.

6.4 LIMITATIONS OF PROTECTIVE CLOTHING

PPE ensembles designated for use during field activities have been selected to provide protection against contaminants at unknown concentrations at the Site. No protective garment, glove or boot is chemical-proof, nor will it afford protection against all chemical types. Permeation of a given chemical through PPE is a complex process governed by contaminant concentrations, environmental conditions, physical condition of the protection garment, and the resistance of a garment to a specific contaminant;

chemical permeation may continue even after the source of contamination has been removed from the garment.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all Site personnel using PPE:

i) when using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift;

ii) inspect all clothing, gloves and boots both prior to and during use for:

   a) imperfect seams,

   b) non-uniform coatings,

   c) tears, and

   d) poorly functioning closures; and

iii) inspect reusable garments, boots and gloves both prior to and during use for:

   a) visible signs of chemical permeation,

   b) swelling,

   c) discoloration,

   d) stiffness,

   e) brittleness,

   f) cracks,

   g) any sign of puncture, and

   h) any sign of abrasion.

Reusable gloves, boots or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit elevated concentrations of contaminants will not be reused.

Additional PPE usage guidelines are as follows:

i) ankles/wrists will be secured tightly with the use of duct tape;

ii) prescription eyewear used on Site shall be safety glasses equipped with side shields when full-face respirators are not required. Contact lenses shall not be used;

iii) all EZ workers will have received training in the usage of full-face air purifying respirators and self-contained breathing apparatus which may be required in an emergency;

iv) steel toe leather footwear shall be covered with neoprene overboots prior to entering the EZ and immediately upon entering the CRZ; and

v) safety footwear and hard hats are to be worn by Site personnel at all times.

EZ personnel also carry certain responsibilities for their own health and safety, and are required to observe the following safe work practices:

i) familiarize themselves with this HASP;

ii) use the "buddy system" when working in a contaminated operation;

iii) use the safety equipment in accordance with training received, labeling instructions and common sense;

iv) maintain safety equipment in good condition and proper working order;

v) refrain from activities that would create additional hazards (i.e., smoking, eating, etc., in restricted areas, leaning against dirty, contaminated surfaces);

vi) smoking and eating will be prohibited except in designated areas. These designated areas may change during the duration of the project to maintain adequate separation from the active work area(s). Designation of these areas will be the responsibility of the Site Representative; and

vii) soiled disposable outerwear shall be removed and placed into a covered container prior to washing hands and face, eating, using lavatory facilities or leaving the Site.

6.5 RESPIRATORY PROTECTION PROGRAM

Prior to arriving at the Site, all on-Site personnel will have received training in the use of, and have been fit tested for either a half-facepiece or full-facepiece respirator. All on-Site personnel will be required to comply with their employer-specific written respiratory protection program developed in accordance with OSHA 29 CFR 1910.134.

Respiratory protection may be required during some of the field activities. This is to ensure worker protection from potentially contaminated particulates and volatile organic compounds (VOCs).

A photoionization detector (PID) equipped with a 10.6 eV lamp will be used to determine if organic vapors are present. A background reading will be established prior to commencing work activities at each active work area.

Action levels to determine the level of respiratory protection necessary for organic vapors during field activities are based on the concentration of the Site contaminants measured within the breathing zone. The action levels and appropriate respiratory protection for these Site activities are as follows:

Sustained Organic Vapor Reading Above Background Within Worker Breathing Zone in Parts Per Million (ppm)	*Action Taken*
0 or Background to .5	Half- or Full-Face Respirator Available
.5 to 5	Wear Half- or Full-Face Respirator
5 to 25	Must Wear Full-Face Respirator
>25	Wear Supplied Air Respirator, Implement Additional Engineering Controls

However, if the ambient concentrations of organic vapors are due to identifiable substances, the level of respiratory protection may be altered by the Site Representative.

The appropriate air purifying respirator cartridge to be used at the Site is a combination organic vapor/P-100 particulate cartridge. The cartridge used must be of the same manufacturer as the respiratory facepiece.

6.6 SITE CONTROL

Designated work areas will be set up during the Site field activities, as required. The purpose of these procedures is to limit access to potentially contaminated areas, and prevent the migration of potentially hazardous materials into adjacent non-contaminated areas. These areas are described in the following section:

i) The Exclusion Zone (EZ): is the area immediately surrounding the active work area. Sufficient area will be provided for efficient movement of personnel and equipment as well as contaminant control. Boundaries are modifiable depending on operational requirements. The Site Representative will be responsible for maintaining the boundaries of this area. Personnel entering this area are required to wear the PPE as defined previously. A wind direction indication device (i.e., flagging, windsock, etc.) will be mounted in the area of any EZ during Site activities.

All personnel (including visitors) entering the EZ or CRZ using respiratory protection must have successfully passed a qualitative respirator FIT test in accordance with OSHA 29 CFR 1910.134. Documentation of FIT testing is the responsibility of each employer.

In the event that unauthorized personnel enter the EZ, work will stop. Work will not resume until the unauthorized personnel have been removed from the EZ or have been moved to an acceptable on-Site area. A log of all visitors to the Site, including those entering the EZ, will be maintained;

ii) The Contaminant Reduction Zone (CRZ): will provide a location for removal of contaminated PPE and final removal and decontamination of personnel and equipment. Supplemental safety equipment, such as fire extinguishers, portable eyewash and extra quantities of PPE may be stored in this area. CRA will follow its specific SOP for Level C and D personnel decontamination procedures but the general order in which safety equipment is to be donned is as follows:

    i) chemical resistant coveralls,;
    ii) neoprene boots,
    iii) gloves,
    iv) respiratory protection equipment, and
    v) hard hat.

    The following order provides a general outline when removing safety equipment:

    i) wash off boots and outer gloves prior to removal,
    ii) chemical resistant coveralls,
    iii) hard hat,
    iv) respiratory protection equipment, and
    v) inner gloves; and

iii) The Support Zone (SZ): is situated in clean areas where there is a minimal risk of encountering hazardous materials or conditions. PPE beyond standard construction safety equipment is therefore not required.

7.0 ACTIVITY HAZARD/RISK ANALYSIS

This section identifies the general hazards associated with specific field activities and presents the documented or potential health and safety hazards that exist at the Site. Every effort will be made to reduce or eliminate these hazards. Those which cannot be eliminated must be guarded against by use of engineering controls and/or PPE. Table E7.1 presents the anticipated hazards/risks and hazard controls.

In addition to the chemical hazards presented in Section 2.0 of this HASP, physical hazards including poison ivy, mosquitoes, bees, wasps, uneven terrain, slippery surfaces, hazards presented by the use of heavy equipment, vehicular traffic, the use of decontamination equipment and potential heat and cold stress exist at the Site. It will be the responsibility of each contractor and their personnel to identify the physical hazards posed by the various Site field activities and implement preventative and corrective action.

7.1 CHEMICAL EXPOSURE

Preventing exposure to toxic chemicals is a primary concern. Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systematically, causing a toxic effect at a part of the body distant from the point of initial contact.

Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from acute exposures usually occur during or shortly after exposure to a sufficiently high concentration of a contaminant. The concentration required to produce such effects varies widely from chemical to chemical. The term "chronic exposure" generally refers to exposures to "low" concentrations of a contaminant over a long period of time. The "low" concentrations required to produce symptoms of chronic exposure depend upon the chemical, the duration of each exposure, and the number of exposures. For a given contaminant, the symptoms of an acute exposure may be completely different from those resulting from chronic exposure.

For either chronic or acute exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any such warning signs (this is a particular concern for chronic exposures to low concentrations). Health effects such as cancer or respiratory disease may not become manifest for several years or decades after exposure. In addition, some toxic chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious physiological sensations. Thus, a worker's senses or feelings cannot be relied upon in all cases to warn of potential toxic exposure.

The effects of exposure not only depend on the chemical, its concentration, route of entry, and duration of exposure, but may also be influenced by personal factors such as the individual's smoking habits, alcohol consumption, medication use, nutrition, age, and sex.

An important exposure route of concern at the Site is inhalation. The lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Some toxic chemicals present in the atmosphere may not be detected by human senses (i.e., they may be colorless, odorless, and their toxic effects may not produce any immediate symptoms). Respiratory protection is therefore extremely important if there is a possibility that the work site atmosphere may contain such hazardous substances. Chemicals can also enter the respiratory tract through punctured eardrums. Where this is a hazard, individuals with punctured eardrums should be medically evaluated specifically to determine if such a condition would place them at an unacceptable risk and preclude their working at the task in question.

Direct contact of the skin and eyes by hazardous substances is another important route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where they are transported to vulnerable organs. Skin absorption is enhanced by abrasions, cuts, heat, and moisture. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye). Wearing protective equipment, not using contact lenses in contaminated atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing contact with liquid and solid chemicals can help protect against skin and eye contact.

Although ingestion should be the least significant route of exposure at the Site, it is important to be aware of how this type of exposure can occur. Deliberate ingestion of chemicals is unlikely, however, personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics at the Site may provide a route of entry for chemicals.

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (i.e., by stepping or tripping and falling onto contaminated sharp objects). Wearing safety shoes, avoiding physical hazards, and taking common sense precautions are important protective measures against injection.

8.0 AIR MONITORING PROGRAM

Air monitoring will be performed during designated excavating, drilling, and other on-Site work tasks to protect field personnel against exposure to airborne hazardous substances and to determine appropriate levels of PPE for work tasks. The Site Representative will be responsible for conducting air monitoring. The following sections discuss initial air monitoring, periodic air monitoring, monitoring parameters, and use and maintenance of survey equipment.

8.1 INITIAL AIR MONITORING

Initial air monitoring of the work area will be determined before beginning any work task. This monitoring will be performed using a realtime field survey instrumentation (PID) to determine the levels of airborne VOCs. These levels will also be monitored at the beginning of each work day to identify background contaminant concentrations and to detect any potentially hazardous situation that might have developed during of-shift periods.

8.2 PERIODIC AIR MONITORING

Periodic air monitoring will be performed during all Site activities. This type of monitoring will be performed as a minimum requirement when the following situations arise:

i) work begins on a different portion of the Site;

ii) contaminants other than those previously identified are encountered;

iii) a different type of operation is initiated (e.g., well installation is initiated after drilling activities); and

iv) workers experience physical difficulties.

Required survey instrumentation, sampling procedures, and monitoring procedures are specified in Section 8.3.

8.3 MONITORING PARAMETERS FOR ORGANIC VAPORS

Air monitoring for organic vapors will be performed at shoulder height (in the breathing zone) on workers most likely to be exposed to potentially hazardous concentrations of contaminants. Situations that will require air monitoring, monitoring parameters, detection devices, and action levels are discussed in the following paragraph. The following instrument and monitoring frequency will be used to monitor for organic vapors during project activities:

i) Instrument: Ultraviolet PID equipped with a 10.6 eV lamp; and

ii) Monitoring Frequency: Monitoring will occur continuously during on-Site activities. PID readings will initially be recorded in the field log book every hour. If continued monitoring does not indicate the presence of VOCs, readings may be recorded every hour or longer based on the Site Representative's review of the monitoring data collected.

8.4 USE AND MAINTENANCE OF SURVEY EQUIPMENT

All personnel using field survey equipment will be briefed on its operation, limitations, and maintenance by the Site Representative. Maintenance and calibration will be performed in accordance with manufacturer guidelines by a designated individual familiar with the devices and the calibration of these devices will be recorded in the logbook that will be signed by the technician.

Air monitoring equipment will be calibrated before work begins each day. Only routine maintenance such as changing batteries or lamps and cleaning lamps and fans will be performed by on-Site personnel. Any additional maintenance will be performed by a trained service technician.

9.0 DECONTAMINATION PROCEDURES

In general, everything that enters the EZ at this Site must either be decontaminated or properly discarded upon exit from the EZ. All personnel must enter and exit the EZ through the CRZ. Prior to demobilization, potentially contaminated equipment will be decontaminated on a wash pad (decontamination pad) and inspected by the Site Representative before it is moved into the clean zone. Any material that is generated by decontamination procedures will be stored in a designated area in the EZ until disposal arrangements are made.

The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for drilling equipment and for any reusable PPE is Liqui-nox soap. The Material Safety Data Sheets (MSDSs) for Liqui-nox and any other chemical containing products brought to the Site will be maintained on-Site by the Site Representative.

9.1 EQUIPMENT DECONTAMINATION PROCEDURES

All equipment must be decontaminated within the CRZ by a pressure water cleaner upon exit from the EZ. Decontamination procedures should include: knocking soil/mud from machines; water brush scrubbing using a solution of water and Liqui-nox; and a final water rinse. Personnel shall wear a level of protection one level lower than what was worn in the EZ when decontaminating equipment. Runoff will be collected and stored until proper disposal arrangements have been made. Following decontamination and prior to exit from the EZ, the Site Representative shall be responsible for ensuring that the item has been sufficiently decontaminated. This inspection shall be included in the Site log.

9.2 PERSONNEL DECONTAMINATION PROCEDURES

CRA will follow its SOP for going through personnel decontamination. This SOP will be available on-Site.

10.0 GENERAL SAFETY AND PERSONAL HYGIENE

All Site personnel will observe the following general principles:

i) eating at the Site is prohibited except in specifically designated areas. Designation of eating areas will be the responsibility of the Site Representative. The location of these areas may change during the duration of the project to maintain adequate separation from the active work area(s);

ii) smoking at the Site is prohibited except in specifically designated areas;

iii) individuals getting wet to the skin with effluent from the washing operation must wash the affected area immediately. If clothes in contact with skin are wet, then these must be changed;

iv) hands must be washed with soap and water before eating, drinking, smoking and before using toilets at the facilities provided;

v) all disposable coveralls and soiled gloves will be disposed of in covered containers at the end of every shift or sooner, if deemed necessary by the Site Representative. Waste will be stored until such time that it is properly disposed of during completion of field activities; and

vi) all Site personnel who wear respirators shall be clean shaven upon arrival at the Site.

11.0 MEDICAL SURVEILLANCE

In accordance with the requirements detailed in 29 CFR 1910.120 and 29 CFR 1910.134, all Site personnel who will come in contact with potentially contaminated materials will have received, within one year prior to starting field activities, medical surveillance by a licensed physician or physician's group. Personnel working on-Site must either be involved in an ongoing medical surveillance program or will receive pre- and post-project medical examinations.

Medical records for all on-Site personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work.

The medical records will be available to the employee or his designated representative upon written request, as outlined in 29 CFR 1910.1020.

Each employer will provide certifications to the Site Representative that its' personnel involved in Site activities will have all necessary medical examinations prior to commencing work which requires respiratory protection or potential exposure to hazardous materials. Personnel not obtaining medical certification will not perform work within contaminated areas.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to any Site activity or when accidental exposure to elevated concentrations of contaminants occur.

12.0 ENVIRONMENTAL CONTROL PROGRAM

This section of the HASP outlines measures to be implemented at the Site to prevent hazards associated with environmental conditions.

12.1 WEATHER MONITORING

The Site Representative will be responsible for checking weather forecasts for the next day and week of work to provide advance notification of any severe weather conditions. Severe weather conditions (e.g., heavy rain) may cause unsafe conditions at the Site and in some situations work may have to be stopped.

12.2 RAIN, SNOW, ICE

Excessive amounts of precipitation may cause potential safety hazards for all work tasks. The hazards would be most commonly associated with slipping, tripping or falling due to slippery surfaces and further hazards are detailed by work task as shown in Table E7.1.

12.3 TEMPERATURE

High and low temperatures during implementation of field activities may be experienced which require measures to be implemented to prevent health and safety hazards from occurring. The potential hazard arising from both high and low temperatures is heat and cold stress.

The potential hazard due to worker heat stress is particularly important if high protection levels of PPE are in use (e.g., respirators). A detailed monitoring program and prevention measures to implement to reduce heat and cold stress are detailed in CRA's SOP for heat and cold stress which will be available on-Site. It is the responsibility of the Site Representative to determine which measures are appropriate to implement to prevent heat and/or cold stress; these will depend largely on daily Site conditions.

12.4 WIND

High winds may be encountered at the Site and these can cause hazards that may affect Site personnel health and safety. Preventative measures that will be implemented if necessary are as follows:

i) restricted Site activity;

ii) battening down light equipment or building materials;

iii) partially enclosing work areas; and

iv) reduction or stoppage of work activities.

13.0 EMERGENCY CONTINGENCIES

It is essential that Site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate.

13.1 EMERGENCY CONTACTS

Agency/Facility/Individual	*Phone*
Police Department	911
Fire Department	911
Paramedics/Local Ambulance	911
Hospital (to be determined)	
National Response Center (24 Hours)	800-424-8802
CRA Project Manager (Rick Shepherd)	519-884-0510
CRA Manager of Safety and Health (Craig Gebhardt)	716-297-6150
CRA Project Coordinator (Carol Dunnigan)	716-297-6150
Underground Facilities Locating Services	800-962-7962
Poison Control Center	800-822-3232
New York State Emergency Response Commission	518-457-9996
New York State Spills	716-851-7220 (800-457-7362 after hours)

Directions from the Site to the hospital will be available on-Site.

Communication between work areas and the command post, located within the CZ, will be via verbal communication, auto horn, or 2-way radio. The Site Representative will use the nearest telephone on Site or may be in the possession of a mobile telephone to communicate with outside emergency and medical facilities.

The following signals shall be established for use with auto or compressed air-type horns:

i) 1 Long Blast (2 Second Duration): evacuate exclusion area, meet at CRZ or designated area;

ii) 1 Long Blast (2 Short Blasts): prepare for removal of injured personnel, evacuate work area; and

iii) 3 Short Blasts: all clear.

The following hand signals will be used by downrange field teams in conjunction with the "buddy" system. These signals are very important when working with heavy equipment. They shall be known by the entire field team before operations commence.

Signal	*Meaning*
• Hand Gripping Throat	Out of Air; Can't Breathe
• Grip Partner's Wrist	Leave Area Immediately
• Hands on Top of Head	Need Assistance
• Thumbs Up	Ok, I'm All Right, I Understand
• Thumbs Down	No, Negative

13.2 EMERGENCY AND FIRST AID EQUIPMENT

Emergency safety equipment will be available for use by Site personnel and will be located and maintained on Site. The safety equipment will include, but is not limited to, the following:

i) portable emergency eye wash;

ii) one 20-pound ABC type dry chemical fire extinguishers and one on each piece of heavy equipment;

iii) approved first-aid kit for a minimum of five personnel;

iv) portable air horn;

v) open top drums;

vi) shovels and a pump to collect spilled liquids; and

vii) absorbent material.

13.3 PROJECT PERSONNEL RESPONSIBILITIES DURING EMERGENCIES

SITE REPRESENTATIVE

As the administrator of the project, the Site Representative has primary responsibility for responding to and correcting emergency situations. The Site Representative will:

i) take appropriate measures to protect personnel including communicating proper evacuation routes to all Site personnel: withdrawal from the EZ, total evacuation and securing of the Site or upgrading or downgrading the level of protective clothing and respiratory protection;

ii) take appropriate measures to protect the public and the environment including isolating and securing the Site, preventing runoff to surface waters, and ending or controlling the emergency to the extent possible;

iii) ensure that appropriate Federal, State, and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted;

iv) ensure that appropriate decontamination treatment or testing for exposed or injured personnel is obtained;

v) determine the cause of the incident and make recommendations to prevent the recurrence; and

vi) ensure that all required reports have been prepared.

13.4 MEDICAL EMERGENCIES

Any person who becomes ill or injured in the EZ must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed as much as possible without causing further harm to the patient. First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the Site Representative.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a copy of the identified chemicals on Site to which they may have been exposed.

Any vehicle used to transport contaminated personnel, will be cleaned or decontaminated as necessary.

13.5 FIRE OR EXPLOSION

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the Site Representative or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on Site.

If it is safe to do so, Site personnel should:

i) report to the Project Manager;
ii) use fire fighting equipment available on Site; or
iii) remove or isolate flammable or other hazardous materials which may contribute to the fire.

13.6 SPILLS

On-Site

If a spill occurs, the following procedure will be followed:

i) notify the Site Representative;
ii) evacuate immediate area of spill;
iii) determine the needed level of PPE;
iv) don required level of PPE and prepare to make entry to apply spill containment and control procedures; and
v) absorb or otherwise clean up the spill and containerize the material, sorbent, and affected soils.

The Site Representative has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-Site areas.

Releases from drums containing solid wastes will be placed into approved containers and covered. Each container will be labeled as to contents.

In the event that a drum or container of liquid is spilled on-Site outside of the EZ, a drum handling team will immediately respond to the spill. The spilled liquids will be confined to the immediate area of the spill and the liquids will be pumped, with the use of a portable hand pump, into a new open top drum. The spilled liquids will be confined by diking around the spill with native material or with an inert absorbent. Any residual liquids which cannot be pumped will be absorbed with a sufficient quantity of inert absorbent to ensure that no free liquids remain. If the spill occurred on soil, the visibly affected soil will be excavated to limits based on a visual determination of spill contamination with the concurrence of the on-Site Agency Representative. The absorbent and excavated material will be drummed or otherwise appropriately contained.

14.0 RECORDKEEPING

The Site Representative shall establish and maintain records of all necessary and prudent monitoring activities as described below:

i) name and job classification of the employees involved on specific tasks;

ii) records of fit testing and medical surveillance results for Site personnel;

iii) records of all OSHA training certification for Site personnel;

iv) records of training acknowledgment forms;

v) emergency report sheets describing any incidents or accidents;

vi) air monitoring equipment calibrations; and

vii) air monitoring data.

APPENDIX E

TABLES

TABLE E2.1

CHEMICAL COMPOUNDS OF CONCERN
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

Chemical Compound
Benzene
Ethylbenzene
Lead
Tetrachloroethene
Toluene
Trichloroethene
Xylenes

TABLE E2.2

EXPOSURE ROUTES AND EXPOSURE LEVELS FOR THE CHEMICAL COMPOUNDS OF CONCERN SITE INVESTIGATION PARCEL 2 - SENECA STREET BUFFALO, NEW YORK

Chemical Compound	*Ionization Potential*	*Exposure Routes*	*Acceptable Exposure Levels in Air*
Benzene	9.2	Inhalation, Ingestion, Skin Absorption, Human Carcinogen	0.5 ppm (1) 1 ppm (2) 5 ppm (4) 500 ppm (3)
Trichloroethene	9.5	Inhalation, Ingestion	50 ppm (1) 100 ppm (2) 1000 ppm (3) 300 ppm (5)
Tetrachloroethene	9.3	Inhalation, Ingestion, Animal Carcinogen	25 ppm (1) 100 ppm (2) 150 ppm (3)
Xylene	8.5	Inhalation, Ingestion	100 ppm (1) 100 ppm (2) 900 ppm (3)
Toluene	8.8	Inhalation, Ingestion, Skin Absorption	50 ppm (1) 200 ppm (2) 500 ppm (3) 500 ppm (6)
Ethylbenzene	8.8	Inhalation, Ingestion	100 ppm (1) 100 ppm (2) 800 ppm (3)
Lead	NA	Inhalation, Ingestion, Animal Carcinogen	0.05 mg/m^3 (1) 0.05 mg/m^3 (2) 100 mg/m^3 (3)

Notes:
(1) 1999-2000 Values, American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLVs).
(2) Federal Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL).
(3) Immediately Dangerous to Life and Health (IDLH).
(4) Federal OSHA 15 minute ceiling standard.
(5) Federal OSHA 5 minute exposure limit.
(6) Federal OSHA 10 minute exposure limit.
mg/m^3 Milligrams per Cubic Meter.
NA Not Applicable.
ppm Parts Per Million.

TABLE E6.1

SPECIFIC PERSONAL PROTECTION LEVELS
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

Work Task	*Maximum Protection Level*[1]	*Alternate Protection Level*[2]
Mobilization and Demobilization of Labor, Materials, and Equipment to and from the Site	Modified D	D
Surveying Activities	Modified D	D
Installation of Soil Borings and Soil Sampling Activities	Level C	Modified D
Installation of Groundwater Monitoring Wells and Groundwater Sampling Activities	Level C	Modified D
Hydraulic Conductivity Testing (Slug Testing)	Level C	Modified D
Decontamination Activities	Level C	Modified D

Notes:
Specific requirements of protection levels are detailed in Section 6.0.

(1) Level C: To be worn when the criterion for using air purifying respirators (APRs) are met and a lesser level of skin protection is needed.
Modified D: To be worn when dermal protection is required, however, no respiratory hazards are present. It provides minimal protection against chemical hazards.

(2) Alternate protection levels will be used if monitoring indicates that conditions are appropriate or the Site Representative determines that there is a reduced potential of exposure.

TABLE E7.1

ANTICIPATED HAZARDS/RISKS AND HAZARD CONTROLS
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

Activity	*Anticipated Hazards/Risks*	*Appropriate Precautions*
1. Mobilization and Demobilization Activities and Surveying Activities	• slip/trip/fall hazards • potential back injuries from lifting heavy objects • potential heat/cold stress • severe weather • electrical hazards from power sources • moving or backing vehicles • potential contact with poison ivy • bites and/or stings from ticks, bees, mosquitoes, wasps, and dogs • overhead utility lines • hazards presented by the use of drilling equipment • potential cuts to hands from working with sharp objects such as knives or fencing material • hazards created by vehicular traffic (e.g., being stuck)	• Modified D or Level D personal protection • practice safe lifting techniques • participate in on-Site training programs • practice good personal hygiene principles • use a spotter around moving or backing equipment • work activities will be reduced or suspended during severe weather conditions • ground fault circuit interrupters (GFCIs) should be used to reduce the hazard of electrical shock. Do not stand in water when handling equipment. Electrical equipment will be approved • keep first aid kit for those allergic to bees or wasps • wear orange vests when working near vehicular traffic

TABLE E7.1

ANTICIPATED HAZARDS/RISKS AND HAZARD CONTROLS
SITE INVESTIGATION
PARCEL 2 - SENECA STREET
BUFFALO, NEW YORK

Activity	*Anticipated Hazards/Risks*	*Appropriate Precautions*
2. Installation of Soil Borings and Soil Sampling Activities, Installation of Groundwater Monitoring Wells, and Groundwater Sampling Activities and Decontamination Activities	• slip/trip/fall hazards • potential back injuries from lifting heavy objects • potential heat/cold stress • severe weather • electrical hazards from power sources • moving or backing vehicles and equipment • personnel injuries from sharp objects, falling debris, and pinch points • direct contact with potentially contaminated soils and groundwater • hazards presented by the use of drilling equipment • overhead and underground utility hazards (e.g., electrical lines) • potential burns from hot equipment hazards presented by the use of specialized equipment (e.g., decontamination equipment) • potential contact with poison ivy • bits and/or stings from ticks, bees, mosquitoes, wasps and dogs • hazards created by vehicular traffic (e.g., being stuck)	• Level C and Modified D, based on realtime air monitoring and established protection levels (see Table 6.1) • practice safe lifting techniques • participate in all on-Site training programs • be trained with all appropriate equipment standard operation procedures • practice good personal hygiene principles • take proper precautions in unsafe areas • use the "buddy" system • perform an underground utilities search • only essential personnel allowed in work area • use a spotter around moving or backing equipment • identify all high temperature objects or equipment • work activities will be reduced or suspended during severe weather • GFCIs should be used to reduce the hazard of electrical shock. Do not stand in water when handling equipment. Electrical equipment will be approved • keep first aid supplies readily available including antidote kit for those allergic to bees or wasps • wear orange vests when working near vehicular traffic

ATTACHMENT E1

TRAINING ACKNOWLEDGEMENT FORM

TRAINING ACKNOWLEDGEMENT FORM

I have read and understand the HASP and/or I have attended the mandatory Site-specific initiation session and understand the information presented in the HASP. I fully understand the known potential hazards present on-Site, the required levels of PPE to complete my work, and the emergency procedures for the Site. I further confirm that I have the required training to participate in the activities that I will be involved with. I agree to work in accordance with the guidelines presented in the HASP and I understand that failure to do so could result in removal from the Site.

Date	*Printed Name*	*Signature*	*Position*	*Company Name*