SUPPLEMENTAL SITE INVESTIGATION WORK PLAN

WEST FALLS MACHINE CO., INC.
EAST AURORA, NY

December 2002 0067-001-100

Prepared for:
West Falls Machine Co., Inc.
East Aurora, NY

BENCHMARK
ENVIRONMENTAL
ENGINEERING &
SCIENCE, PLLC

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1.0 INTRODUCTION

1.1 Background

West Falls Machine Company, Inc. operates a specialty parts manufacturing facility at 11692 East Main Street in East Aurora, NY (Figures 1 and 2). The property is comprised of an approximately 7,000 square foot industrial/manufacturing building and offices located on a 2.8-acre parcel (Erie County Tax Map SBL No. 166.00-2-17.11). The subject facility is primarily engaged in the manufacture and finishing of antique automobile parts, with production operations including machining, electroplating and painting.

Green Environmental Specialists, Inc. performed a Phase II Site investigation on the property in June 1998 (Ref. 1). The investigation was performed in response to an alleged report of disposal of metal-bearing wastewater to the site septic system. The Phase II investigation involved the collection of groundwater samples from 20 temporary monitoring well locations across the northern portion of the property in the vicinity of the facility's leach field (see Figure 2). All samples were analyzed for total chromium. With the exception of one groundwater sampling location (SB-12), chromium was not detected at any of the monitoring locations. Summary text and tables from the Phase II investigation are presented in Appendix A.

1.2 Purpose and Objectives

Based on the detection of chromium in groundwater collected from SB-12, the New York State Department of Environmental Conservation (NYSDEC) is requiring supplemental investigation of the site involving additional soil samples in and around the area of SB-12 and the leach field. This Work Plan has been prepared to describe the planned supplemental site investigation activities. The supplemental investigation work is being performed by Benchmark Environmental Engineering & Science, PLLC (Benchmark) on behalf of our client, West Falls Machine Company, Inc. pursuant to Schedule B of NYSDEC Order on Consent No. 9-B9-0542-98-10, (Ref 2).

This Work Plan includes the following Sections:

- **Section 2** describes the Supplemental Investigation field activities.
- **Section 3** identifies quality assurance/quality control procedures to be followed during the course of the project.
- **Section 4** describes the report that will be prepared to summarize the Supplemental Site Investigation findings.
- **Section 5** presents references used to prepare this Supplemental Investigation Work Plan.

2.0 SUPPLEMENTAL FIELD INVESTIGATION

2.1 Soil Borings

A number of additional borings will be performed in the vicinity of previous boring SB-12 to delineate the vertical and horizontal extent of metal impacts, if any, in the soils beneath the leach field drain tile. The location of previous boring SB-12 is approximated on Figure 2 based on field measurements identified by Green Environmental during the Phase II investigation. Benchmark's field staff will initially re-establish the location of SB-12 and will mark the locations of the leach field piping. Six (6) additional direct-push soil borings, identified as SB-21 through SB-26, will then be advanced into the overburden soil and shallow groundwater in the vicinity of previous boring SB-12 and the facility septic system. The exact location of the boring locations will be field-determined, but generally will be located so as to surround former boring SB-12, with the new borings spaced a maximum of 10 feet from former boring SB-12 (see Figure 2). All of the six borings will be located within the leach field.

At each boring location, a direct-push drill rig (i.e. Geoprobe^{R} or similar equipment) will advance 1.5-inch diameter samplers through overburden soil to a depth of 2 feet below the top of the water table, (expected to be encountered within 10 to 15 feet of grade), or to refusal, whichever occurs first. Continuous 4-foot sample cores will be retrieved from each location in clear PVC sleeves to allow for visual characterization of the soil materials by an experienced project geologist. The depth to groundwater and native soil, characteristics of soil (color, content, etc.) and odors, if any, will be recorded. A photoionization detector (PID) fitted with a 10.6 eV lamp will also be used to field screen soil cores for the presence of volatile organic compounds (VOCs) in the soil samples. Soil cores will be opened indoors if the ambient temperature is below 50°C and/or if wet weather precludes use of the PID outdoors. If any PID reading exceeds 5 ppm, a sample of the unsaturated soil will be collected across the depth of the boring and retained for the analyses described below. A groundwater sample will also be collected at this location according to the methodology described for well installation. The locations of the borings will be measured from fixed

building reference points (via tape measure) and recorded as well. Drilling tools will be decontaminated between each boring location using tap water and Alconox (soap). New, dedicated plastic sleeves will be used for each boring and depth interval. Field Operating Procedures for borehole/drilling documentation requirements and equipment decontamination are provided in Appendix B. Health and Safety procedures to be followed during the field investigation program are presented in Appendix C.

2.2 Temporary Well Installation

As stated above, in soil borings with PID readings that exceed 5 ppm, a temporary well comprised of one-inch, schedule 80 PVC well will be installed. A five-foot screen will be used to straddle the water table. The wells will be installed to the completion depth of the boring.

2.3 Soil Sampling and Analysis

Soil grab samples will be collected from each of the cores at 1-foot depth intervals below the approximate elevation of the leach bed (approximately 2 feet below ground surface, as reported by West Falls Machine Company). Initially, only the two uppermost depth intervals will be analyzed for chromium and lead. The laboratory will be instructed to archive all remaining deeper samples (in refrigeration) until further instruction by Benchmark. If these parameters are detected at concentrations exceeding 2 times the upper range of eastern U.S. Background concentrations as published in NYSDEC Technical Assistance and Guidance Memorandum (TAGM) HWR-94-4046 in one or more of the sampled intervals, additional depth samples in that same boring will be submitted for analysis to determine the vertical limits of contamination, if needed. The specific sample depth intervals to be analyzed from such borings will be discussed with NYSDEC prior to analysis.

At least one of the shallow samples submitted to the laboratory will also be analyzed for leachable (RCRA) metals via the Toxicity Characteristic Leaching Procedure (TCLP). This sample will be collected from a boring located within the leach field proximate to (MW-

12). In addition, if any soil intervals exhibit elevated PID readings above 5 ppm, a sample of the unsaturated soil will be collected across the depth of the boring and analyzed for Target Compound List (TCL) VOCs.

All soil samples will be placed in laboratory-provided, 4-ounce precleaned sample jars for discrete analysis. Soil will be placed into each jar using a dedicated stainless steel spoon or trowel directly from the clear PVC sleeve. Soil jars will be labeled according to borehole number and depth of sampling interval, and will be temporarily stored in coolers to maintain temperature at or below 4°C. Samples will be delivered to the laboratory under strict chain of custody procedures. Sample labeling, shipping and chain of custody FOPs are provided in Appendix B.

The soil sampling and analytical program is summarized on Tables 1 and 2. As indicated, all samples will be analyzed in accordance with USEPA Method SW-846 methodology by a NYSDEC ASP CLP laboratory and will be reported with equivalent ASP Category B deliverables.

2.4 Groundwater Sampling Procedure

If groundwater sampling is necessary based on the criteria described above, Groundwater will be collected from temporary monitoring wells using either a peristaltic pump or disposable bailer. If the peristaltic pump is used, the pumping rate will be set at approximately 500 ml/min to provide for low-flow purging of the wells and minimize elevated turbidity levels. Field parameters of pH, turbidity, temperature and specific conductance will be measured and recorded during sampling. Groundwater elevation will also be recorded.

The groundwater sampling and analytical program is summarized on Tables 1 and 2. Groundwater samples will be analyzed in accordance with USEPA Method SW-846 methodology by a NYSDEC ASP CLP laboratory, and will be reported with equivalent ASP Category B deliverables.

3.0 QA/QC REQUIREMENTS

3.1 Project Responsibilities

Benchmark Environmental Engineering and Science, PLLC (Benchmark) is the prime consultant on this project and is responsible for the performance of all services required to implement each phase of the Supplemental Investigation Work Plan, including field operations, laboratory testing, data management, data analysis and reporting. Excluding the QA Officer position, any one member of Benchmark's staff may fill more than one of the identified project positions (e.g., field team leader and site safety and health officer). The various quality assurance, field, laboratory and management responsibilities of key project personnel are defined below.

3.2 Management Responsibilities

NYSDEC Project Manager

The NYSDEC Project Manager represents the governing authority for the Voluntary Cleanup site activities. The NYSDEC Project Coordinator is responsible for ensuring that the project is completed to the satisfaction of NYSDEC.

Patrick T. Martin, P.E., Benchmark Project Manager (PM)

The Benchmark PM has the responsibility for ensuring that the project meets the Work Plan objectives. The PM will report directly to the Client (West Falls Machine Co., Inc.) and the NYSDEC Project Manager and is responsible for technical and project oversight. The PM will:

- Define project objectives and develop a detailed work plan schedule.
- Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task.
- Acquire and apply technical and corporate resources as needed to assure performance within budget and schedule constraints.

- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- Review the work performed on each task to assure its quality, responsiveness, and timeliness.
- Review and analyze overall task performance with respect to planned requirements and authorizations.
- Review and approve all deliverables before their submission to NYSDEC.
- Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product.
- Ultimately be responsible for the preparation and quality of interim and final reports.
- Represent the project team at meetings.

Jeanne M. Asquith, Field Team Leader

The Field Team Leader has the responsibility for implementation of specific project tasks identified at the Site, and is responsible for the supervision of project field personnel, subconsultants, and subcontractors. The Field Team Leader reports directly to the Project Manager. The Field Team Leader will:

- Define daily develop work activities.
- Orient field staff concerning the project's special considerations.
- Monitor and direct subcontractor personnel.
- Review the work performed on each task to ensure its quality, responsiveness, and timeliness.
- Assure that field activities, including sample collection and handling, are carried out in accordance with this Work Plan.

For this project the field team leader will also serve as the Site Safety and Health Officer (SSHO). As such, she is responsible for implementing the procedures and required components of the Site Health and Safety Plan (HASP), determining levels of protection needed during field tasks, controlling site entry/exit, briefing the field

team and subcontractors on site-specific health and safety issues, and all other responsibilities as identified in the HASP.

3.3 Quality Assurance (QA) Responsibilities

Thomas H. Forbes, P.E., Project QA Officer

The QA Officer will have direct access to corporate executive staff as necessary, to resolve any QA dispute. He is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations and Benchmark policies, and NYSDEC requirements. The QA Officer has sufficient authority to stop work on the investigation as deemed necessary in the event of serious QA issues. Specific function and duties include:

- Providing QA technical assistance to project staff.
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the Project Manager for technical operations.
- Responsible for review of sample results from the analytical laboratory and resolving data quality control issues.

3.3.1 Laboratory Responsibilities

The laboratory assigned with responsibility for chemical analyses of environmental samples is Severn Trent Laboratories, Inc. (STL) located at 10 Hazelwood Drive, Suite 106, Amherst, New York. STL is a NYSDEC Contract Laboratory Protocol (CLP) certified laboratory maintaining ASP accreditation.

Brian Fischer, STL Project Manager

The STL project manager will report directly to the Benchmark Project Manager. The STL Project Manager provides a complete interface with clients from initial project specification to final deliverables.

Susan Tinsmith, STL Laboratory Director

The Laboratory Director is a technical advisor and is responsible for summarizing and reporting overall unit performance. Responsibilities of the STL Laboratory Director include:

- Provide technical, operational, and administrative leadership.
- Allocation and management of personnel and equipment resources.
- Quality performance of the facility.
- Certification and accreditation activities.
- Blind and reference sample analysis.

Charles Huber, STL Quality Assurance Director (QA Director)

The STL QA Director has the overall responsibility for data after it leaves the laboratory. The STL QA Director will be independent of the laboratory but will communicate data issues through the STL Laboratory Director. In addition, the STL QA Director will:

- Oversee laboratory QA.
- Oversee QA/QC documentation.
- Conduct detailed data review.
- Determine whether to implement laboratory corrective actions, if required.
- Define appropriate laboratory QA procedures.
- Prepare laboratory SOPs.

Independent QA review will be provided by the STL Laboratory Director and QA Director prior to release of all data to Benchmark.

STL Sample Management Office

The STL Sample Management Office will report to the STL Laboratory Director. Responsibilities of the STL Sample Management Office will include:

- Receiving and inspecting the incoming sample containers.
- Recording the condition of the incoming sample containers.
- Signing appropriate documents.

- Verifying chain-of-custody.
- Notifying laboratory manager and laboratory supervisor of sample receipt and inspection.
- Assigning a unique identification number and customer number, and entering each into the sample receiving log.
- With the help of the laboratory manager, initiating transfer of the samples to appropriate lab sections.
- Controlling and monitoring access/storage of samples and extracts.

STL Technical Staff (TS)

The STL TS will be responsible for sample analyses and identification of corrective actions. The staff will report directly to the STL Laboratory Director.

3.3.2 Other Subcontractor Personnel

Other subcontractor personnel to be utilized on this project include a drilling subcontractor for soil boring and temporary well construction work (C&W Environmental). This firm is experienced in NY State Site Investigation and Remediation projects.

3.4 Field Quality Control Checks

Assessment of field sampling precision and bias will be made by collecting field duplicates and field blanks for laboratory analysis. Table 1 identifies site-specific quality assurance/quality control (QA/QC) samples to be collected during the Supplemental Investigation. Collection of QA/QC samples will be in accordance with the applicable FOPs presented in Appendix B.

One (1) equipment blank will be collected for each day of sampling activity **if** non-dedicated sampling equipment is used. These equipment blank samples will be used as a QC check of the decontamination procedures for sampling equipment. (For the West Falls Machine Company site, new, dedicated bailers will be used for sample collection; therefore an equipment blank is not planned).

One VOC travel blank (a.k.a., "trip blank") will be included in each cooler containing water matrix samples to be analyzed for VOCs and sent to the laboratory for analysis.

3.4.1 Laboratory Quality Control Checks

The internal QC checks for laboratory analysis of soil and groundwater samples that will be collected during the supplemental investigation are described in the analytical methods and are covered in the laboratory's QA Manual. Laboratory analytical internal QA/QC will be conducted in accordance with USEPA SW-846. The checks include internal QC methods covering surrogate spikes, duplicates, preparation blanks, calibration, lab quality control samples and reagent checks.

A site-specific MS/MSD sample will be analyzed as a further QC check for soil samples collected during the supplemental investigation. The matrix spike samples will be analyzed at the same frequency as the duplicate samples. The matrix spike samples will allow accuracy to be determined by using the percent recovery of the spiked compounds. The purpose of the MS/MSD samples is to monitor any possible matrix effects specific to samples collected from the Site. Acceptable QC limits for the MS/MSD samples are found in USEPA SW-846. The specific soil sampling sample location that will be used for matrix spikes may be chosen by the Project Manager or Project QA Officer.

4.0 REPORTING

A Supplemental Site Investigation Report will be prepared by Benchmark upon receipt of the analytical results and completion of data interpretation. The report will contain a site map, investigative methodologies that deviated from the Work Plan, geologic and hydrogeologic interpretation/description of subsurface materials, and presentation of laboratory analytical data with comparisons to applicable regulatory standards, criteria and guidance values and/or background concentrations. An estimate of the lateral and vertical extent of impacted soil will be provided using map and borehole data. Copies of all pertinent records, including field-test readings, maps, project field forms and laboratory reports will be appended to the report.

5.0 REFERENCES

1. Green Environmental Specialists, Inc., June 16, 1988, *Groundwater Sampling Survey – Final Report.* Prepared for Robert L. Boreanaz, Esq., Representing The West Falls Machine Company, Inc.

2. NYSDEC Order on Consent No. 9-B9-0542-98-10. West Falls Machine Company, Inc.

TABLES

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE PLLC

TABLE 1

SUMMARY OF SAMPLING AND ANALYTICAL PROGRAM

WEST FALLS MACHINE COMPANY, INC.
SUPPLEMENTAL INVESTIGATION WORK PLAN

Location	Number of Samples for Analysis	Matrix	Where Collected	Parameters	QA/QC Samples		
					MS	MSD	Trip Blank
SB-21 through SB-26	12 (See Note 1)	Soil	0-1' Below Drain Tile and 1-2' Below Drain Tile	Chrome, Lead	1	1	-
SB-21 through SB-26 (one location to be field selected)	1	Soil	0-1' Below Drain Tile	Leachable (TCLP) Metals	-	-	-
SB-21 through SB-26	(See Note 2)	Soil	Across 4' spoon containing greatest VOC impacts (if any)	TCL VOCs	1	1	-
SB-21 through SB-26	(See Note 3)	Groundwater	From boring containing VOC-impacted soils (if any)	TCL VOCs	1	1	1
				Field Parameters [4]	-	-	-

Notes:

1. Samples will be collected across boring depth at 1' intervals below leach field drain tile. Laboratory shall initially analyze samples from 0-1' and 1-2'. Remaining samples to be archived for potential analysis.
2. Collect one sample across spilt spoon from any boring where PID screening indicates VOCs above 5 ppm (6 samples maximum).
3. Install temporary well and collect one groundwater sample at any boring where PID screening indicates VOCs above 5 ppm (6 samples maximum).
4. Field parameters include: pH, temperature, specific conductance, turbidity, Eh and dissolved oxygen.

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TABLE 2

SUMMARY OF ANALYTICAL METHODS, PRESERVATIVES AND HOLDING TIMES [1]

WEST FALLS MACHINE COMPANY, INC.
SUPPLEMENTAL INVESTIGATION WORK PLAN

Parameter	Reporting Units	Analytical Method	Holding Time	Preservation [2]	Container [3]
Field Measurements					
pH	units	field measured	immediately upon collection	none	4 ounce jar
Temperature	degrees F	field measured	immediately upon collection	none	4 ounce jar
Specific Conductance	mS or μS	field measured	immediately upon collection	none	4 ounce jar
Turbidity	NTU	field measured	immediately upon collection	none	4 ounce jar
Volatile Organic Compounds (VOCs)					
TCL VOCs - Soil	ug/Kg	8260B[4]	14 days	Cool to 4° C	4 oz. glass jar, no headspace
TCL VOCs - Groundwater	ug/L	8260B[4]	14 days	HCl to pH <2, cool to 4° C	3, 40 mL glass vials
Inorganics					
Total Chromium	mg/Kg	1311/6010B[4]	6 Months	Cool to 4° C	4 oz. glass jar
Total Lead	mg/Kg	1311/6010B[4]	6 Months	Cool to 4° C	4 oz. glass jar
TCLP Arsenic	mg/L	1311/6010B	6 Months	Cool to 4° C	4 oz. glass jar
TCLP Barium	mg/L	1311/6010B	6 Months	Cool to 4° C	4 oz. glass jar
TCLP Cadmium	mg/L	1311/6010B	6 Months	Cool to 4° C	4 oz. glass jar
TCLP Chromium	mg/L	1311/6010B	6 Months	Cool to 4° C	4 oz. glass jar
TCLP Lead	mg/L	1311/6010B	6 Months	Cool to 4° C	4 oz. glass jar
TCLP Mercury	mg/L	1311/7471A	6 Months	Cool to 4° C	4 oz. glass jar
TCLP Selenium	mg/L	1311/6010B	6 Months	Cool to 4° C	4 oz. glass jar
TCLP Silver	mg/L	1311/6010B	6 Months	Cool to 4° C	4 oz. glass jar

Notes:

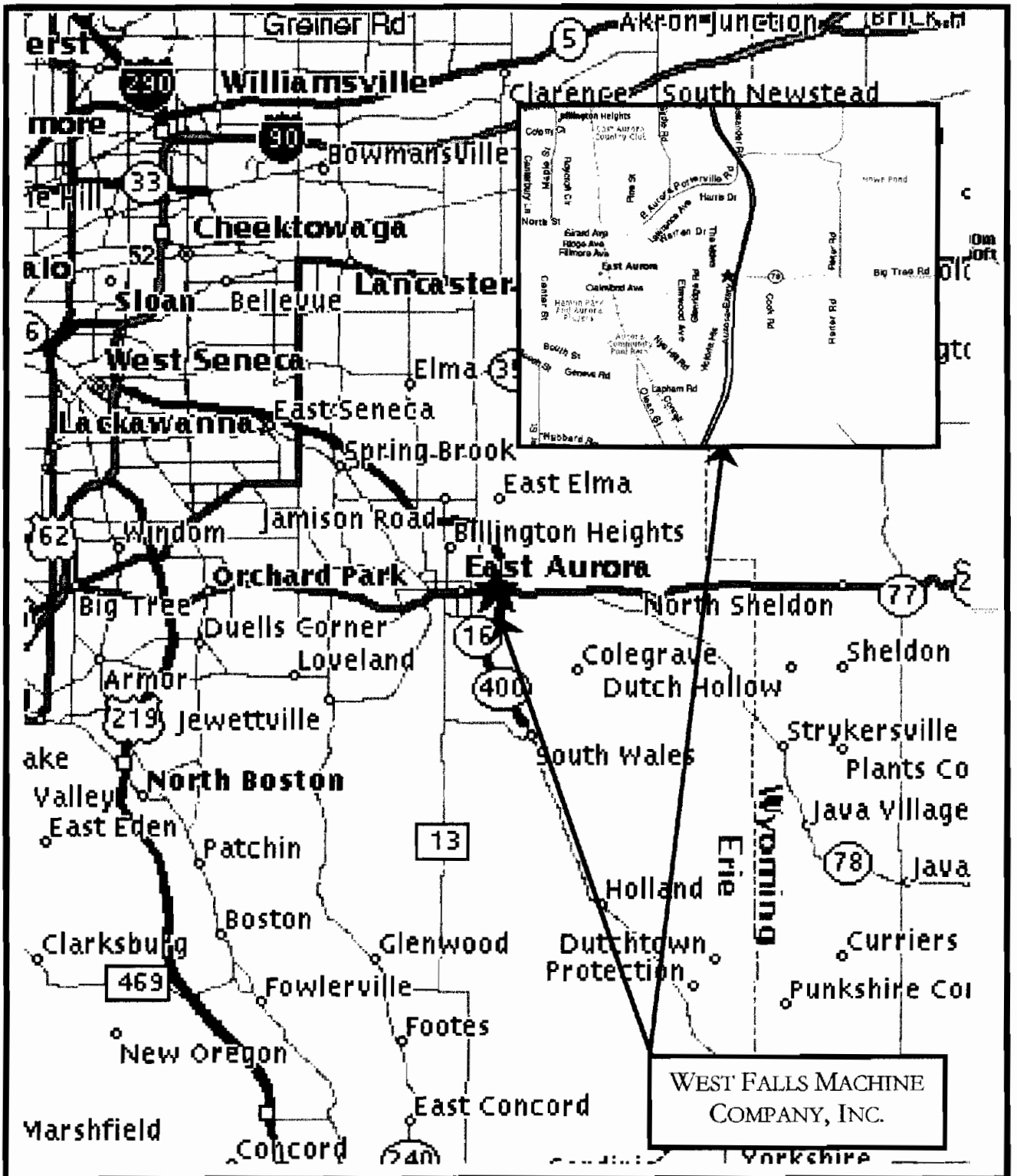
1. All field samples will be delivered to the lab within 1 day of their collection. VOC analysis of water samples must be completed within 14 days of Validated Time of Sample Receipt (VTSR). The VTSR shall be the date on which a sample is received at the laboratory, as recorded on the chain-of-custody form and the lab's central sample log.

2. Bottles will be received from the laboratory pre-preserved. If bottles are not pre-preserved by the laboratory, preservatives will be added to the sample bottles in the field immediately after sample has been collected. Ice will be used to cool samples in the field and in transit to the laboratory.

3. Containers shown are those necessary to satisfy minimum volume requirements for analysis.

4. Report with equivalent ASP/CLP Category B Deliverables Package.

FIGURES



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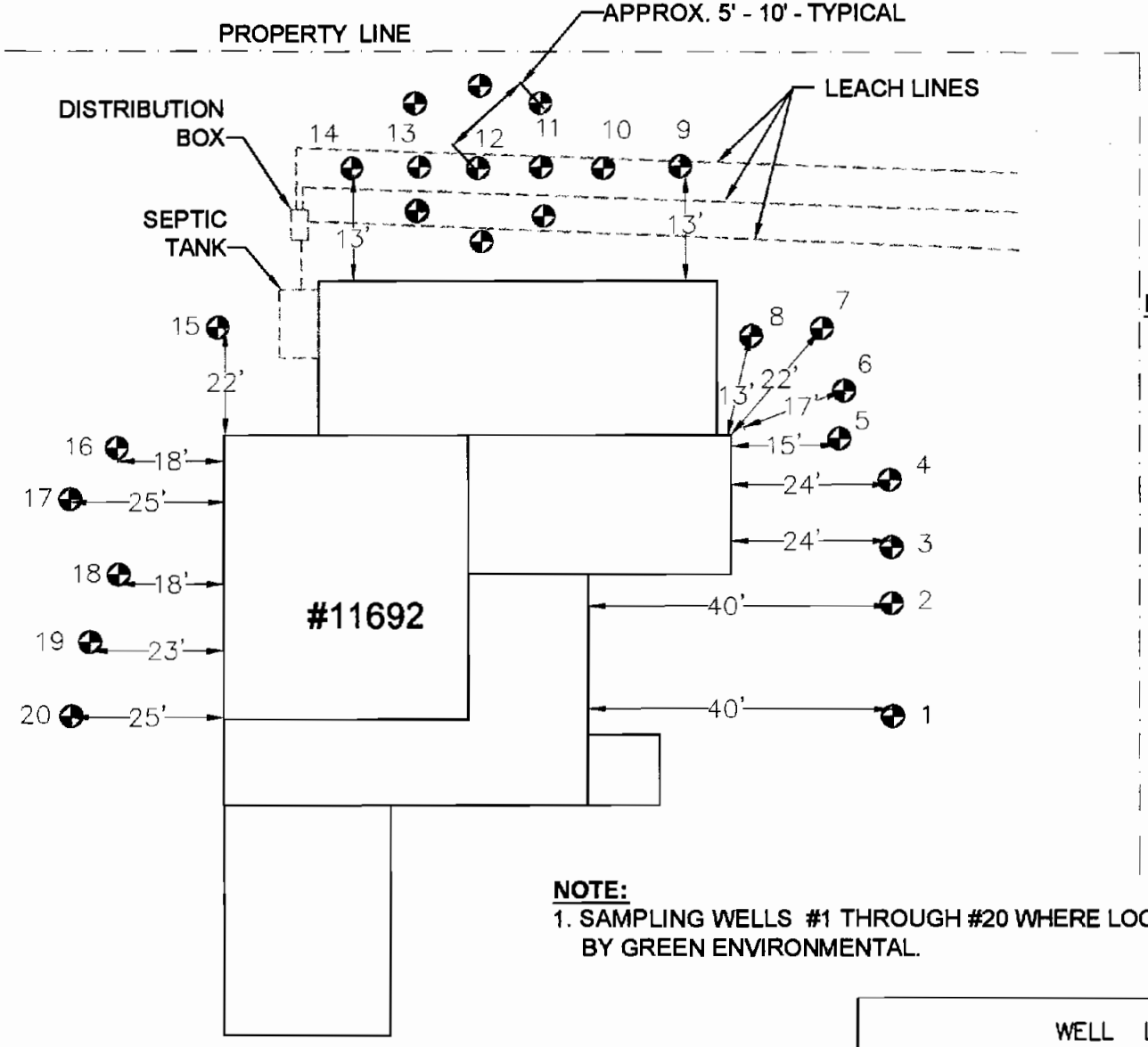
SITE VICINITY MAP

SUPPLEMENTAL INVESTIGATION WORK PLAN
WEST FALLS MACHINE COMPANY, INC.



LEGEND:

- PREVIOUS SAMPLING WELL LOCATION.
- PROPOSED SOIL BORING LOCATION

NOTE:

1. SAMPLING WELLS #1 THROUGH #20 WHERE LOCATED AND SAMPLED BY GREEN ENVIRONMENTAL.

SITE LAYOUT

NOT TO SCALE

WELL LOCATION PLAN
WEST FALLS MACHINE SHOP
11692 EAST MAIN STREET
EAST AURORA, NEW YORK

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC	Project No.	Figure 2

DATE: December 2002
DRAFTED BY: JRM
FILEPATH: f:\benchmark\cad\west falls machine\well location plan

APPENDIX A

PHASE II INVESTIGATION SUMMARY

Green Environment Specialists, Inc.

Presents:

GROUNDWATER SAMPLING SURVEY

FINAL REPORT

Prepared for:

Robert L. Boreanaz, Esq.

Representing:

The West Falls Machine Company, Inc.

GES

LAYOUT

On June 3rd, 1998 Green Environment Specialists, Inc., (GES), mobilized to The West Falls Machine Co., located at 11692 E. Main St., East Aurora, NY to begin the layout phase of the GeoProbe/Ground Water Sampling project. After some discussion with Mike George (owner of West Falls Machine), it was determined that due to the contour of the land surrounding the facility it would be most advantageous to probe the northern perimeter of the grounds. Thus, using florescent spray paint, GES marked 20 test locations beginning with a point on the eastern most side of the property and extending in approximately 180 degrees of arc to a point on the western most side of the property; such that if a line were drawn from the first sampling point to the last it would effectively bisect the facility into northern and southern sections.

A hand drawn map of the test locations can be found in appendix A of this report.

SAMPLING DAY 1

GES mobilized manpower and equipment to the West Falls location on June 4th to begin ground water sampling. The first drilling was completed and a ground water sample procured at 08:40 using the *macrocoring* method. Using this method, a sample of the soil (at a depth of 16 feet) was returned to the surface for visual examination to determine the characteristics of the solid matrix. At this juncture it was determined that the screen sampling method would be used to complete the survey.[1] The last sample was taken from location number 20 at 16:42, in total, 9 test wells/samples were taken. Ambient conditions were sunny, warm, temperature about 72 degrees with a light wind.

SAMPLING DAY 2

Commenced work approximately 07:30, the first sample was procured at 08:00 beginning with location number 19. The last sample (from location number 9) was taken at 15:36. A duplicate sample was taken from test locations 12, 14 & 15 at the request of West Falls Machine and provided to same. The duplicates will presumably be tested as a form of bias control at the discretion of West Falls Machine. A total of 11 samples plus three duplicates were taken. An additional sample comprised of plating solution was given to GES by West Falls to be tested for hexavalent vs. trivalent chromium content. Ambient conditions were similar to previous day with slight cloud cover.

[1] For the purposes of this report a macrocore punches a much larger hole than a screen sampling probe. The screen sampler uses a polyethylene tube and a ball check valve to secure ground water samples and is much more efficient for this particular application.

In all cases split samples were taken and retained by GES for future analyses. At the time of this writing however, the split samples have been disposed of as their shelf life has expired. All ground water samples were kept on ice in a cooler from the time of collection until delivery to the laboratory representative. Samples were prepared by the laboratory (NYSDOH certified) for analyses via ICAP (i.e. Inductive Coupled Argon Plasma) to determine the total chromium content. The following table is a summary of the sampling activities that took place on June 4th & 5th:

Sample #	Material	Depth in Feet	Method	Time	Date	Total Cr. Result
1	Ground Water	16	Macrocore	08:40	06/04/98	BDL
2	Ground Water	16	Screen Sample	09:40	06/04/98	BDL
3	Ground Water	16	Screen Sample	10:55	06/04/98	BDL
4	Ground Water	16	Screen Sample	11:30	06/04/98	BDL
5	Ground Water	18	Screen Sample	12:30	06/04/98	BDL
6	Ground Water	18	Screen Sample	13:30	06/04/98	BDL
7	Ground Water	18	Screen Sample	14:21	06/04/98	BDL
8	Ground Water	15	Screen Sample	15:57	06/04/98	BDL
20	Ground Water	15	Screen Sample	16:42	06/04/98	BDL
19	Ground Water	15	Screen Sample	08:00	06/05/98	BDL
18	Ground Water	15	Screen Sample	08:41	06/05/98	BDL
17	Ground Water	15	Screen Sample	09:39	06/05/98	BDL
16	Ground Water	14	Screen Sample	10:47	06/05/98	BDL
15	Ground Water	13	Screen Sample	12:15	06/05/98	BDL
15D	Ground Water	13	Screen Sample	12:15	06/05/98	No Report
14	Ground Water	16	Screen Sample	13:00	06/05/98	BDL

Sample #	Material	Depth in Feet	Method	Time	Date	Total Cr. Result
14D	Ground Water	16	Screen Sample	13:00	06/05/98	No Report
13	Ground Water	16	Screen Sample	13:37	06/05/98	BDL
12	Ground Water	15	Screen Sample	14:04	06/05/98	1.38 mg/L
12D	Ground Water	15	Screen Sample	14:04	06/05/98	No Report
11	Ground Water	15	Screen Sample	14:30	06/05/98	BDL
10	Ground Water	14	Screen Sample	14:55	06/05/98	BDL
9	Ground Water	14	Screen Sample	15:36	06/05/98	BDL
WF-01A	Plating Solution	N/A	Grab	15:00	06/05/98	All Cr+6

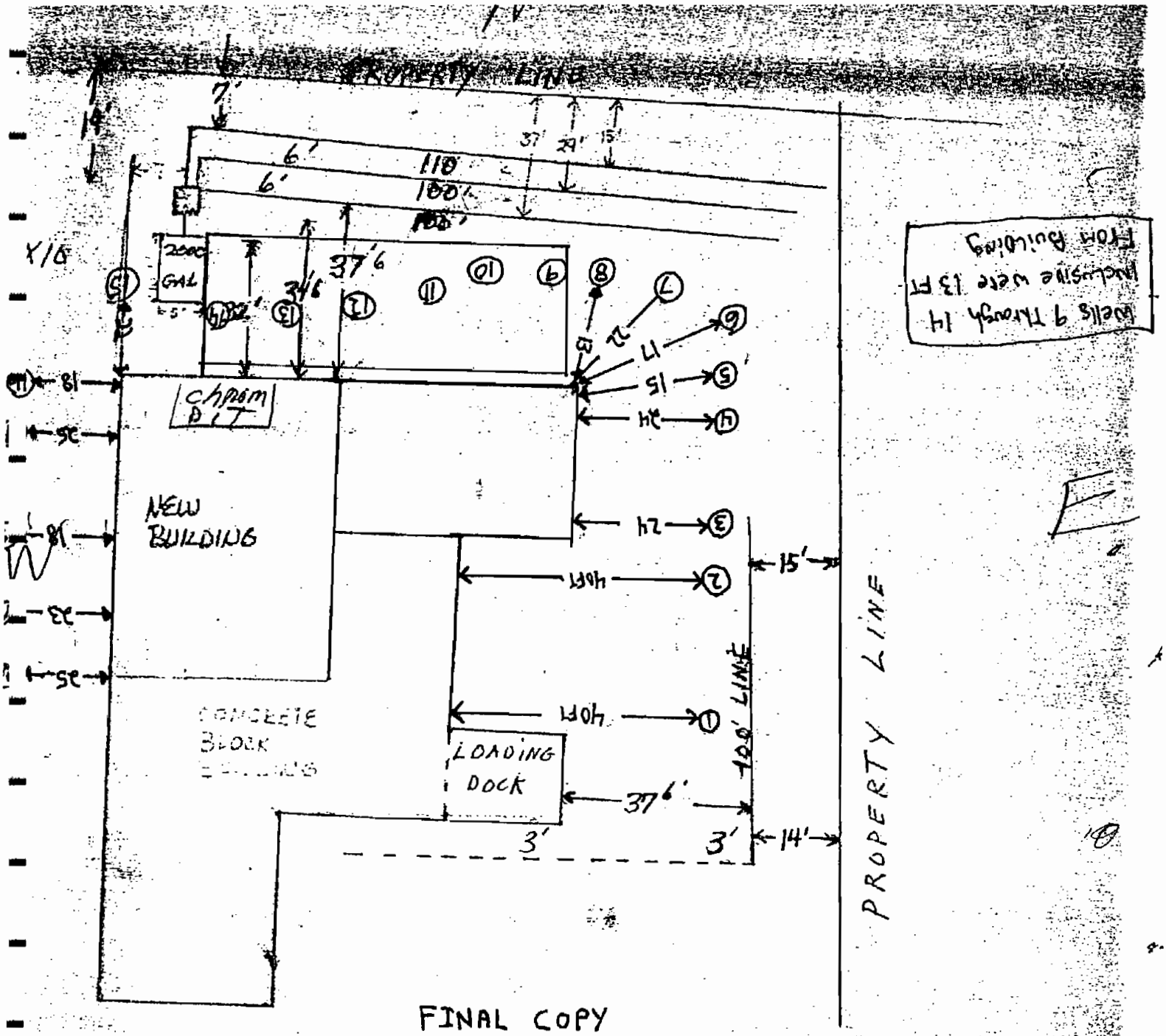
The analytical report can be found as appendix B of this report.

SUMMARY

Based on the data tabulated above, GES recommends **no further action** be taken with respect to external grounds and/or ground water contamination as it applies to the West Falls Machine Company property at 11692 East Main St., E. Aurora, NY. GES is prepared to move on to the next phase of environmental compliance.

Appendix A

- Map – Test Locations



WEST FALLS MACHINE SHOP

SEPTIC SYSTEM LAYOUT

SCALE

APPENDIX B

FIELD OPERATING PROCEDURES

FOP No.	Procedure
1	Calibration and Maintenance of Portable Field pH, Eh Meter
2	Calibration and Maintenance of Portable Field Turbidity Meter
3	Calibration and Maintenance of Portable Photoionization Detector (PID)
4	Calibration and Maintenance of Portable Specific Conductance Meter
5	Documentation Requirements for Drilling and Well Installation
6	Groundwater Level Measurement
9	Groundwater Sample Collection
10	Non-Disposable and Non-Dedicated Sampling Equipment Decontamination
11	Sample Labeling, Storage and Shipment Procedures
12	Soil Boring Log Description Procedures Using the USCS

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

FIELD OPERATING PROCEDURE

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD pH/Eh METER

PURPOSE

This guideline describes a method for calibration of a portable pH/Eh meter. The pH/Eh meter measures the hydrogen ion concentration or acidity of a water sample (pH function), and the oxidation/reduction potential of a water sample (Eh function). Calibration is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the pH/Eh meter will be:

pH ± 0.2 pH unit, over the temperature range of ± 0.2 C.

Eh ± 0.2 millivolts (mV) over the range of ± 399.9 mV, otherwise ± 2 mV.

CALIBRATION PROCEDURE

Note: Meters produced by different manufacturers may have different calibration procedures. These instructions will take precedence over the procedure provided herein. This procedure is intended to be used as a general guideline, or in the absence of available manufacturer's instructions.

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

FIELD OPERATING PROCEDURE

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD pH/Eh METER

1. Obtain and active the meter to be used. As stated above, initial calibrations will be performed at the beginning of each sampling day.

2. Immerse the sensing probe in a container of certified pH 7.0 buffer solution traceable to the National Bureau of Standards.

3. Measure the temperature of the buffer solution, and adjust the temperature setting accordingly.

4. Compare the meter reading to the known value of the buffer solution while stirring. If the reading obtained by the meter does not agree with the known value of the buffer solution, recalibrate the meter according to the manufacturer's instructions until the desired reading is obtained. This typically involves accessing and turning a dial or adjustment screw while measuring the pH of the buffer solution. The meter is adjusted until the output agrees with the known solution pH.

5. Repeat Steps 2 through 5 with a pH 4.0 and 10.0 buffer solution to provide a three-point calibration. Standards used to calibrate the pH meter will be of concentrations that bracket the expected values of the samples to be analyzed, especially for two-point calibrations (see note below).

   Note: Some pH meters only allow two-point calibrations. Two-point calibrations should be within the suspected range of the groundwater to be analyzed. For example, if the groundwater pH is expected to be approximately 8, the two-point calibration should bracket that value. Buffer solutions of 7 and 10 should then be used for the two-point calibration.

6. Document the calibration results and related information in the Project Field Book and on an Equipment Calibration Log (see attached example). Information will include, at a minimum:

   - Time, date, and initials of the field team member performing the calibration
   - The unique identifier for the meter, including manufacturer, model, and serial number

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD pH/Eh METER

- The brand and expiration dates of buffer solutions
- The instrument readings
- The instrument settings (if applicable)
- Pass or fail designation in accordance with the accuracy specifications presented above
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate

MAINTENANCE

- When not in use, or between measurements, keep the pH/Eh probe immersed in or moist with buffer solutions.

- Check the meter batteries at the end of each day and recharge or replace as needed.

- Replace the pH/Eh probe any time that the meter response time becomes greater than two minutes or the meeting system consistently fails to retain its calibrated accuracy for a minimum of ten sample measurements.

- If a replacement of the pH/Eh probe fails to resolve instrument response time and stability problems, obtain a replacement instrument (rental instruments) and/or order necessary repairs/adjustment.

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EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ BM/TK ☐ Rental

METER TYPE	UNITS	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTINGS
☐ pH meter	uni				4.00		
					7.00		
					10.01		
☐ Turbidity meter	NTU				< 0.5		
					20		
					100		
					800		
☐ Sp. conductance meter	uS/mS				1413 μS @ 25 °C		
☐ PID	ppm				open air		
					100 ppm Iso. Gas		
☐ Particulate meter	mg/m^3				zero air		
☐ Oxygen	%				open air		
☐ Hydrogen sulfide	ppm				pen air		
☐ Carbon monoxide	ppm				n air		
☐ LEL	%				pen air		
☐ Radiation Meter	uR/H				background area		
☐							
☐							

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

FIELD OPERATING PROCEDURE

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD TURBIDITY METER

PURPOSE

This guideline describes a method for calibration of a portable field turbidity meter. Turbidity is one water quality parameter measured during purging and development of wells. Turbidity is measured as a function of the samples ability to transmit light, expressed as Nephelometric Turbidity Units (NTUs). The turbidity meter is factory calibrated and must be checked daily prior to using the meter in the field. Calibration is performed to verify instrument accuracy and function. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the turbidity meter will be ± 1 percent of full-scale on all scale ranges.

CALIBRATION CHECK PROCEDURE

Note: Meters produced by different manufacturers may have different calibration check procedures. These manufacturers' instructions will take precedence over the procedure provided here. This procedure is intended to be used as a general guideline, or in the absence of available manufacturer's instructions.

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FIELD OPERATING PROCEDURE

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD TURBIDITY METER

Note: Because the turbidity meter measures light transmission, it is critical that the meter and standards be cared for as precision optical instruments. Scratches, dirt, dust, etc. can all temporarily or permanently affect the accuracy of meter readings.

1. With the instrument turned off, check the mechanical zero adjustment on the meter face. Adjust the ZERO control for a zero reading if necessary.

2. Turn the meter on and perform a battery check. Charge the battery pack if the meter indicates low battery charge.

3. Place the focusing template into the cell holder, press the 1.0 range switch, and adjust the ZERO control to obtain a zero NTU reading.

4. Remove the focusing template and insert a 0.9 NTU turbidity standard. Adjust the SPAN control for a corrected 0.9 NTU reading, if necessary.

5. Remove the 0.9 NTU standard and replace it with a 9 NTU standard. Press the 10 range switch. The meter should indicate 9 (±0.02) NTU. If it does not, the 10 range potentiometer must be adjusted in accordance with the manufacturer's instructions. Adjust the SPAN control for a reading of 9 NTU.

6. Remove the 9 NTU standard and replace it with the cell riser and 90 NTU standard. Press the 100 range switch. The meter should indicate 90 (±2) NTU.

7. Remove the 90 NTU standard and cell riser and insert the 9 NTU standard. Press the 10 NTU range switch. Adjust the SPAN control for a reading of exactly 9 NTU.

8. Remove the 9 NTU standard and replace it with a 0.9 NTU standard. Press the 1.0 range switch. The meter should indicate the correct value for the 0.9 NTU standard (±0.2). If it does not, the 1.0 range potentiometer must be adjusted in accordance with the manufacturer's instructions.

9. Document the calibration results and related information in the Project Field Book and on an Equipment Calibration Log (see attached example). Information will include, at a minimum:

- Time, date, and initials of the field team member performing the calibration
- The unique identifier for the meter, including manufacturer, model, and serial number
- The brand of calibration standards
- The instrument readings
- The instrument settings (if applicable)
- Pass or fail designation in accordance with the accuracy specifications presented above
- Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate

MAINTENANCE

- Check the meter battery pack at the end of each day and recharge when needed.
- When not in use, store the meter in a clean, dry area with the protective cover shut.
- Clean the lens periodically with a dry cloth or tissue.

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EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ BM/TK ☐ Rental

METER TYPE	UNITS	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTINGS
☐ pH meter	un				4.00		
					7.00		
					10.01		
☐ Turbidity meter	NTU				< 0.5		
					20		
					100		
					800		
☐ Sp. conductance meter	uS/mS				1413 µS @ 25 °C		
☐ PID	ppm				open air		
					100 ppm Iso. Gas		
☐ Particulate meter	mg/m^3				zero air		
☐ Oxygen	%				open air		
☐ Hydrogen sulfide	ppm				pen air		
☐ Carbon monoxide	ppm				n air		
☐ LEL	%				pen air		
☐ Radiation Meter	uR/H				background area		
☐							
☐							

SAMPLE

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

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FIELD OPERATING PROCEDURE

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD PHOTOIONIZATION DETECTOR (PID)

PURPOSE

This procedure describes a general method for the calibration and maintenance of a portable photoionization detector (PID). The PID detects and initially quantifies a reading of the volatile organic compound (VOC) concentration in air. The PID is used as a field-screening tool for initial evaluation of soil samples and for ambient air monitoring of compounds with ionization potentials (IP) less than the PID lamp electron voltage (eV) rating. The IP is the amount of energy required to move an electron to an infinite distance from the nucleus thus creating a positive ion plus an electron. It should be noted that all of the major components of air (i.e., carbon dioxide, methane, nitrogen, oxygen etc.) have IP's above 12 eV. As a result, they will not be ionized by the 9.5, 10.2, 10.6 or 11.7 eV lamps typically utilized in field PIDs. The response of the PID will then be the sum of the organic and inorganic compounds in air that are ionized by the appropriate lamp (i.e., 9.5, 10.2, 10.6 or 11.7 eV).

Calibration is performed to verify instrument accuracy and function. All field instruments will be calibrated, verified and recalibrated at frequencies required by their respective operating manuals or manufacturer's specifications, but not less than once each day that the instrument is in use. Field personnel should have access to all operating manuals for the instruments used for the field measurements. This procedure also documents critical maintenance activities for this meter.

Note: The information included below is equipment manufacturer- and model-specific, however, accuracy, calibration, and maintenance procedures for this type of portable equipment are typically similar. The information below pertains to the Photovac 2020

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD PHOTOIONIZATION DETECTOR (PID)

photoionization detector equipped with a 10.6 eV lamp. The actual equipment to be used in the field will be equivalent or similar.

Note: The PID indicates <u>total</u> VOC concentration readings that are normalized to an isobutylene standard, so actual quantification of individual compounds is not provided. In addition, the PID response to compounds is highly variable, dependent on ionization potential of the compound, and the presence or absence of other compounds.

ACCURACY

The Photovac 2020 is temperature compensated so that a 20° C change in temperature corresponds to a change in reading of less than two percent full-scale at maximum sensitivity. The useful range of the instrument is from 0.5 – 2000 ppm isobutylene with an accuracy of ± 10% or ± 2 ppm. Response time is less than three seconds to 90 percent of full-scale. The operating temperature range is 0 to 40° C and the operating humidity range is 0 to 100 % relative humidity (non-condensing).

CALIBRATION PROCEDURE

1. Calibrate all field test equipment at the beginning of each sampling day. Check and recalibrate the PID according to the manufacture's specifications.
2. Calibrate the PID meter using a compressed gas cylinder containing a 100-ppm isobutylene standard, a flow regulator, and a tubing assembly. In addition, a compressed gas cylinder containing zero air ("clean" air) may be required if ambient air conditions do not permit calibration to "clean air".

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD PHOTOIONIZATION DETECTOR (PID)

3. Fill two Tedlar bags equipped with a one-way valve with zero-air (if applicable) and 100-ppm isobutylene gas.

4. Assemble the calibration equipment and actuate the PID in its calibration mode. Connect the PID probe to the zero air calibration bag (or calibrate to ambient air if conditions permit) and wait for a stable indication.

5. Change the response factor of the PID to the Methyl Isobutyl Ketone (MIBK) setting, which is a response factor of 1.0 for the Photovac 2020.

6. Connect the PID probe to the 100-ppm isobutylene standard calibration bag. Measure an initial reading of the isobutylene standard and wait for a stable indication.

7. Keep the PID probe connected to the 100-ppm isobutylene standard calibration bag, calibrate to 100-ppm with the isobutylene standard and wait for a stable indication.

8. Document the calibration results and related information in the Project Field Book and on an Equipment Calibration Log (see attached example), indicating the meter readings before and after the instrument has been adjusted. This is important, not only for data validation, but also to establish maintenance schedules and component replacement. Information will include, at a minimum:

    - Time, date and initials of the field team member performing the calibration
    - The unique identifier for the meter, including manufacturer, model, and serial number
    - The brand and expiration date of the isobutylene gas
    - The instrument readings: before and after calibration
    - The instrument settings (if applicable)
    - Pass or fail designation in accordance with the accuracy specifications presented above
    - Corrective action taken (see Maintenance below) in the event of failure to adequately calibrate

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FIELD OPERATING PROCEDURE

CALIBRATION AND MAINTENANCE OF PORTABLE FIELD PHOTOIONIZATION DETECTOR (PID)

MAINTENANCE

- The probe and dust filter of the PID should be checked before and after every use for cleanliness. Should instrument response become unstable, recalibration should be performed. If this does not resolve the problem, access the photoionization bulb and clean with the manufacturer-supplied abrasive compound, then recalibrate.

- The PID battery must be recharged after each use. Store the PID in its carrying case when not in use. Additional maintenance details related to individual components of the PID are provided in the equipment manufacturer's instruction manual. If calibration or instrument performance is not in accordance with specifications, send the instrument to the equipment manufacturer for repair.

- Maintain a log for each monitoring instrument. Record all maintenance performed on the instrument on this log with date and name of the organization performing the maintenance.

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EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ BM/TK ☐ Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTINGS
☐ pH meter	uni					4.00		
						7.00		
						10.01		
☐ Turbidity meter	NTU					< 0.5		
						20		
						100		
						800		
☐ Sp. conductance meter	uS/mS					1413 μS @ 25 °C		
☐ PID	ppm					open air		
						100 ppm Iso. Gas		
☐ Particulate meter	mg/m^3					zero air		
☐ Oxygen	%					open air		
☐ Hydrogen sulfide	ppm					pen air		
☐ Carbon monoxide	ppm					n air		
☐ LEL	%					pen air		
☐ Radiation Meter	uR/H					background area		
☐								
☐								

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

FIELD OPERATING PROCEDURE

CALIBRATION AND MAINTENANCE OF PORTABLE SPECIFIC CONDUCTANCE METER

PURPOSE

This guideline describes a method for calibration of a portable specific conductance meter. This meter measures the ability of a water sample to conduct electricity, which is largely a function of the dissolved solids within the water. The instrument has been calibrated by the manufacturer according to factory specifications. This guideline presents a method for checking the factory calibration of a portable specific conductance meter. A calibration check is performed to verify instrument accuracy and function. All field test equipment will be checked at the beginning of each sampling day. This procedure also documents critical maintenance activities for this meter.

ACCURACY

The calibrated accuracy of the specific conductance meter will be within ± 1 percent of full-scale, with repeatability of ± 1 percent. The built-in cell will be automatically temperature compensated from at least 50° to 160° F (10° to 71°C).

CALIBRATION PROCEDURE

1. Field check the meter at the beginning of each sampling day.
2. Use a calibration solution of known specific conductivity and salinity. For maximum accuracy, use a Standard Solution Value closest to the samples to be tested.
3. Turn the Range Switch to 20 milliSiemens (mS) (also known as millimhos).

CALIBRATION AND MAINTENANCE OF PORTABLE SPECIFIC CONDUCTANCE METER

4. Insert the meter probe into a container of the calibration solution (note: do not use the solution bottle). Alternatively, depending on meter design, fill the meter's test cup with calibration solution.

5. If the reading obtained does not agree with the known specific conductivity of the solution, proceed as follows:

   - Clean the cell in accordance with the instruction manual. Rinse the cell thoroughly and repeat the calibration check.
   - If the meter still does not indicate the correct value, recalibrate the meter in accordance with the manufacturer's instructions. This typically involves accessing and turning a dial or adjustment screw while measuring the conductance of the calibration solution. The meter is adjusted until the output agrees with the known solution conductance.
   - If calibration cannot be achieved or maintained, obtain a replacement instrument (rental instruments) and/or order necessary repairs/adjustment.

6. Document the calibration results and related information in the Project Field Book and on an Equipment Calibration Log (see attached example), indicating the meter readings before and after the instrument has been adjusted. This is important, not only for data validation, but also to establish maintenance schedules and component replacement. Information will include, at a minimum:

   - Time, date, and initials of the field team member performing the calibration
   - The unique identifier for the meter, including manufacturer, model, and serial number
   - The brand and expiration dates of calibration solutions
   - The instrument readings: before and after calibration
   - The instrument settings (if applicable)
   - The approximate response time
   - The overall adequacy of calibration including the Pass or fail designation in accordance with the accuracy specifications presented above

- Corrective action taken (see Step 5 above) in the event of failure to adequately calibrate

MAINTENANCE

- Check the meter batteries at the end of each day and replace when needed.

- Track the meter response time and stability to determine the need for instrument maintenance. When response time becomes greater than two minutes and the meter must be recalibrated more than once per day, send the instrument to the manufacturer for maintenance and repair.

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EQUIPMENT CALIBRATION LOG

PROJECT INFORMATION:

Project Name: Date:

Project No.:

Client: Instrument Source: ☐ BM/TK ☐ Rental

METER TYPE	UNITS	TIME	MAKE/MODEL	SERIAL NUMBER	CAL. BY	STANDARD	READING	SETTINGS
☐ pH meter	units					4.00		
						7.00		
						10.01		
☐ Turbidity meter	NTU					< 0.5		
						20		
						100		
						800		
☐ Sp. conductance meter	uS/mS					1413 µS @ 25 °C		
☐ PID	ppm					open air		
						100 ppm Iso. Gas		
☐ Particulate meter	mg/m^3					zero air		
☐ Oxygen	%					open air		
☐ Hydrogen sulfide	ppm					pen air		
☐ Carbon monoxide	ppm					n air		
☐ LEL	%					pen air		
☐ Radiation Meter	uR/H					background area		
☐								
☐								

SAMPLE

ADDITIONAL REMARKS:

PREPARED BY: **DATE:**

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

FIELD OPERATING PROCEDURE

DOCUMENTATION REQUIREMENTS FOR DRILLING AND WELL INSTALLATION

PURPOSE

The purpose of these documentation requirements is to document the procedures used for drilling and installing wells in order to ensure the quality of the data obtained from these operations. Benchmark field technical personnel will be responsible for developing and maintaining documentation for quality control of field operations. At least one field professional will monitor each major operation (e.g. one person per drilling rig) to document and record field procedures for quality control. These procedures provide a description of the format and information for this documentation.

PROCEDURE

Project Field Book

Personnel assigned by the Benchmark Field Team Leader or Project Manager will maintain a Project Field Book for all site activities. These Field Books will be started upon initiation of any site activities to document the field investigation process. The Field Books will meet the following criteria:

- Permanently bound, with nominal 8.5-inch by 11-inch gridded pages.
- Water resistant paper.
- Pages must be pre-numbered or numbered in the field, front and back.

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FIELD OPERATING PROCEDURE

DOCUMENTATION REQUIREMENTS FOR DRILLING AND WELL INSTALLATION

Notations in the field book will be in black or blue ink that will not smudge when wet. Information that may be recorded in the Field Book includes:

- Time and date of all entries.
- Name and location of project site, and project job number.
- Listing of key project, client and agency personnel and telephone numbers.
- Date and time of daily arrivals and departures, name of person keeping the log, names and affiliation of persons on site, purpose of visit (if applicable), weather conditions, outline of project activities to be completed.
- Details of any variations to the procedures/protocols presented in the RFI Work Plan or Field Operating Procedures, and the basis for the change.
- Field-generated data relating to implementation of the field program, including sample locations, sample descriptions, field measurements, instrument calibration, etc.
- Record of all photographs taken in the field, including date, time, photographer, site location and orientation, sequential number of photograph, and roll number.

Upon completion of the site activities, the Field Books will be placed in the project files.

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FIELD OPERATING PROCEDURE

DOCUMENTATION REQUIREMENTS FOR DRILLING AND WELL INSTALLATION

Borehole Log Form

An example of this form is attached to this Field Operating Procedure. One form will be completed for every boring by the Benchmark field person overseeing the drilling. At a minimum, these forms will include:

- Project name, location, and number.
- Boring number.
- Drilling method.
- Drilling dates.
- Sampling method.
- Sample descriptions, to meet the requirements of the Unified Soil Classification System (USCS) for soils and the Unified Rock Classification System (URCS) for rock.
- Results of headspace analyses.
- Blow counts for sampler penetration.
- Drilling rate, rig chatter, and other drilling-related information.

All depths recorded on Boring Log Forms will be expressed in increments tenths of feet, and not in inches.

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FIELD OPERATING PROCEDURE

DOCUMENTATION REQUIREMENTS FOR DRILLING AND WELL INSTALLATION

Monitoring Well Construction Log

An example of this form is attached to this Field Operating Procedure. One form will be completed for every boring by the Benchmark field person overseeing the well installation. At a minimum, these forms will include:

- Project name, location, and number.
- Well number.
- Installation dates.
- Dimensions and depths of the various well components illustrated in the Monitoring Well Construction Diagram (reference the Benchmark Field Operating Procedures for Monitoring Well Installation). These include the screened interval, bottom caps or plugs, centralizers, and the tops and bottoms of the various annular materials.
- Drilling rate, rig chatter, and other drilling related information.

All depths recorded on Monitoring Well Construction Logs will be expressed in tenths of feet, and not in inches.

Daily Drilling Report Form

An example of this form is attached to this Field Operating Procedure. This form should be used to summarize all drilling activities. One form should be completed for each rig for each day. These forms will include summaries of:

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC

FIELD OPERATING PROCEDURE

DOCUMENTATION REQUIREMENTS FOR DRILLING AND WELL INSTALLATION

- Footage drilled, broken down by diameter (e.g. 200 feet of 6-inch diameter hole, 50 feet of 10-inch diameter hole).
- Footage of well and screen installed, broken down by diameter.
- Quantities of materials used, including sand, cement, bentonite, centralizers, protective casings, traffic covers, etc. recorded by well or boring location.
- Active time (hours), and activity (drilling, decontamination, development, well installation, surface completions, etc.)
- Down-time (hours) and reason.
- Mobilizations and other events.
- Other quantities that will be the basis for drilling invoices.

The form should be signed daily by both the Benchmark field supervisor and the driller's representative, and provided to the Benchmark Field Team Leader.

Other Project Field Forms

Well purging/well development forms, test pit logs, environmental sampling field data sheets, water level monitoring forms, and well testing (slug test or pumping test) forms. Refer to specific guidelines for form descriptions.

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FIELD BOREHOLE LOG

Project Name:	BORING NUMBER:
Project Number:	Location:
Client:	Start Date/Time:
Drilling Company:	End Date/Time:
Driller:	Logged By:
Helper:	Drilling Method:
Rig Type:	Weather:

Depth (bgs)	Sample No.	Blows (per 6")	Recovery	PID Scan (ppm)	SOIL DESCRIPTIO	PID HDSP (ppm)	Samples (y/n)	Pocket Penetrometer
					USCS Classification: Color, Moisture Conditi cenla f Soil Type, Texture, Plasticity, Fabric, Bedd			

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FIELD BOREHOLE/MONITORING WELL INSTALLATION LOG

Project Name:	WELL NUMBER:
Project Number:	Location:
Client:	Start Date/Time:
Drilling Company:	End Date/Time:
Driller:	Logged By:
Helper:	Drilling Method:
Rig Type:	Weather:

Depth (bgs)	Sample No.	Blows (per 6")	Recovery	PID Scan (ppm)	SOIL DESCRIPTION USCS Classification: Color, Moisture Condition, [illegible] ge of Soil Type, Texture, Plasticity, Fabric, Bedding, Other	[illegible]P (ppm)	Samples (y/n)	Pocket Penetrometer	Well Construction Details and/or Drilling Remarks

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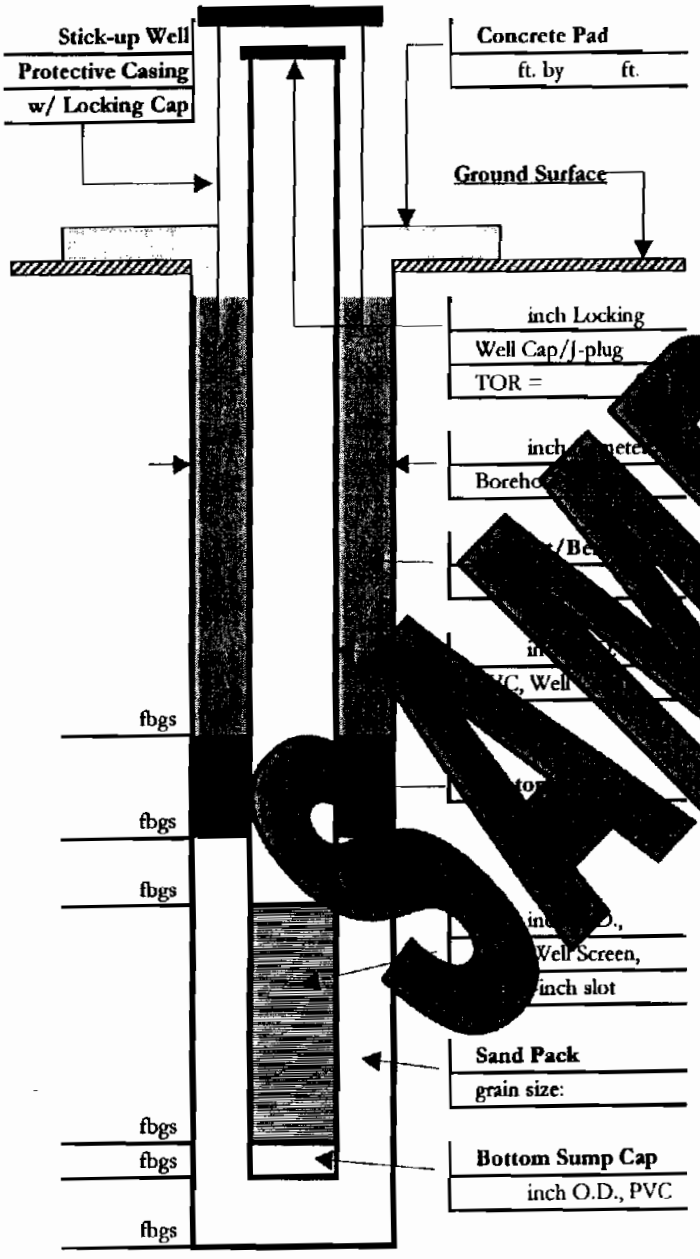
STICK-UP WELL/PIEZOMETER COMPLETION DETAIL

Project Name:	WELL NUMBER:
Client:	Date Installed:
Boring Location:	Project Number:



Driller Information

Company:	
Driller:	
Helper:	
Permit N	
Drill R	

Well Inform

and Surface	fmsl (approximate)
ling Method:	
mple Collecti	
Dri uid:	
id R ring ing	gallons (approximate)

l of W ction

ng:	
en:	
San	
ton Pellets:	

ell Development

Well Purpose:	
Techneque(s):	
Date Completed:	
BM/TK Personnel	
Total Volume Purge:	gallons
Static Water Level:	fbTOR
Pump Depth:	
Pumping Duration:	minutes
Yeild:	gpm
Specific Capacity:	gpm/ft

Comments:

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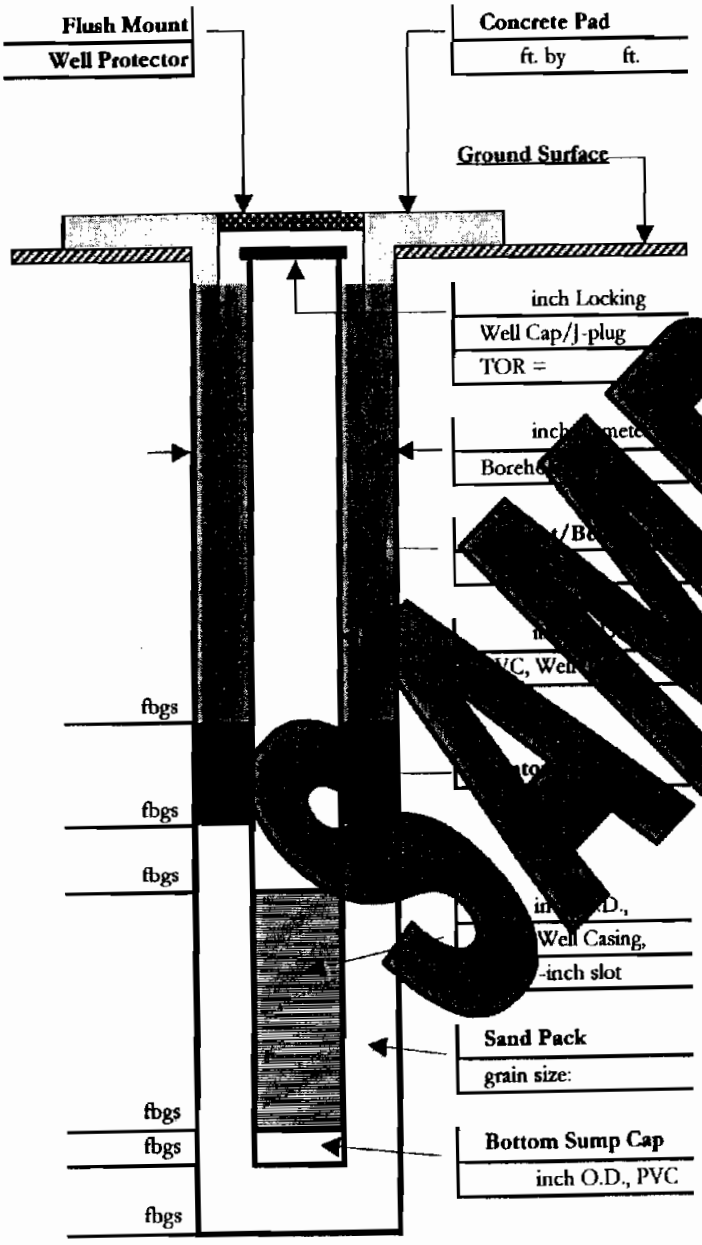
FLUSHMOUNT WELL/PIEZOMETER COMPLETION DETAIL

Project Name: WELL NUMBER:

Client: Date Installed:

Boring Location: Project Number:



Driller Information

Company:
Driller:
Helper:
Permit N
Drill

Well Inform

and Surface : fmsl (approximate)
lling Method:
mple Collecti
Dr luid:
id gallons (approximate)

al of W iction

ing:
en:
Sa
ntonite Pellets:

ell Development

Well Purpose:	
Techneque(s):	
Date Completed:	
BM/TK Personnel	
Total Volume Purge:	gallons
Static Water Level:	fbTOR
Pump Depth:	
Pumping Duration:	minutes
Yeild:	gpm
Specific Capacity:	gpm/ft

Comments:

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DAILY DRILLING REPORT

CONTRACTOR: _____ DATE: _____

DRILLING EQUIP.: _____ WEATHER: _____

CREW MEMBERS: _____

SITE NAME: _____ JOB NUMBER: _____

CATEGORY	Total Hours	a.m. 6 7 8 9 10 11	12	p.m. 13 14 15 16 17 18 19 20 21 22 23	24	a.m. 1 2 3 4 5
MOB / DEMOB						
DRILLING - ROCK						
WELL INSTALLATION						
DEVELOPMENT / TESTING						
GROUTING						
STEAM / DECON						
DOWN TIME						
STANDBY						
OTHER:						

REMARKS:

CONSUMABLE: DESCRIBE NATURE, QUANTITY, S

OR SERVI	QTY.	NOTES

Borehole No.	From (feet)	(		METHOD, SIZE, ETC.

PERSONNEL TIME LOG:

POSITION	NAME	HOURS
Observer		
Driller		
Helper		

DRILLER

BM REP.

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FIELD OPERATING PROCEDURE

GROUNDWATER LEVEL MEASUREMENT

PURPOSE

This procedure describes the methods used to obtain accurate and consistent water level measurements in monitoring wells/piezometers. Water levels will be measured at monitoring wells and, if practicable, in supply wells to estimate purge volumes associated with sampling, and to develop a potentiometric surface of the groundwater in order to estimate the direction and velocity of flow in the aquifer. Water levels in monitoring wells will be measured using an electronic water level indicator (e-line) that has been checked for operation prior to mobilization.

PROCEDURE

1. Decontaminate the e-line probe and a lower portion of cable following the procedures referenced in the Benchmark Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination. Store the e-line in a protected area until use. This may include wrapping the e-line in clean plastic until the time of use.

2. Unlock and remove the well protective cap or cover and place on clean plastic.

3. Lower the probe slowly into the monitoring well until the audible alarm sounds. This indicates the depth to water has been reached.

4. Move the cable up and down slowly to identify the depth at which the alarm just begins to sound. Measure this depth against the mark on the lip of the well riser used as a surveyed reference point.

5. Read depth from the graduated cable to the nearest 0.01 foot. Do not use inches. If the e-line is not graduated, use a rule or tape measure graduated in 0.01-foot increments to measure from the nearest reference mark on the e-line cable.

6. Record the water level on a Water Level Monitoring Record (sample attached).

GROUNDWATER LEVEL MEASUREMENT

7. Remove the probe from the well slowly, drying the cable and probe with a clean paper wipe. Be sure to repeat decontamination before use in another well.

8. Replace well plug and protective cap or cover. Lock in place as appropriate.

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WATER LEVEL MONITORING RECORD

Project Name: ______________________ Client: ______________________
Project No.: ______________________ Location: ______________________
Field Personnel: ______________________ Date: ______________________
Weather: ______________________

NOTE: For convenience, the following abbreviations may be used.

D = Dedicated Pump	I = Inaccessible	ST = Steel Tape	WL = Water Level
ES = Electric Sounder	MP = Measuring Point	TOC = Top of Casing	fmsl = feet mean sea level
GS = Ground Surface	P = Pumping	TOR = Top of Riser	fbTOR = feet below TOR

Well No.	Time	MP Elevation (fmsl)	WL (fbTOR)	WL Elevation (fmsl)	__/ (fb	Remarks

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FIELD OPERATING PROCEDURE

GROUNDWATER SAMPLE COLLECTION

PURPOSE

This procedure describes the methods for collecting groundwater samples from monitoring wells and domestic supply wells following purging and sufficient recovery. This procedure also includes the preferred collection order in which water samples are collected based on the volatilization sensitivity or suite of analytical parameters required.

PROCEDURE

Perform sampling as soon as practical after purging at any time after the well has recovered sufficiently to sample, or within 24 hours after evacuation, if the well recharges slowly. If the well does not yield sufficient volume for all required laboratory analytical testing (including quality control), a decision should be made to prioritize analyses based on contaminants of concern at the site. If a well takes longer than 24 hours to recharge, the Project Manager should be consulted.

Monitoring Wells

1. Purge the monitoring well in accordance with the Benchmark Field Operation Procedures for Monitoring Well Purging Procedures Prior to Sample Collection.

2. Sampling equipment that is not disposable or dedicated to the well will be decontaminated in accordance with the Benchmark Field Operating Procedure for Non-Disposable and Non-Dedicated Sampling Equipment Decontamination.

3. Calibrate all field meters (i.e., pH/Eh, turbidity, specific conductance, dissolved oxygen, PID etc.) in accordance with the Benchmark Field Operating Procedure for Calibration and Maintenance of the specific field meter.

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FIELD OPERATING PROCEDURE

GROUNDWATER SAMPLE COLLECTION

4. Groundwater samples will be collected directly from the sampling valve on the flow through cell (low-flow), discharge port of a standard pump assembly (peristaltic, pneumatic, submersible, or Waterra™ pump) or bailer (stainless steel, PVC or polyethylene). In low-yielding wells at which the flow through cell is not used, the samples may be collected using a disposable bailer.

5. If disposable polyethylene bailers are used, the bailer should be lowered *slowly* below the surface of the water to minimize agitation and volatilization.

6. Sampling data will be recorded on a Water Sample Collection Log (example attached).

7. Pre-label all sample bottles in the field using a waterproof permanent marker in accordance with the Benchmark Field Operating Procedure for Sample Labeling, Storage and Shipment Procedures. The following information, at a minimum, should be included on the label:

    - Project Number;
    - Sample identification code (as per project specifications);
    - Date of sample collection (mm, dd, yy);
    - Time of sample collection (military time only) (hh:mm);
    - Specify "grab" or "composite" sample;
    - Sampler initials;
    - Preservative(s) (if applicable); and
    - Analytes for analysis (if practicable).

8. Collect a separate sample of approximately 200 ml into an appropriate container prior to collecting the first and following the last groundwater sample collected to measure the following parameters:

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FIELD OPERATING PROCEDURE

GROUNDWATER SAMPLE COLLECTION

Parameter	Units
Dissolved Oxygen	parts per million (ppm)
Specific Conductance	µmhos/cm or µS or mS
pH	pH units
Temperature	°C or °F
Turbidity	NTU
Eh *(optional)*	mV
PID VOCs *(if applicable)*	ppm

Record all field measurements on a Water Sample Collection Log form (example attached).

9. Collect samples into pre-cleaned bottles provided by the analytical laboratory with the appropriate preservative(s) added based on the volatilization sensitivity or suite of analytical parameters required designated below.

10. The samples will be labeled, stored and shipped in accordance with the Benchmark Field Operating Procedure for Sample Labeling, Storage and Shipment Procedures.

Domestic Supply Wells

1. Calculate or estimate the volume of water in the well. It is desirable to purge at least one casing volume before sampling. This is controlled, to some extent, by the depth of the well, well yield and the rate of the existing pump. If the volume of water in the well cannot be calculated, the well should be purged continuously for no less than 15 minutes.

2. Connect a sampling tap to an accessible fitting between the well and the pressure tank where practicable. A hose will be connected to the device and the hose discharge located 25 to 50 feet away. The well will be allowed to pump until the lines and one well volume is removed. Flow rate will be measured with a container of known volume and a stopwatch.

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FIELD OPERATING PROCEDURE

GROUNDWATER SAMPLE COLLECTION

3. Place a clean piece of polyethylene or Teflon tubing on the sampling port and collect the samples in the order designated below and in the sample containers supplied by the laboratory for the specified analytes. ***DO NOT*** use standard garden hose to collect samples.

4. Sampling will be recorded on a Water Sample Collection Log form (example attached).

5. The samples will be labeled, stored and shipped in accordance with the Benchmark Field Operating Procedure for Sample Labeling, Storage and Shipment Procedures.

SAMPLE COLLECTION ORDER

All groundwater samples, from monitoring wells and domestic supply wells, will be collected in accordance with the following.

1. Samples will be collected preferentially in recognition of volatilization sensitivity. The preferred order of sampling is:

   - Volatile Organic Compounds (VOCs)
   - Total Organic Halogens (TOX)
   - Total Organic Carbon (TOC)
   - Extractable Organic Compounds (i.e., BNAs, SVOCs, etc.)
   - Total metals (Dissolved Metals)
   - Total Phenolic Compounds
   - Cyanide
   - Sulfate and Chloride
   - Turbidity
   - Nitrate and Ammonia
   - Radionuclides

2. Document the sampling procedures and related information in the Project Field Book and on a Water Sample Collection Log form (example attached).

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WATER SAMPLE COLLECTION LOG

Project Name:	WELL NUMBER:
Project Number:	Laboratory Name:
Client:	Date Shipped to Lab:
	Sample Matrix:

WELL DATA:

DATE:	TIME:
Casing Diameter (inches):	Casing Material:
Screened interval (fbTOR):	Screen Material:
Static Water Level (fbTOR):	Bottom Depth (fbTOR):
Elevation Top of Well Riser (fmsl):	Datum Ground Surface or Mean Sea Level
Elevation Top of Screen (fmsl):	Stick-up (feet):

PURGING DATA:

DATE:	START TIME:	END TIME:		
Method:	Is purge equipment dedicated to sample location?		yes	no
No. of Well Volumes Purged:	Was well purged to dryness?		yes	no
Standing Volume (gallons):	Was screen allowed to be backfilled with sand pack?		yes	no
Volume Purged (gallons):	Field Personnel:			
Purge Rate (gal/min):	*SEE GROUNDWATER WELL DEVELOPMENT & PURGE LOG*			

SAMPLING DATA:

DATE:	START TIME:	END TIME:		
Method:	Sampling equipment dedicated to sample location?		yes	no
Initial Water Level (fbTOR):	Well screen sampled to dryness?		yes	no
Final Water Level (fbTOR):	Was screen allowed to be backfilled with sand pack?		yes	no
Weather Conditions:	Color of Well:			
Air Temperature (°F):	Field Personnel:			
Source and type of water used in the field for QC purposes:				

PHYSICAL & CHEMICAL DATA

DESCRIPTION OF WATER SAMPLE		
Odor		
Color		
NAPL		
PID Scan	NA	
Contains Sediment?	yes	no

WATER QUALITY MEASUREMENTS							
Sample	Time	pH (units)	TEMP. (°C)	COND. (uS)	D.O. (ppm)	TURB. (NTU)	Eh (mV)
initial							
final							

REMARKS:

PREPARED BY:

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FIELD OPERATING PROCEDURE

NON-DISPOSABLE AND NON-DEDICATED SAMPLING EQUIPMENT DECONTAMINATION

PURPOSE

This procedure is to be used for the decontamination of non-disposable and non-dedicated equipment used in the collection of environmental samples. The purpose of this procedure is to remove chemical constituents from previous samples from the sampling equipment. This prevents these constituents from being transferred to later samples, or being transported out of controlled areas.

HEALTH AND SAFETY

Nitric acid is a strong oxidizing agent as well as being extremely corrosive to the skin and eyes. Solvents such as acetone, methanol, hexane and isopropanol are flammable liquids. Limited contact with skin can cause irritation, while prolonged contact may result in dermatitis. Eye contact with the solvents may cause irritation or temporary corneal damage. Safety glasses with protective side shields, neoprene or nitrile gloves and long-sleeve protective clothing must be worn whenever acids and solvents are being used.

PROCEDURES

Bailers, split-spoons, steel or brass split-spoon liners, Shelby tubes, submersible pumps, soil sampling knives, and similar equipment will be decontaminated as described below.

1. Wash equipment thoroughly with non-phosphate detergent and potable-quality water, using a brush where possible to remove any particulate matter or surface film. If the sampler is visibly coated with tars or other phase-separated hydrocarbons, pre-wash

with acetone or isopropanol, or by steam cleaning. Decontamination will adhere to the following procedure:

a. Rinse with potable-quality water;

b. Rinsed with 10% nitric acid (HNO_3) solution (see ***Note 1***);

c. Rinse with potable-quality water;

d. Rinse with pesticide grade acetone or methanol (see ***Note 2***);

e. Rinse with pesticide grade hexane (see ***Note 2***);

f. Rinse with deionized water demonstrated analyte-free such as distilled water);

g. Air dry; and

h. Store in a clean area or wrap in aluminum foil (shiny side out) or new plastic sheeting as necessary to ensure cleanliness.

2. All non-dedicated well evacuation equipment, such as submersible pumps and bailers, which are put into the well, must be decontaminated following the procedures listed above. All evacuation tubing must be dedicated to individual wells (i.e., tubing cannot be reused). However, if submersible pump discharge tubing must be reused, the tubing and associated sample valves or flow-through cells used in well purging or pumping tests will be decontaminated as described below:

a. Pump a mixture of potable water and a non-phosphate detergent through the tubing, sample valves and flow cells, using the submersible pump.

b. Steam clean or detergent wash the exterior of the tubing, sample valves, flow cells and pump.

c. Pump potable water through the tubing, sample valve, and flow cell until no indications of detergent (e.g. foaming) are observed.

d. Double rinse the exterior of the tubing with potable water.

e. Rinse the exterior of the tubing with distilled water.

f. Store in a clean area or wrap the pump and tubing assembly in new plastic sheeting as necessary to ensure cleanliness until ready for use.

3. All unused sample bottles and sampling equipment must be maintained in such a manner that there is no possibility of casual contamination.

NOTES

(1) Omit this step if metals are <u>not</u> being analyzed. For carbon steel split spoon samplers, a 1% rather than 10% HNO_3 solution should be used.

(2) This solvent rinse can be omitted if organics are <u>not</u> being analyzed. Alternatively, if approval from the NYSDEC has been granted, use pesticide grade isopropanol as the cleaning solvent. Isopropanol is better suited as a cleaning solvent that acetone, methanol and hexane for the following reasons:

- Acetone is a parameter analyzed for on the Target Compound List (TCL); therefore the detection of acetone in samples collected using acetone rinsed equipment is suspect;
- Almost all grades of methanol contain 2-butanone (Methyl Ethyl Ketone, MEK) contamination. As for acetone, 2-butanone is a TCL compound. Thus, the detection of 2-butanone in samples collected using methanol rinsed equipment is suspect. In addition, methanol is much more hazardous than either isopropanol or acetone.
- Hexane is not miscible with water (hydrophobic) and therefore, is not an effective rinsing agent unless the sampling equipment is dry. Isopropanol is extremely miscible in water (amphoteric), making it an effective rinsing agent on either wet or dry equipment.

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FIELD OPERATING PROCEDURE

SAMPLE LABELING, STORAGE AND SHIPMENT PROCEDURES

PURPOSE

The collection and analysis of samples of environmental media, including soils, groundwater, surface water, and sediment, are the central activities of the field investigation. These samples must be properly labeled to preserve its identity, and properly stored and shipped in a manner that preserves its integrity and chain of custody. This procedure presents methods for these activities.

SAMPLE LABELING PROCEDURE

1. Assign each sample retained for analysis a unique 9-digit alphanumeric identification code. Follow format in Table 3 of QAPP.

2. Affix a non-removable (when wet) label to each sample container. The following information will be written on the label with black or blue ink that will not smudge when wet:
    - Project number
    - Sample ID (see Step 1 above)
    - Date of sample collection
    - Time of sample collection (military time only)
    - Specify "grab" or "composite" sample with an "X"
    - Sampler initials
    - Preservative(s) (if applicable)
    - Analytes for analysis (if practicable)

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FIELD OPERATING PROCEDURE

SAMPLE LABELING, STORAGE AND SHIPMENT PROCEDURES

3. Record all sample label information in the Project Field Book and on a Sample Summary Collection Log (see attached examples), keyed to the sample identification number. In addition, add information regarding the matrix, sample location, depth, etc. to provide a complete description of the sample.

SAMPLE STORAGE PROCEDURE

1. Immediately after collection, placement in the proper container, and labeling, place samples to be retained for chemical analysis into resealable plastic bags.

2. Place bagged samples into an ice chest filled approximately half-full of double bagged ice. Blue ice is not an acceptable substitute for ice.

3. Maintain samples in an ice chest or in an alternative location (e.g. sample refrigerator) as approved by the Benchmark Field Team Leader until time of shipment. Periodically drain melt-water off coolers and replenish ice as necessary.

4. Ship samples on a daily basis, unless otherwise directed by the Benchmark Field Team Leader.

5. Maintain appropriate custody procedures on coolers and other sample storage containers at all times. These procedures are discussed in detail in the Quality Assurance Project Plan or Monitoring Plan.

SAMPLE SHIPPING PROCEDURE

1. Fill out the chain-of-custody form completely (see attached example) with all relevant information. The white original goes with the samples and should be placed in a resealable plastic bag and taped inside the sample cooler lid; the sampler should retain the copy.

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FIELD OPERATING PROCEDURE

SAMPLE LABELING, STORAGE AND SHIPMENT PROCEDURES

2. Place a layer of inert cushioning material such as bubble pack in the bottom of cooler.

3. Place each bottle in a bubble wrap sleeve or other protective wrap. To the extent practicable, then place each bottle in a resealable plastic bag.

4. Open a plastic bag into a cooler and place sample bottles into the garbage bag (or similar) with volatile organic analysis (VOA) vials near the center of the cooler.

5. Pack bottles with ice in plastic bags. At packing completion, cooler should be at least 50 percent ice, by volume. Coolers should be completely filled, so that samples do not move excessively during shipping.

6. Duct tape (or similar) cooler drain closed and wrap cooler completely in two or more locations to secure lid, specifically covering the hinges of the cooler. Place signed custody seals over duct tape between the lid and cooler body and wrap with clear strapping tape.

7. Place laboratory label address identifying cooler number (i.e., 1 of 4, 2 of 4 etc.) and overnight delivery waybill sleeves on cooler lid or handle sleeve (Federal Express).

8. Sign the custody seal tape with an indelible soft-tip marker and place over the duct tape across the front and back seam between the lid and cooler body.

9. Cover the signed custody seal tape with an additional wrap of transparent strapping tape.

10. Place "Fragile" and "This Side Up" labels on all four sides of the cooler. "This Side Up" labels are yellow labels with a black arrow with the arrow head pointing toward the cooler lid

11. For coolers shipped by overnight delivery, retain a copy of the shipping waybill, and attach to the chain-of-custody documentation.

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FIELD OPERATING PROCEDURE

SOIL BORING LOG DESCRIPTION PROCEDURES USING THE UNIFIED SOIL CLASSIFICATION SYSTEM

PURPOSE

This guideline presents a means for insuring proper field identification and description of soils collected from a split-spoon (barrel) sampler. The lithology and moisture content of each soil sample will be physically characterized by visual observation according to the Unified Soil Classification System (USCS). This method of soil characterization describes soil types based on grain size and liquid and plastic limits and includes moisture content. Intensely weathered or decomposed rock that is friable and can be reduced to gravel size or smaller by normal hand pressure should be classified as a soil. The soil classification would be followed by the parent rock name in parenthesis.

PROCEDURE

Assemble necessary equipment and discuss program requirements with drilling contractor.

1. Advance boring in accordance with accepted Benchmark Split-Spoon Sampling Field Operating Procedure at pre-specified intervals. Samples shall be taken at a minimum from each stratigraphic unit and each screened interval. Record the number of blows necessary to drive the split-spoon sampler per 6-inch interval. If the sampler is not driven the 6-inch interval after 50 blows are delivered, measure the sampler penetration distance and record this distance along with the blow count. Advance augers to the next sample interval and repeat procedure.

2. After opening the split-spoon sampler, measure and record the length of the recovered sample. The upper 2 to 3 inches of the sample should be disregarded, as the material is likely not representative of the native in-situ materials.

3. Shave a thin layer off the entire length of the sample to expose fresh sample. (Note: The outer sample surface of often smeared while the sample barrel is being driven.) The sample should be photographed and screened with a PID at this time, if applicable.

4. Describe the sample using terminology presented in the Descriptive Terms section below.

5. After the sample has been described, place representative portion of the sample in new, preclcaned jars. Label the jar with the borehole number, sample interval, date, number of blow counts and project number and store in a secure location.

DESCRIPTIVE TERMS

All field soil samples will be classified in accordance with the Unified Soil Classification System (USCS) presented herein and on the attached pages. It is desirable to supplement the USCS classification with a geologic interpretation of the soil sample that is supported by thc soil descriptive terms presented in Table A (attached).

Use the following descriptive sequence when classifying soils:

- Group Name
- Group Symbol
- Consistency/Relative Density
- Color
- Moisture
- Particle Size/Shape/Angularity
- Gradation
- Plasticity
- Structure
- Cementation
- Organics

- Fill Materials
- Other Constituents/Characteristics

REQUIRED EQUIPMENT

- Knife
- Engineer's rule/measuring tape
- Permanent marker
- Pre-cleaned sample jars (usually provided by the driller)
- 10X hand lens
- Hydrochloric acid
- Camera
- Munsell soil color chart
- Project Field Book

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FIELD OPERATING PROCEDURE

UNIFED SOIL CLASSIFICATION SYSTEM

IDENTIFICATION TESTS FOR FINE-GRAINED SOILS

Soil Type	Group Symbol	Dry Strength	Dilatency	Toughness
Silts & Clays Liquid Limit <50	ML	None to slight	Quick to flow	None
	CL	Medium to high	None to very slow	medium
	OL	Slight to medium	Slow	slight
Silts & Clays Liquid Limit: >50	MH	Slight to medium	slow to none	slight to medium
	CH	High to very high	none	high
	OH	Medium to high	none to very slow	slight medium
Highly Organic Soils	PT	Identifiable by: And commonly:	color, order, by fibrous texture	Spongy feel

APPENDIX C

SITE-SPECIFIC HEALTH AND SAFETY PLAN (HASP)

BENCHMARK ENVIRONMENTAL ENGINEERING & SCIENCE, PLLC
SITE-SPECIFIC HEALTH AND SAFETY PLAN

PART 1 – GENERAL SITE INFORMATION

Site Name: West Falls Machine Co., Inc.	Corporate Health and Safety Director: Thomas H. Forbes, P.E.
Site Address: 11692 E. Main St. East Aurora, NY 14052 Site Phone (if available): (716) 870-3325 (cellular phone)	
Project(s) covered by this HASP: Completion of Soil Borings, Collections of soil samples, Potential collection of groundwater samples.	
HASP prepared by: J.Asquith, Reviewed by T. Forbes	
Date: 12/13/02	
Revision Date:	

PART 2 – SITE-SPECIFIC INFORMATION

2.1 Site Type (check applicable boxes):

- ☐ State Inactive Hazardous Waste
- ☐ USEPA CERCLA
- ☐ Sanitary Landfill
- ☐ UST/LUST
- ☐ Active
- X Other (explain):
  Active specialty parts manufacturing facility
- ☐ RCRA Site
- ☐ C&D Landfill
- ☐ First Entry
- X Previously Characterized
- ☐ Inactive

2.2 Nature of Work at Site:

Work at the site involves the completion of 6 direct push soil borings, soil sample collection, and groundwater collection (possibly). Intrusive work will involve using a Geoprobe Unit.

2.3 Tasks to be Performed by Benchmark Personnel:

1. Observe Drilling operations

2. Collection/preparation of soil/groundwater for analysis.

2.4 Project-Specific Roles:

Task No.:	Field Crew	Benchmark on-site H&S Officer:	Contractor's on-site H&S Officer:
1	J. Asquith	J. Asquith	to be determined
2	J. Asquith	J. Asquith	to be determined

PART 3 – SITE CONTROL

The majority of the work will be performed outside. The general prevailing wind direction is to the east, therefore Benchmark personnel will position themselves upwind of the work area whenever possible. Control zones (exclusion, contaminant reduction and support zones) will be established as the work progresses. These exclusion zones will be established by the Site Safety Officer and identified by the contractor with survey tape or rope. Visitors will not be permitted to enter the exclusion or contaminant reduction zones. All subcontractors performing work in support of this project will be responsible for developing their own HASP unless otherwise covered by the contractor's HASP.

PART 4 – PHYSICAL HAZARDS

Check all potential physical hazards to which Benchmark employees may be exposed and indicate in the blank space which task numbers may result in exposure.

- ☐ Steep/Uneven Terrain
- ☐ Heavy Lifting
- ☐ Extreme Cold
- ☐ Overhead Hazards
- ☐ Electrical Hazards _____
- ☐ Dangerous Wildlife _____
- ☐ Vectors/Parasites _____
- X Heavy Equipment 1,2
- ☐ Extreme Heat _____
- X Excessive Noise 1,2
- ☐ Fire/Explosion
- ☐ Biological _____
- ☐ Poisonous Vegetation _____
- ☐ (describe below)

Describe "other" hazards and affected tasks:

PART 5 – CHEMICAL HAZARDS

5.1 IDENTIFIED CONTAMINANTS

Known or suspected hazardous/toxic materials (attach historical information, physical description, map of contamination and tabulated data, if available)

Media	Chemicals Present	Characteristics	Estimated Concentrations	PEL
GW	Chromium	TO	ND - 1.38 ppm in gw	0.5 mg/m^3

Media types: GW (ground water), SW (surface water), WW (wastewater), AIR (air), SL (soil), SED (sediment), WL (waste,liquid), SOL (waste, solid), WD (waste, sludge), WG (waste, gas), DNAPL (Dense Non-Aqueous Phase Liquid) OT (other).

Characteristics: CA (corrosive, acid), CC (corrosive, caustic), IG (ignitable), RA (radioactive), VO (volatile), TO (toxic), RE (reactive), BIO (infectious), UN (unknown), OT (other, describe)

5.2 ROUTES OF EXPOSURE

BENCHMARK TASK #	RTE OF POTENTIAL EXPOSURE	METHOD OF MONITORING	METHOD OF C ONTROL
1,2	Inhalation of dust	Dust Meter	Control exposed amount of soil
1,2	Incidental Ingestion		Limit hand-mouth contact
1,2	Direct Contact w/soil, or water		Use of gloves/PPE

The Site Safety Officer will briefthe Benchmark field team on symptoms and signs of overexposure to chemical hazards.

PART 6 – CONFINED SPACE ENTRY

Confined space entry will NOT be performed by Benchmark employees as part of this assignment.

PART 7 – HAZARD COMMUNICATION PROGRAM

If chemicals are introduced to the site by Benchmark personnel (viz., decon fluids, preservatives, etc.), a copy of the Material Safety Data Sheets (MSDSs) will be brought to the site. The Site Safety Officer will review this information with all field personnel prior to the start of the project. The Comprehensive List of Chemicals for this site is:

Alconox (soap solution)

PART 8 – ENVIRONMENTAL MONITORING REQUIREMENTS

The following environmental monitoring equipment shall be used at the indicated frequencies. Guidance for establishing action levels is presented below. The Site Health and Safety Officer shall be responsible for reviewing monitoring results and adjusting the monitoring frequency accordingly.

Benchmark Task #	Monitoring Equipment[1]	Monitoring Frequency	Action Level (concentration)	Response to be Taken by Affected Workers
1,2	Photoionization Detector (PID)	Constant monitoring	Sustained reading in breathing zone >5 ppm above background	Upgrade to level C respiratory
1,2	Dust Meter	Constant Monitoring	Sustained reading in breathing zone >0.5 mg/m^3 above background	Upgrade to Dust Mask respiratory

1. Monitoring equipment may include Photoionization detector (PID), Flame Ionization Detector (FID), combustible gas meter, percent oxygen monitor, particulate (respirable dust) meter, toxic gas indicator,

combination (O_2, combustible, & toxic gas) meter, radiation meter, colorimetric tubes, etc. Monitoring equipment is to be calibrated according to manufacturers' instructions. Record calibration events/results and air concentrations in the on-site Health and Safety log book.

Breathing zone action levels and response guidance is presented below. This information is only to be used as guidance, and shall not be a substitute for development of site and chemical-specific action level and responses when site characterization data is available.

Measurement		Response
Uncharacterized volatile gas:	at background conc.	Continue in level D respiratory
	0-5 ppm above bgrnd	Upgrade to level C respiratory
	5-500 ppm above bgrnd	Upgrade to level B respiratory
	>500 ppm above bgrnd	Exit work zone
Percent O_2 :	<21%	Investigate – possible displacement issue
	<19.5%	Leave area; re-enter only w/ supplied air
	>23.5%	Fire/explosion hazard – leave area
Percent explosive gas:	<10% LEL	Investigate
	<25% LEL	Work may continue – evaluate respiratory prot.
	>25%	Explosion hazard – leave area

PART 9 – HEALTH AND SAFETY TRAINING AND MEDICAL MONITORING PROGRAM

All Benchmark project staff involved in performance of hazardous waste operations participate in Benchmark's Health and Safety Training and Medical Monitoring Program, which meets the requirements of 29CFR 1910.120(e)(2). Employee-specific information for anticipated field staff is presented below.

NAME	MED. EXAM (DATE)	INITIAL HAZWOPER TRAINING (DATE)	REFRESHER HAZWOPER TRAINING (DATE)	SUPERVISOR HAZWOPER TRAINING (DATE)	FIRST AID TRAINING (DATE)	RESPIRATOR FIT TEST (INDICATE TYPE AND SIZE)
J. Asquith	12/01	6/89	5/02	6/89		MSA Medium

PART 10 – PERSONAL MONITORING

The following personal monitoring will be in effect at the site:
Air (Dust, particulates).

PART 11 – PERSONAL PROTECTIVE EQUIPMENT

11.1 Protective Clothing

The following personal protective equipment shall be worn by employees working in the exclusion zone. Dermal and respiratory protection may be upgraded or downgraded by the Site Health and Safety Officer based on the results of exposure monitoring (Part 8) or based on field observations.

Task #	Respitatory Protection[1]			Dermal Protection (indicate type)[2]			
	Level	Use	Cartridge	Gloves	Clothing	Boots	Other
1	D	Upgrd	C,DM	L		L,SS	S, H
2	D	Upgrd	C,DM	L		L,SS	S, H

1. Respiratory protection:

Level
Level A = Supplied air w/ hood
Level B = Supplied air respirator
Level C = Air Purifying Respirator
Level D = None
DM = Dust Mask

Cartridge
O = Organic Vapor
G = Organic Vapor/Acid Gas
A = Asbestos
P = Particulate
C = Combination Organic

Use
Reqd = Required in Exclusion Zone
Upgrd = upgrade

2. Dermal Protection:

Gloves
N = Nitrile
L = Latex
L/N = Latex inner, nitrile outer

Clothing
T = Tyvex
S = Saranex
PT = Poly-coated Tyvec

Boots
L = Latex
Neo = Neoprene
SS = Steel Safety

Other
G = Safety Goggles
S = Safety Glasses
H = Hardhat

B = Butyl
V = Viton
SS = Silver Shield
C = CottonNeo = Neoprene

LS = Long sleeve (coverall)

F = Face shield
E = Hearing Protection

11.2 Other Safety Equipment

Check box and identify in the blank space the task # for which the indicated equipment will be required.

X First Aid Kit 1, 2
X Eye Wash Kit 1,2
☐ Portable Phone _____
☐ Portable Lighting _____
☐ Barricades _____

☐ ABC Fire Extinguisher _____
☐ Air Horn _____
☐ Tripod/Harness
☐ Other- Ventilation blower
_____

PART 12 – COMMUNICATIONS PROCEDURES

Phone numbers (mobile or command post) for the site are:
(716) 870-3325(portable phones)

The following signals will be used in the event verbal communications are not feasible:

Hand(s) gripping throat – out of air; can't breath
Hands on top of/over head – need assistance
Grab partner's wrist – leavc area immediately
Thumbs up – ok, acknowledged
Thumbs down – negative, not ok

PART 13 – DECONTAMINATION PROCEDURES

All personnel and equipment exiting the exclusion zone will be decontaminated to the level appropriate for the nature of the work. The decontamination procedures to be followed are identified below. The Site Health and Safety Officer is responsible for ensuring decontamination protocols are followed.

For Tasks 1 & 2:

1. Equip. drop
2. Boot wash or containment in plastic
3. Glove removal
4. Canister/dust mask change
5. Outer garment removal (if appl.)
6. Hard hat & safety glass removal
7. Field wash

PART 14 – SAFE WORK PRACTICES

The following procedures must be followed by Benchmark staff working at the site:

1. Smoking, eating, chewing gum or tobacco, or drinking are forbidden except in clean or designated areas.
2. Contact with samples, excavated materials, or other contaminated media should be minimized.
3. Use of contact lenses is prohibited at all times.
4. If drilling or other heavy equipment is used, identify and be able to access the kill switch.
5. All electrical equipment used in outside locations, wet areas or near water must be plugged into ground fault circuit interrupter (GFCI) protected outlets.
6. A "Buddy System" in which another worker is close enough to render immediate aid will be in effect.
7. Good housekeeping practices are to be maintained.
8. Where the eyes or body may be exposed to corrosive materials, suitable facilities for quick drenching or flushing shall be available for immediate use.
9. In the event of dangerous working conditions due to inclement weaher (eg, thunderstorm, heavy fog, extreme cold or heat) field tasks will be suspended until conditions improve or appropriate protection from the elements is provided.
10. Other Site-Specific Safe Work Practices: see attachment to Health & Safety Plan_____

PART 15 – SAFE WORK PRACTICES

The following emergency procedures will be followed by Benchmark personnel. The Site Health and Safety Officer shall be notified of any onsite emergencies and be responsible for ensuring that the appropriate procedures are followed.

Injury in the Exclusion Zone: Upon notification of an injury in the Exclusion Zone, a designated emergency signal (2 blasts) shall be sounded. All site personnel shall assemble at the decontamination line. An outside rescue team summoned by the field team leader or Site Health and Safety Officer will enter the Exclusion Zone (if required) to remove the injured person to the hotline. The Site Safety Officer and Field Team Leader should evaluate the nature of the injury, and the affected person should be decontaminated to the extent possible prior to movement to the Support Zone. The onsite personnel shall initiate the appropriate first aid, and contact should be made for an ambulance and with the designated medical facility (if required). No persons shall reenter the Exclusion Zone until the cause of the injury or symptoms is determined.

Personal Protective Equipment Failure: If any site worker experiences a failure of personal protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the Exclusion Zone. Reentry shall not be permitted until the equipment has been repaired or replaced.

Fire/Explosion: Upon notification of a fire or explosion on site, the designated emergency signal (1 blast) shall be sounded and all site personnel assembled at the decontamination line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

Other Equipment Failure: If any other equipment on site fails to operate properly, the Site Health and Safety Officer shall be notified and then determine the effect of the failure on site operations. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel shall leave the Exclusion Zone until the situation is evaluated

and appropriate actions taken.

The following emergency escape routes are designated for use in those situations where egress from the Exclusion Zone cannot occur through the decontamination line (attach map if available):
Emergency escape routes shall be determined by the Site Health and Safety Officer on a daily basis depending on site Conditions, wind direction and work areas. Emergency departure shall be upwind, whenever possible.

In all situations, when an onsite emergency results in evacuation of the Exclusion Zone, personnel shall not reenter until:

1. The conditions resulting in the emergency have been corrected.
2. The hazards have been reassessed by the Site Health and Safety Officer.
3. The Site Safety Plan has been reviewed by the Site Health and Safety Officer and Corporate Health and Safety Officer.
4. Site personnel have been briefed on any changes in the Site Safety Plan by the Site Health and Safety Officer.

PART 16 – EMERGENCY INFORMATION

RESOURCE	NAME	PHONE NUMBER
Ambulance	Village of East Aurora	911
Fire Dept.	Village of East Aurora	911
Police	Village of East Aurora	911
Hospital[1]		

1. Hospital shall be contacted and confirmed capable of providing emergency medical assistance, including treatment of individuals suffering from acute hazardous chemical/material exposure.

The name of the Site is: West Falls Machine Co., Inc.

The Site Address is: 11692 E. Main St.
East Aurora, NY

Nearest Cross Roads: NY Route 78

Site Phone Number (or cell phone no.): (716) 870-3325

Directions to Hospital (Mercy Ambulatory Care Center)**(Attach Map):**

1. Turn Right onto U.S. 20A. Drive west for approximately 10 miles.

2. Turn right onto 240/277. Drive north for approximately 2 miles.

3. Bear right onto U.S 20 (Southwestern Blvd.). Hospital is located at 3669 Southwestern Blvd.

Benchmark Contacts:

Corporate Health and Safety Officer:	**Thomas H. Forbes, P.E.** (716) 856-0599 (W) (716) 685-0062 (H)	**Project Manager: Tom Forbes** (716) 856-0599 (W) (716) 685-0062 (H)
Site Health and Safety Officers:	**Jeanne M. Asquith** (716) 856-0635 (W) (716) 652-9646 (H)	**Richard L. Dubisz** (716) 856-0635 (W) (716) 655-7406 (H)

PART 17 – EMPLOYEE ACKNOWLEDGEMENT

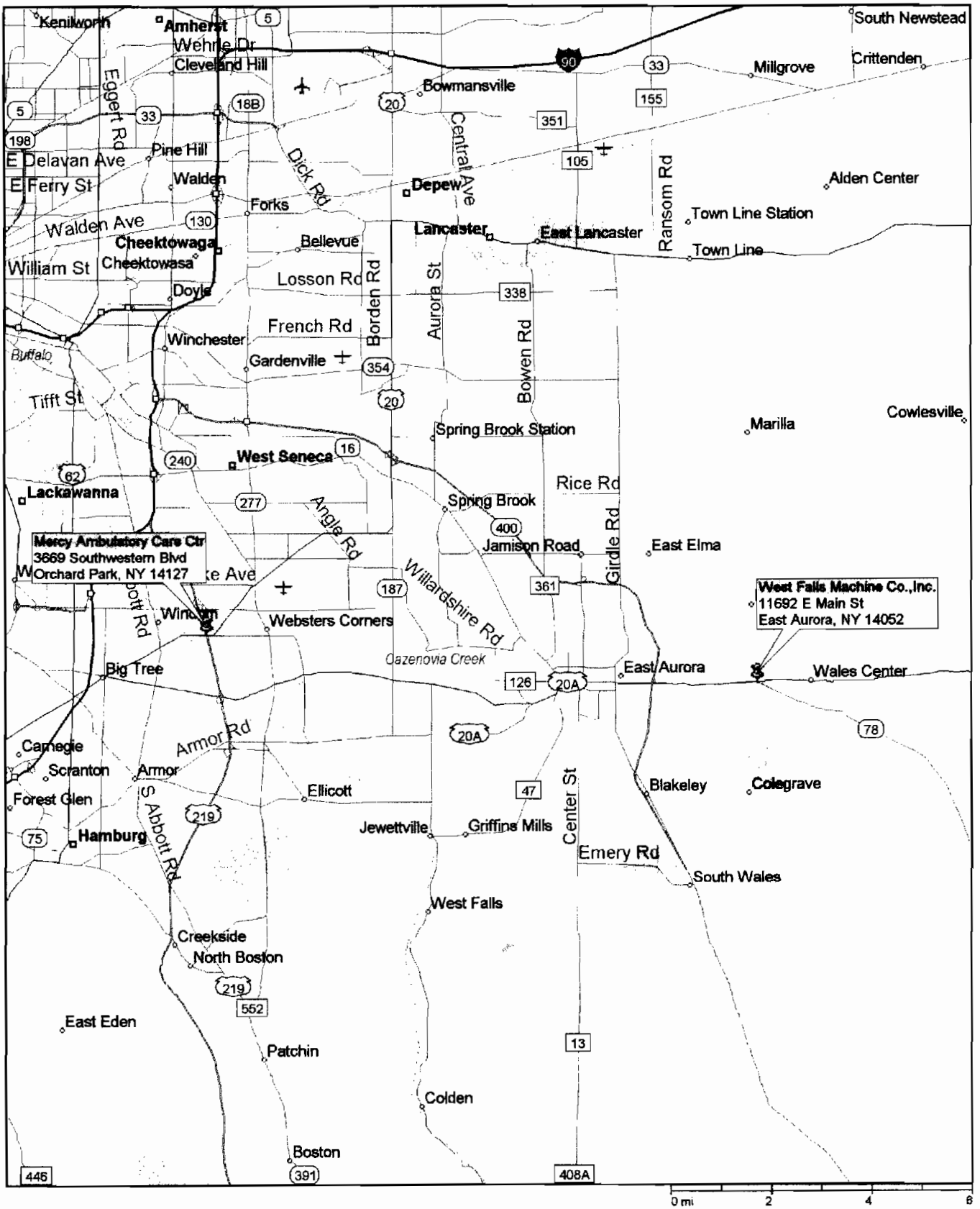
Plan Reviewed by:

Corporate Health and Safety Officer:	Thomas H. Forbes
Project Manager	Thomas H. Forbes
Designated Site Health & Safety Officers	Jeanne M. Asquith

I acknowledge that I have reviewed the information contained in this site-specific Health and Safety Plan, and understand the hazards associated with performance of the field activities described herein. I agree to comply with the requirements of this plan.

NAME (PRINT)	SIGNATURE	DATE
Thomas H. Forbes		
Jeanne M. Asquith		

Figure 1 - Mercy Ambulatory Care Center



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