Work Plan for Natural Attenuation Monitoring

Bush Industries, Inc.
312 Fair Oak Street
Little Valley, New York

Prepared for:

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TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLES

FIGURES

ATTACHMENTS

WORK PLAN FOR NATURAL ATTENUATION MONITORING

Bush Industries, Inc.
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Little Valley, New York

1.0 INTRODUCTION

1.1 BACKGROUND

Geomatrix Consultants, Inc. (Geomatrix) has been retained by Bush Industries, Inc. (Bush Industries) to prepare this Work Plan for Natural Attenuation Monitoring (Work Plan) for the Bush Industries Property (Site) in Little Valley, New York. The location of the Site is shown on Figure 1. This Work Plan is required by and appended to the Amended and Supplemental Order (File No.: 96-07 R9-4314-96-06) agreed to between Bush Industries and the New York State Department of Environmental Conservation (NYSDEC).

The Site is located within the Little Valley Superfund Site (LVSS). The LVSS extends from the Village of Little Valley south to near the City of Salamanca, a distance of approximately 8 miles, and is currently being addressed by the United States Environmental Protection Agency (USEPA). A Remedial Investigation and Feasibility Study (RI/FS) has been prepared for the USEPA culminating in a Record of Decision (ROD) specifying monitored natural attenuation (MNA) as the remedy for TCE contaminated groundwater measured throughout the LVSS.

The USEPA MNA remedy includes groundwater sampling on properties located throughout the LVSS including the Bush Industries property. Bush Industries has agreed to conduct the MNA sampling on its property. This Work Plan describes the procedures to be used by Bush Industries in implementing the MNA sampling at its property.

1.2 SITE DESCRIPTION

The Site is located at 312 Fair Oak Street in the Village of Little Valley, Cattaraugus County, New York. A topographic map of the Site and surrounding area prepared from a 7.5 minute series U.S. Geological Survey map is presented in Figure 1. The parcels comprising the Site have been purchased over a number of years. The Site is situated on a 9.4 acre lot, and contains three contiguous buildings (see Figure 2).

1.3 PREVIOUS SITE INVESTIGATIONS

Bush Industries has conducted an extensive investigation of groundwater conditions at its Site. Results are documented in the report entitled Groundwater Evaluation Report, prepared by Conestoga-Rovers & Associates (CRA) and dated February 21, 2000. The findings presented the Groundwater Evaluation Report are summarized as follows:

1. The highest concentrations of TCE and its degradation products remain in the interior of the Site. There is a residual low level presence of TCE and its degradation products in the interior of the Site with concentrations in groundwater dropping precipitously along the downgradient flow path.

2. Concentrations of TCE at the downgradient perimeter of the Site are approximately equal to or below the New York State Groundwater criterion.

3. Benzene concentrations below method detection limits were estimated to be above the New York State groundwater criteria of 1 ug/L at two interior well locations (MW-D2 and MW-4) where concentrations of 2J (estimated) were reported for the May 1999 sampling event. Benzene was not above the New York State groundwater criteria in any well during the December 1999 sampling event.

4. This distribution trend (rapidly declining concentrations with distance from the interior of the Site) indicates that natural attenuation processes occur limiting constituent migration and the Site does not pose a significant threat to downgradient groundwater quality.

The Groundwater Evaluation Report was approved by NYSDEC by letter dated March 31, 2000.

In May 2000, Bush Industries submitted the Remediation Report prepared by Geomatrix which recommended implementation of a 5-year annual MNA sampling program at the Site. No action was taken with respect to recommendations of the Remediation Report pending completion of the LVSS RI/FS/ and ROD (see Section 1.1).

1.4 PROJECT OBJECTIVES

The objectives of the natural attenuation monitoring are to:

1. Perform annual monitored natural attenuation (MNA) sampling events

2. Evaluate historic and new analytical data to monitor natural attenuation at the Site

2.0 SCOPE OF WORK

The MNA monitoring work to be performed at the Bush Industries Site is specified in the following USEPA documents:

Final Remedial Action Work Plan for the Little Valley Superfund Site
Contract Number:68-W-98-214
Prepared by Tetra Tech EC, Inc.
Dated October 2006

Quality Assurance Project Plan Addendum for the Little Valley Superfund Site
Contract Number:68-W-98-214
Prepared by Tetra Tech EC, Inc.
Dated September 2006

The USEPA Work Plan specifies the following for the Bush Industries Site:

1. Conduct two annual groundwater sampling events for the following wells: MW-D1, MW-D2, MW-2, MW-3, MW-6, and MW-8.

2. Analyze samples for the following MNA analyses: Volatile Organic Chemicals (VOCs), alkalinity, sulfate, sulfide, nitrate, chloride, total organic carbon, ferrous iron, ethane, ethene and methane.

3. Data validation.

4. Data evaluation.

Monitoring well MW-8 was destroyed by a snow plow during the winter of 2005-2006. In accordance with the USEPA Work Plan, this well will be replaced in the program by designated alternate well MW-5 (see Section 3.1.1, below).

The USEPA Work Plan specifies two annual MNA sampling events, the first of which has already been performed (October 2006). The Bush Industries Work Plan presented herein specifies nine annual MNA sampling events at its Site which (counting the October 2006 event conducted by USEPA) will constitute ten consecutive annual sampling events. This is consistent with the recommendations presented in the Bush

Industries Remediation Report (see Section 1.3), except the monitoring period has been extended from 5 annual events to 10 annual events.

3.0 PROJECT TASKS

3.1 CONSISTENCY WITH USEPA WORK PLAN

In order to facilitate direct comparison of the Bush Industries analytical results with results from other wells within the LVSS to be sampled by USEPA, the sampling methods, analytical methods and QA/QC protocols specified by USEPA for the LVSS remediation will be utilized for the Bush Industries MNA monitoring and are incorporated herein.

3.2 TASK 1: GROUNDWATER SAMPLING

3.2.1 Monitoring Wells to be Sampled

The following Bush Industries monitoring wells will be sampled: MW-D1, MW-D2, MW-2, MW-3, MW-6, and MW-5. The rationale for selection of the six Bush Industries monitoring wells to be samples is presented in the USEPA Work Plan referenced above.

3.2.2 Sample Identification System

The sample identification system will be in accordance with the USEPA Work Plan. Sample identification will include LVRA for the Remedial Action MNA Program activities at the LVSS, a two digit number for the sampling event, a five letter code for the type of sampling being performed (MNAGW), and the location name. Sampling events or rounds will be numbered in sequence, as applicable. For example a groundwater sample collected from monitoring well MW-5 at the Bush Industries property for the third sampling event of the MNA program would be identified as "LVRA03-MNAGW-MW5."

Duplicate samples ("blind duplicates") will be "coded" in such a manner that the laboratory will not be able to determine the corresponding original field sample. An explanation of the duplicate "coding" will be written in the field logbook.

3.2.3 Sample Collection

The wells will be sampled using low flow methodology. The following Standard Operating Procedures (SOPs) obtained from the USEPA Work Plan will be used during sample collection:

- SOP # 1: Groundwater Sampling (Low Flow Purge Procedure)

- SOP # 2: Field Parameter Measurement
- SOP # 3: Water Level Measurements
- SOP # 4: Decontamination (Non-disposable Sampling Equipment)
- SOP # 5: Decontamination (Field Instrumentation-Probes, Water Quality Meters)

These SOPs are included in Attachment 1.

3.2.4 Sample Custody

Immediately following sample collection, each sample container will be marked with the following information:

- Sample Identification
- Project Number
- Date/Time
- Sample Type
- Analyses to be performed
- Preservation Method
- Sampler's Initials

After all sample identification information has been recorded, each sample label will be covered with waterproof clear plastic tape to preserve its integrity. All samples will be recorded and tracked under strict chain-of-custody (COC) protocols.

3.3 TASK 2: GROUNDWATER ANALYSES

As indicated above, the analytical parameter list and methods will be in accordance with the USEPA Work Plan. Groundwater samples will be analyzed for the following parameters: VOCs, alkalinity, sulfate, sulfide, nitrate, chloride, total organic carbon, ferrous iron, ethane, ethene and methane. The analytical program is summarized in Table 1 (from the USEPA Work Plan).

Groundwater samples will be analyzed by a laboratory deemed acceptable by NYSDEC. The selected laboratory(ies) will be subject to NYSDEC concurrence prior to being contracted to perform the analyses.

Quality Assurance and Quality Control (QA/QC) protocols will be as described in Section 4.0.

3.4 TASK 3: DATA VALIDATION

The analytical results obtained for the laboratory(ies) will undergo a systematic data validation to provide assurance that the data is adequate for its intended use. The validation will be performed by personnel who have appropriate training and/or experience in performing data validation for the analyses of interest associated with this project.

Validation will be performed based on an evaluation of method specific QC information (such as holding times, calibration records, laboratory and field blanks, duplicate precision, and surrogate and matrix spike recoveries), the most current version of the USEPA Region 2 Data Validation SOPs (www.epa.gov/region02/desa/hsw/sops.htm), the most current version of the EPA National Functional Guidelines (www.epa.gov/superfund/programs/clp/guidance.htm) and the best professional judgment of the validator. If USEPA has not defined acceptance criteria for a specific parameter or methodology (e.g., alkalinity, methane), the data will be reviewed/validated based on an evaluation of method-specific QC data and the best professional judgment of the validator.

Non-conforming QA/QC Results will be evaluated with respect to their implications for data reliability and usability following EPA Region 2 SOPs, EPA National Functional Guidelines and the best professional judgment of the validator. Qualifiers (as applicable) will be added to the data results.

3.5 TASK 4: DATA EVALUATION AND REPORTING

3.5.1 Annual Summary Reports

The results of the Bush Industries annual MNA sampling will be evaluated and reported to the NYSDEC in annual summary reports. These reports will include the following:

- An evaluation of whether natural attenuation is occurring according to expectations (i.e., concentrations are decreasing over time).

- An evaluation of whether expansion of the plume is minimal to nonexistent.

- An evaluation of whether any additional receptors are impacted.

- An evaluation of whether any new releases of contaminants to the environment are detected (i.e. spike in concentrations).

- An evaluation of whether cleanup objective levels are being attained.

- Tables of current and historical volatile organic compounds (VOC) and MNA/water quality sampling data for the monitoring wells and piezometers sampled during the event.

- Maps showing the sampling locations.

- Water Table or piezometeric head maps.

- Time-series plots of VOC concentrations of each of the Bush Industries monitoring wells on individual plots.

- Executive summary, text and conclusions.

3.5.2 Final Report

After completion of the tenth consecutive groundwater MNA sampling event, a Final Report would be submitted to NYSDEC which will assess trends in chemical concentrations and present recommendations concerning:

1. The need for and/or requirements of continued monitoring; and
2. The need for and/or nature of continued prohibitions of on-site groundwater use.

4.0 PROJECT QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance and quality control protocols will be in accordance with the USEPA Quality Assurance Project Plan (USEPA QAPP) referenced in Section 2.0. The QA objectives and QA/QC protocols for the MNA sampling are summarized on the following tables (from the USEPA QAPP).

Table 1. QA Objectives for Field Investigation Data

Table 2. Reference Limits

Table 3. Sample Collection and Analysis Protocols

Table 4. Summary of Analytical QC Procedure Checks, Frequencies, Acceptance Criteria and Corrective actions for Field Screening and Laboratory Sample Analyses

5.0 PROJECT SCHEDULE

The first annual MNA sampling event at the Bush Industries Site was conducted by USEPA in October 2006 in accordance with the USEPA Work Plan and QAPP (and therefore in accordance with this Work Plan). The schedule for completion of the program is as follows:

Activity	*Target Completion Date*
2006 MNA Sampling	October 2006
2007 MNA Sampling	Week of September 24, 2007
2007 Annual Summary Report	90 days after completion of 2007 annual sampling
2008 MNA Sampling	Coincident with USEPA 2008 LVSS MNA Sampling (if conducted)
2008 Annual Summary Report	90 days after completion of 2008 annual sampling
2009 MNA Sampling	Coincident with USEPA 2009 LVSS MNA Sampling (if conducted)
2009 Annual Summary Report	90 days after completion of 2009 annual sampling
2010 MNA Sampling	Coincident with USEPA 2010 LVSS MNA Sampling (if conducted)
2010 Annual Summary Report	90 days after completion of 2010 annual sampling
2011 MNA Sampling	Coincident with USEPA 2011 LVSS MNA Sampling (if conducted)
2011 Annual Summary Report	90 days after completion of 2011 annual sampling
2012 MNA Sampling	Coincident with USEPA 2012 LVSS MNA Sampling (if conducted)
2012 Annual Summary Report	90 days after completion of 2012 annual sampling

2013 MNA Sampling	Coincident with USEPA 2013 LVSS MNA Sampling (if conducted)
2013 Annual Summary Report	90 days after completion of 2013 annual sampling
2014 MNA Sampling	Coincident with USEPA 2014 LVSS MNA Sampling (if conducted)
2014 Annual Summary Report	90 days after completion of 2014 annual sampling
2015 MNA Sampling	Coincident with USEPA 2015 LVSS MNA Sampling (if conducted)
Final Report	90 days after completion of 2015 annual sampling

TABLE 1

QA OBJECTIVES FOR FIELD INVESTIGATION DATA
BUSH INDUSTRIES SITE

Parameter	*Measurement*	*Matrix*	*Method*	*Units*	*Precision*	*Accuracy*	*PQL or Sensitivity*	*Completeness*
Water Level	Screening	Aqueous	Direct Field Measurement	feet	± 0.01	N/A	± 0.01	95%
pH	Screening	Aqueous	Direct Field Measurement	Std. Units	± 0.1	N/A	± 0.1	95%
Temperature	Screening	Aqueous	Direct Field Measurement	°C	± 0.1	N/A	± 0.1	95%
Specific Conductivity	Screening	Aqueous	Direct Field Measurement	umhos/cm or mS/cm	± 1% of full scale*	N/A	± 0.001	95%
Dissolved Oxygen	Screening	Aqueous	Direct Field Measurement	mgO_2/L	± 3%	N/A	± 0.1	90%
Oxidation-Reduction Potential	Screening	Aqueous	Direct Field Measurement	mV	± 10	N/A	± 1	90%
Turbidity	Screening	Aqueous	Direct Field Measurement	NTU	± 2	N/A	± 2	90%
Low Concentration TCL VOCs	Definitive	Aqueous	SOM01.1	µg/L	Compound Specific (± 24% RPD; advisory)	Compound Specific (59 - 172%R)	Compound Specific (0.5-20 µg/L); see Table 3-6	90%
Total Organic Carbon	Definitive	Aqueous	SW-846 method 9060	mg/L	± 25% RPD	N/A	1 mg/L	90%
Alkalinity	Definitive	Aqueous	MCAWW Method 310.1	mg/L	± 25% RPD	N/A	1 mg/L	90%
Sulfate	Definitive	Aqueous	EPA 300.1	mg/L	± 20% RPD	75-125%R	1 mg/L	90%

TABLE 1

QA OBJECTIVES FOR FIELD INVESTIGATION DATA
BUSH INDUSTRIES SITE

Parameter	*Measurement*	*Matrix*	*Method*	*Units*	*Precision*	*Accuracy*	*PQL or Sensitivity*	*Completeness*
Sulfide	Definitive	Aqueous	MCAWW Method 376.1	mg/L	± 25% RPD	N/A	1 mg/L	95%
Nitrate	Definitive	Aqueous	EPA 300.1	mg/L	± 20% RPD	75-125%R	0.05 mg/L	90%
Chloride	Definitive	Aqueous	EPA 300.1	mg/L	± 20% RPD	75-125%R	1 mg/L	90%
Ferrous Iron	Definitive	Aqueous	Std. Methods 3500Fe-D	µg/L	± 25% RPD	N/A	10 µg/L	90%
Ethane	Definitive	Aqueous	GC/FID (SW-846 Method 3810)	µg/L	± 25% RPD	N/A	5 µg/L	90%
Ethene	Definitive	Aqueous	GC/FID (SW-846 Method 3810)	µg/L	± 25% RPD	N/A	5 µg/L	90%
Methane	Definitive	Aqueous	GC/FID (SW-846 Method 3810)	µg/L	± 25% RPD	N/A	5 µg/L	90%

NOTES:
Method References:
SOM01.1 = USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organics (May 2005 or latest revision).
MCAWW = Methods for Chemical Analysis of Water and Wastes, March 1983.
Std. Methods = Standard Methods for the Examination of Water and Wastewater, 20th Edition (January 2000).
SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (November 1986, revised through November 2000 via updates I through IVB).
EPA 300.1 = Determination of Inorganic Anions in Drinking Water by Ion Chromatography, Revision 1 (27 April 1999).
Acronyms/abbreviations include:

%R = Percent Recovery	GC = Gas Chromatograph
FID = Flame Ionization Detector	NTU = Nephelometric Turbidity Units
N/A = Not Applicable	RPD = Relative Percent Difference
PQL = Practical Quantitation Limit	SD = Standard Deviation
VOCs = Volatile Organic Compounds	TCL = Target Compound List

*Precision dependent on meter and scale.

TABLE 2

REFERENCE LIMITS
BUSH INDUSTRIES SITE

Analyte	*CAS Number*	*Project Screening Criteria/Action Limit*	*Project Quantitation Limit*
LOW CONCENTRATION TCL VOCs (µg/L)			
Dichlorodifluoromethane	75-71-8	-- (EPA MCL); 5 (NYSDEC)	0.5
Chloromethane	74-87-3	-- (EPA MCL); 5 (NYSDEC)	0.5
Vinyl Chloride	75-01-4	2 (EPA MCL); 2 (NYSDEC)	0.5
Bromomethane	74-83-9	-- (EPA MCL); 5 (NYSDEC)	0.5
Chloroethane	75-00-3	-- (EPA MCL); 5 (NYSDEC)	0.5
Trichlorofluoromethane	75-69-4	-- (EPA MCL); 5 (NYSDEC)	0.5
1,1-Dichloroethene	75-35-4	7 (EPA MCL); 2 (NYSDEC)	0.5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	-- (EPA MCL); 5 (NYSDEC)	0.5
Acetone	67-64-1	-- (EPA MCL); 50 (NYSDEC)	5
Carbon Disulfide	75-15-0	-- (EPA MCL); 60 (NYSDEC)	0.5
Methyl Acetate	79-20-9	-- (EPA MCL); -- (NYSDEC)	0.5
Methylene Chloride	75-09-2	5 (EPA MCL); 5 (NYSDEC)	0.5
trans-1,2-Dichloroethene	156-60-5	100 (EPA MCL); 5 (NYSDEC)	0.5
Methyl ter-Butyl Ether	1634-04-4	20 (EPA MCL); 10 (NYSDEC)	0.5
1,1-Dichloroethane	75-34-3	-- (EPA MCL); 5 (NYSDEC)	0.5
cis-1,2-Dichloroethene	156-59-2	70 (EPA MCL); 5 (NYSDEC)	0.5
2-Butanone	78-93-3	-- (EPA MCL); 50 (NYSDEC)	5
Chloroform	67-66-3	80 (EPA MCL); 7 (NYSDEC)	0.5
1,1,1-Trichloroethane	71-55-6	200 (EPA MCL); 5 (NYSDEC)	0.5
Cyclohexane	110-82-7	-- (EPA MCL); -- (NYSDEC)	0.5
Carbon Tetrachloride	56-23-5	5 (EPA MCL); 5 (NYSDEC)	0.5
Benzene	71-43-2	5 (EPA MCL); 1 (NYSDEC)	0.5
1,2-Dichloroethane	107-06-2	5 (EPA MCL); 0.6 (NYSDEC)	0.5
1,4-Dioxane	123-91-1	-- (EPA MCL); -- (NYSDEC)	20
Trichloroethene	79-01-6	5 (EPA MCL); 5 (NYSDEC)	0.5
Methylcyclohexane	108-87-2	-- (EPA MCL); -- (NYSDEC)	0.5

TABLE 2

REFERENCE LIMITS
BUSH INDUSTRIES SITE

Analyte	*CAS Number*	*Project Screening Criteria/Action Limit*	*Project Quantitation Limit*
LOW CONCENTRATION TCL VOCs (µg/L) (continued)			
1,2-Dichloropropane	78-87-5	5 (EPA MCL); 1 (NYSDEC)	0.5
Bromodichloromethane	75-27-4	80 (EPA MCL); 50 (NYSDEC)	0.5
cis-1,3-Dichloropropene	10061-01-5	-- (EPA MCL); 0.4 (NYSDEC)	0.5
4-Methyl-2-Pentanone	108-10-1	-- (EPA MCL); -- (NYSDEC)	5
Toluene	108-88-3	1000 (EPA MCL); 5 (NYSDEC)	0.5
trans-1,3-Dichloropropene	10061-02-6	-- (EPA MCL); 0.4 (NYSDEC)	0.5
1,1,2-Trichloroethane	79-00-5	5 (EPA MCL); 1 (NYSDEC)	0.5
Tetrachloroethene	127-18-4	5 (EPA MCL); 5 (NYSDEC)	0.5
2-Hexanone	591-78-6	-- (EPA MCL); 50 (NYSDEC)	5
Dibromochloromethane	124-48-1	80 (EPA MCL); 50 (NYSDEC)	0.5
1,2-Dibromoethane	106-93-4	-- (EPA MCL); -- (NYSDEC)	0.5
Chlorobenzene	108-90-7	100 (EPA MCL); 5 (NYSDEC)	0.5
Ethylbenzene	100-41-4	700 (EPA MCL); 5 (NYSDEC)	0.5
o-Xylene	95-47-6	-- (EPA MCL); 5 (NYSDEC)	0.5
m,p-Xylene	108-38-3 / 106-42-3	-- (EPA MCL); 5 (NYSDEC)	0.5
Styrene	100-42-5	100 (EPA MCL); 5 (NYSDEC)	0.5
Bromoform	75-25-2	80 (EPA MCL); 50 (NYSDEC)	0.5
Isopropylbenzene	98-82-8	-- (EPA MCL); 5 (NYSDEC)	0.5
1,1,2,2-Tetrachloroethane	79-34-5	-- (EPA MCL); 5 (NYSDEC)	0.5
1,3-Dichlorobenzene	541-73-1	-- (EPA MCL); 3 (NYSDEC)	0.5
1,4-Dichlorobenzene	106-46-7	75 (EPA MCL); 3 (NYSDEC)	0.5
1,2-Dichlorobenzene	95-50-1	600 (EPA MCL); 3 (NYSDEC)	0.5
1,2-Dibromo-3-chloropropane	96-12-8	0.2 (EPA MCL); 0.04 (NYSDEC)	0.5
1,2,4-Trichlorobenzene	120-82-1	70 (EPA MCL); 5 (NYSDEC)	0.5
1,2,3-Trichlorobenzene	87-61-6	-- (EPA MCL); 5 (NYSDEC)	0.5

TABLE 2

REFERENCE LIMITS
BUSH INDUSTRIES SITE

Analyte	*Project Screening Criteria/Action Limit*	*Project Quantitation Limit*
WQ/MNA PARAMETER		
Total Organic Carbon (mg/L)	NC (EPA MCL); NC (NYSDEC); >20 (MNA Tech Protocol)	1
Alkalinity (mg/L)	NC (EPA MCL); NC (NYSDEC); >2x background (MNA Tech Protocol)	1
Sulfate (mg/L)	250* (EPA MCL); 250 (NYSDEC); >20 (MNA Tech Protocol)	1
Sulfide (mg/L)	NC (EPA MCL); NC (NYSDEC); >1 (MNA Tech Protocol)	1
Nitrate (mg/L)	10 (EPA MCL); 10 (NYSDEC); <1 (MNA Tech Protocol)	0.05
Chloride (mg/L)	250* (EPA MCL); 250 (NYSDEC); >2x background (MNA Tech Protocol)	1
Ferrous Iron (µg/L)	NC (EPA MCL); NC (NYSDEC); >1 (MNA Tech Protocol)	10
Methane (µg/L)	NC (EPA MCL); NC (NYSDEC); >0.5 (MNA Tech Protocol)	5
Ethane (µg/L)	NC (EPA MCL); NC (NYSDEC); >0.01 (MNA Tech Protocol)	5
Ethene (µg/L)	NC (EPA MCL); NC (NYSDEC); >0.01 (MNA Tech Protocol)	5

NOTES:
*indicates value is a secondary drinking water regulation criterion.
NC indicates no criteria available.
EPA Criteria from 2004 Edition of the Drinking Water Standards and Health Advisories. EPA 822-R-04-005. Winter 2004.
NYSDEC Values are from Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, June 1998; Errata Sheet for the June 1998 TOGS 1.1.1, January 1999; and April 2000 Addendum to the June 1998 TOGS 1.1.1, April 2000.
MNQA Tech Protocol values are from Wiedemeier, T., M. Swanson, et.al. Technical Protocol for Evaluating Naturral Atetnuation of Chlorinated Solvents in Ground Water. EPA/600/R-98/128. September 1998.

TABLE 3

SAMPLE COLLECTION AND ANALYSIS PROTOCOLS
BUSH INDUSTRIES SITE

Sample Type	*Matrix*	*Sampling Device*	*No. of Samples* [1][2]	*Parameter*	*Sample Container* [3][4]	*Sample Preservation*	*Analytical Method* [5]	*PQL*	*Holding Time* [6]
Groundwater	Water	Positive Displacement Submersible Pump	6	pH; temperature; specific conductivity DO; ORP; turbidity [Field Screening]	NA	NA	Direct Field Measurement Following SOP	NA	Analyze Immediately
			6	Low Concentration TCL Volatile Organic Compounds [CLP Lab]	(4) 40 mL VOA vials w/Teflon lined septum	1:1 HCl to pH<2; Cool to 4°C	SOM01.1	Compound specific (0.5 - 20 µg/L)	10 days
			6	Total Organic Carbon [DESA Lab]	(1) L amber glass	H_2SO_4 to pH<2; Cool to 4°C	SW-846 Method 9060	1 mg/L	28 days*
			6	Alkalinity [DESA Lab]	(1) 1 L polyethelyene	Cool to 4°C	MCAWW Method 310.1	1 mg/L	14 days*
			6	Sulfate [DESA Lab]	(1) 1 L polyethelyene	Cool to 4°C	EPA 300.1	1 mg/L	28 days*
			6	Sulfide [DESA Lab]	(1) 1 L polyethelyene	NaOH to pH >12; 4 drops of zinc acetate per liter; Cool to 4°C	MCAWW Method 376.1	1 mg/L	7 days*
			6	Nitrate [DESA Lab]	(1) 1 L polyethelyene	Cool to 4°C	EPA 300.1	0.05 mg/L	48 hours*
			6	Chloride [DESA Lab]	(1) 1 L polyethelyene	Cool to 4°C	EPA 300.1	1 mg/L	28 days*
			6	Ferrous Iron [Sub Lab]	(1) 100 mL amber glass	2mL HCl; Cool to 4°C	Std. Methods Method 3500Fe-D	10 µg/L	24 hours*
			6	Ethane [Sub Lab]	(5) 40-mL VOA vials w/Teflon lined septum	Cool to 4°C	GC/FID (SW-846 Method 3810)	5 µg/L	7 days*
			6	Ethene [Sub Lab]	(5) 40-mL VOA vials w/Teflon lined septum	Cool to 4°C	GC/FID (SW-846 Method 3810)	5 µg/L	7 days*
			6	Methane [Sub Lab]	(5) 40-mL VOA vials w/Teflon lined septum	Cool to 4°C	GC/FID (SW-846 Method 3810)	5 µg/L	7 days*

TABLE 3

SAMPLE COLLECTION AND ANALYSIS PROTOCOLS
BUSH INDUSTRIES SITE

Sample Type	*Matrix*	*Sampling Device*	*No. of Samples* [1][2]	*Parameter*	*Sample Container* [3][4]	*Sample Preservation*	*Analytical Method* [5]	*PQL*	*Holding Time* [6]
Field Blank	Water	Collected Rinsate Passed Over/Through Sampling Equipment	1	Low Concentration TCL Volatile Organic Compounds [CLP Lab]	(4) 40-mL VOA vials w/Teflon lined septum	1:1 HCl to pH<2; Cool to 4°C	SOM01.1	Compound specific (0.5 - 20 µg/L)	10 days
Trip Blank	Water	Direct Fill of Sample Bottles	1	Low Concentration TCL Volatile Organic Compounds [CLP Lab]	(4) 40-mL VOA vials w/Teflon lined septum	1:1 HCl to pH<2; Cool to 4°C	SOM01.1	Compound specific (0.5 - 20 µg/L)	10 days
			6	Ethane [Sub Lab]	(5) 40-mL VOA vials w/Teflon lined septum	Cool to 4°C	GC/FID (SW-846 Method 3810)	5 µg/L	7 days*
			6	Ethene [Sub Lab]	(5) 40-mL VOA vials w/Teflon lined septum	Cool to 4°C	GC/FID (SW-846 Method 3810)	5 µg/L	7 days*
			6	Methane [Sub Lab]	(5) 40-mL VOA vials w/Teflon lined septum	Cool to 4°C	GC/FID (SW-846 Method 3810)	5 µg/L	7 days*

NOTES:
1. The number in parentheses in the "No. of Samples" column denotes the number of duplicate samples.
2. The number of field, trip and DI water blanks is estimated based on the approixmate number of days in the field for each type of sampling during the MNA Program events.
3. The number in parentheses in the "Sample Container" column denotes the number of containers needed. Additional volume must be sent for laboratory QA/QC sample analyses.
4. All bottles will comply with OSWER Directive 9240.0-05A: "Sepcifications and Guidance for Obtaining Contaminant-Free Sample Containers", EPA 540/R-93/051, December 1992.
5. Method References:
   SOM01.1 = USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organics (May 2005 or latest revision).
   MCAWW = Methods for Chemical Analysis of Water and Wastes, March 1983.
   Std. Methods = Standard Methods for the Examination of Water and Wastewater, 20th Edition (January 2000).
   SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (November 1986, revised through November 2000 via Updates I through IVB).
   EPA300.1 = Determination of Inorganic Anions in Drinking Water by Ion Chromatography, Revision I (27 April 1999).
   EPA/600/R-98128 = Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater (September 1998).
6. All holding times listed are from Verified Time of Sample Receipt (VTSR) unless noted otherwise (* denotes from time of sample collection).
7. Acronyms/Abbreviations used:
   CLP = Contract Laboratory Program
   DESA = Division of Environmental Science and Assessment
   DO = Dissolved Oxygen
   ORP = Oxidation-Reduction Potential
   PQL = Practical Quantitation Limit
   Sub Lab = Non-RAS Subcontract Laboratory
   TCL = Target Compound List
   VOA = Voalitle Organic Analysis

TABLE 4

SUMMARY OF ANALYTICAL QC PROECDURE CHECKS, FREQUENCIES, ACCEPTANCE CRITERIA, AND CORRECTIVE ACTIONS FOR FIELD SCREENING AND LABORATORY SAMPLE ANALYSES
BUSH INDUSTRIES SITE

Parameter	*Method*	*QC Procedure*	*Data Quality Indicators (DQIs)*	*Frequency*	*Acceptance Criteria*	*Corrective Action*
Total Organic Carbon	SW-846 Method 9060	Method Blank	Accuracy	1 per event	no constituent >CRQL	suspend analysis until source rectified
		Laboratory Duplicate Sample	Precision	1 per event	± 25% RPD	reanalyze
Alkalinity	MCAWW Method 310.1	Method Blank	Accuracy	1 per event	no constituent >CRQL	suspend analysis until source rectified
		Laboratory Duplicate Sample	Precision	1 per event	± 25% RPD	reanalyze
Sulfide	MCAWW Method 376.1	Method Blank	Accuracy	1 per event	no constituent >CRQL	suspend analysis until source rectified
		Laboratory Duplicate Sample	Precision	1 per event	± 25% RPD	reanalyze
Sulfate, Nitrate, Chloride	EPA 300.1	Laboratory Reagent Blank	Accuracy	1 per event	no analyte >PQL	suspend analysis until source rectified
		Laboratory Fortified Blank	Accuracy	1 per event	85 - 115%R (unless MRL <10xPQL, then 75 - 125%)	check calculations, suspend analysis until source rectified
		Laboratory Fortified Sample Matrix	Accuracy	1 per event	75 - 125%R	quality outliers as "matrix induced bias"
		Surrogate Compounds	Accuracy	all samples	90 - 115%R	reanalyze affected samples
		Laboratory Duplicate Sample	Precision	1 per event or 1 per analysis batch	±20% RPD (MRL to 10x MRL); ±10% RPD (10x MRL to highest calibration level)	qualify affected samples
Ferrous Iron	Std. Methods (3500Fe-D)	Method Blank	Accuracy	1 per event	no constituent >CRQL	suspend analysis until source rectified
		Laboratory Duplicate Sample	Precision	1 per event	± 25% RPD	reanalyze

TABLE 4

SUMMARY OF ANALYTICAL QC PROECDURE CHECKS, FREQUENCIES, ACCEPTANCE CRITERIA, AND CORRECTIVE ACTIONS FOR FIELD SCREENING AND LABORATORY SAMPLE ANALYSES BUSH INDUSTRIES SITE

Parameter	*Method*	*QC Procedure*	*Data Quality Indicators (DQIs)*	*Frequency*	*Acceptance Criteria*	*Corrective Action*
Methane, Ethane, Ethene	GC/FID (SW-846 Method 3810)	Method Blank	Accuracy	1 per event	no constituent >CRQL	suspend analysis until source rectified
		Laboratory Duplicate Sample	Precision	1 per event	± 25% RPD	reanalyze
Low Concentration TCL VOCs	OLC03.2	Method Blank	Accuracy	1 every 12 hours	no constituent >CRQL	suspend analysis until source rectified
		Deuterated Monitoring Compounds	Accuracy	all samples	compound specific (full range: 37 - 171%R)	check calculations and instruments, reanalyze affected samples
		Internal Standards	Accuracy; Sensitivity	all samples	± 40% of response area; ± 20 sec retention time shift	check calculations and instruments, reanalyze affected samples
		Matrix Spike/Matrix Spike Duplicate (optional; not required for EPA Region 2	Accuracy; Precision	if requested, then 1 per event	advisory; compound specific (full range: 61 - 145%R, ±14%RPD)	flag outliers

NOTES:

Method References:

SOM01.1 = USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organics (May 2005 or latest revision).
MCAWW = Methods for Chemical Analysis of Water and Wastes, March 1983.
Std. Methods = Standard Methods for the Examination of Water and Wastewater, 20th Edition (January 2000).
SW-846 = Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (November 1986, revised through November 2000 via Updates I through IVB).
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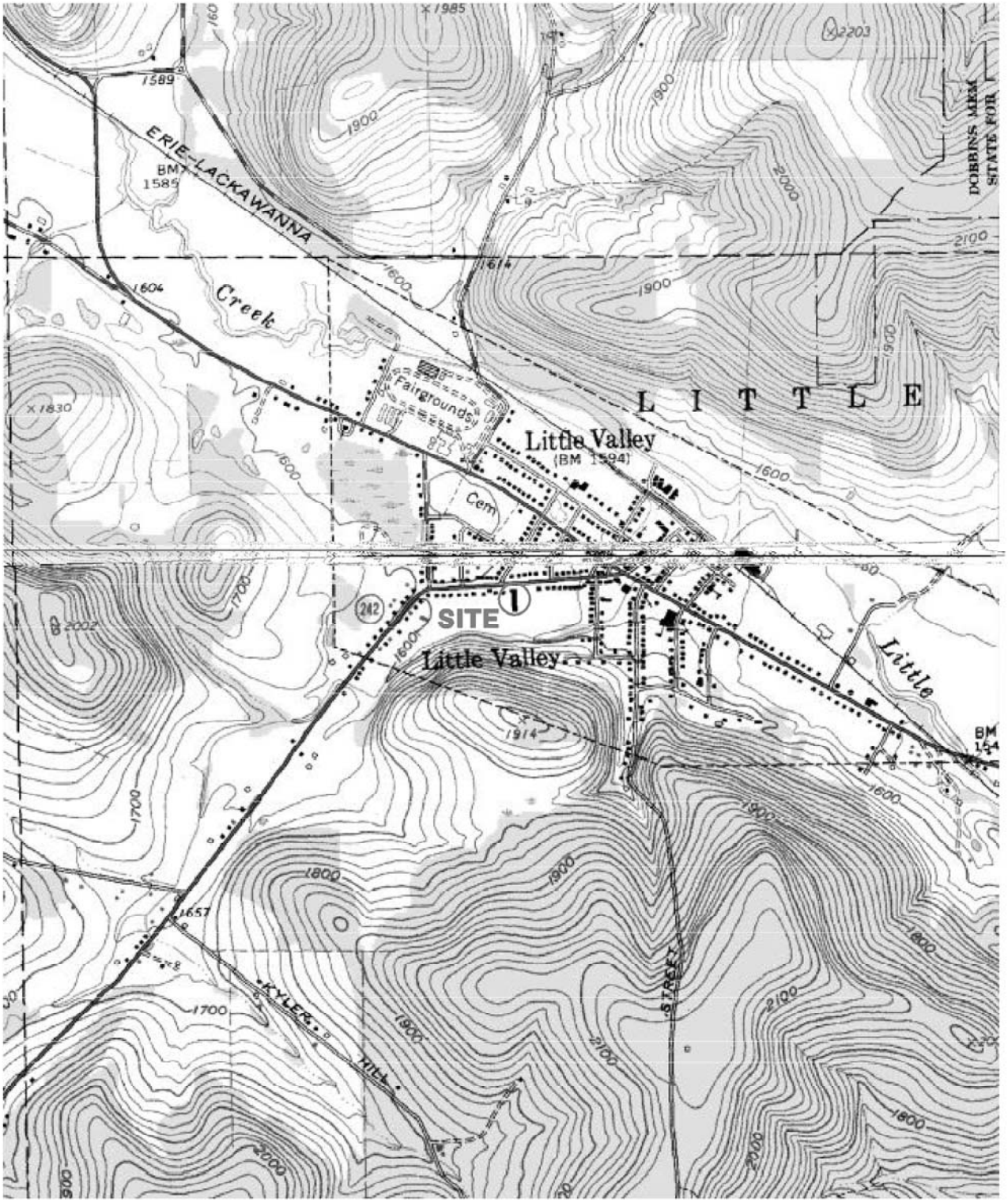
EPA/600/R-98128 = Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater (September 1998).

Acronyms/Abbreviations used:

%R = Percent Recovery
CRQL = Contract Required Quantitation Limit
MRL = Minimum Reporting Level
PQL = Practical Quantiation Limits
RPD = Relative Percent Difference
SD = Standard Deviation
TCL = Target Compound List
VOCs = Volatile Organic Compounds



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GEOMATRIX

SITE LOCATION
BUSH INDUSTRIES
LITTLE VALLEY, NEW YORK

Project No.
6191

Figure
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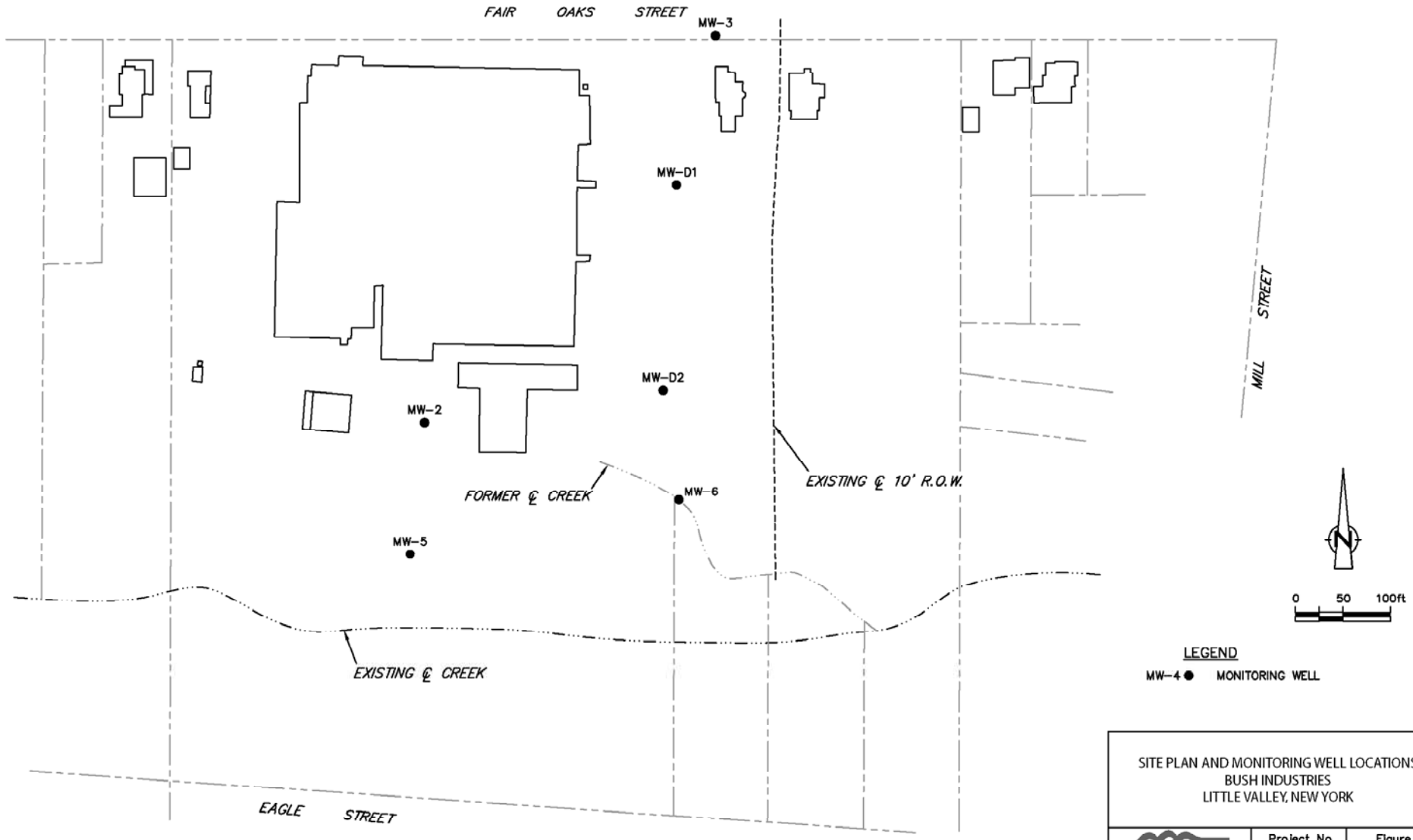

SITE PLAN AND MONITORING WELL LOCATIONS
BUSH INDUSTRIES
LITTLE VALLEY, NEW YORK

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ATTACHMENT A

STANDARD OPERATING PROCEDURES

SOP #1 **Groundwater Sampling [Low Flow Purge Procedure]**
SOP #2 **Field Parameter Measurement**
SOP #3 **Water Level Measurements**
SOP #4 **Decontamination [Non-disposable Chemical Sampling Equipment]**
SOP #5 **Decontamination [Field Instrumentation - Probes, Water Quality Meters, etc.]**

Groundwater Sampling [Low Flow Purge Procedure] (SOP #1)

1. Check and record the condition of the well for any damage or evidence of tampering.

2. Remove the well cap.

3. Measure well headspace with a PID or FID and record the reading in the field logbook.

4. Measure the depth to water as stated in SOP#3, and record the measurement in the field logbook. Do not measure the depth to the bottom of the well at this time (to avoid disturbing any sediment that may have accumulated); see Step 18.

5. Lay out plastic sheeting and place the monitoring, purging and sampling equipment on the sheeting. To avoid cross-contamination, do not let any downhole equipment touch the ground.

6. Re-check and record the depth to water after approximately 5 minutes at the well location. If the measurement has changed more than 0.01 foot, check and record the measurement again, then begin well purging.

7. Attach and secure the Teflon-lined polyethylene tubing to the low-flow submersible pump. As the pump is slowly lowered into the well, secure the safety drop cable, tubing, and electrical lines to each other using nylon stay-ties placed approximately 5 feet apart.

8. Set the pump at approximately the middle of the screen and/or the best depth based on the stratigraphy of the well. Be careful not to place the pump intake less than 2 feet above the bottom of the well as this may cause mobilization of any sediment present in the bottom of the well.

9. Start pumping the well at 0.2 to 0.5 liters per minute.

10. Monitor the water level in the well periodically during pumping - ideally the pump rate should equal the well recharge rate with little or no water level drawdown in the well (drawdown shall be 0.3 foot or less). There should be at least 1 foot of water over the pump intake so there is no risk of the pump suction being broken, or entrapment of air in the sample. Record the pumping rate adjustments and depth(s) to water in the logbook. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump (0.1 to 0.2 liters per minute) to avoid purging the well dry. However, if the recharge rate of the well is very low and the well is purged dry, then wait until the well has recharged to a sufficient level and collect the appropriate volume of sample with the submersible pump.

11. Purge the well at a low flow rate (from 0.2 to 0.5 liters per minute). During purging, monitor the field parameters (temperature, pH, turbidity, ORP, specific conductivity, and DO) approximately every 3 to 5 minutes. A flow-through cell will be used to monitor the field parameters (SOP #2). Begin measuring field parameters after the flow-through cell has been "flushed" with groundwater twice.

Groundwater Sampling [Low Flow Purge Procedure] (SOP #1) [cont'd]

12. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings, as follows:

    - 0.1 for pH
    - 3 percent for specific conductance
    - 10 percent for dissolved oxygen
    - 10 percent for turbidity
    - 10 mV for Eh

    Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

13. Once the field parameters have stabilized, collect the samples directly from the end of the tubing. Volatiles and analyses that degrade by aeration must be collected first.

14. Fill the sample bottles by allowing the pump discharge to flow gently down the inside of the bottle with minimal turbulence. Cap each bottle as it is filled.

15. Preserve and label the samples, and record them on the chain of custody. Place immediately into a cooler for shipment and maintain at 4°C.

16. The filling and preservation procedures will be:

    - VOCs - Determine the amount of 1:1 HCl preservative required to adjust the pH of the sample to less than 2 in an extra 40 ml glass vial. Add this volume to the empty 40 ml vials prior to sampling. Fill each container with sample to just overflowing so that no air bubbles are entrapped inside. If effervescence occurs, submit the sample without preservative and note on the chain of custody form.

    - Other Parameters - Fill each container and preserve immediately as required. To test for pH, pour a minimal portion of sample onto broad range pH paper to verify that the appropriate pH level has been obtained.

17. Carefully remove the pump assembly from the well. The Teflon-lined polyethylene tubing will be dedicated to each well. The tubing should be placed in a large plastic garbage bag, sealed, and labeled with the appropriate well identification number.

Groundwater Sampling [Low Flow Purge Procedure] (SOP #1) [cont'd]

18. After sampling is complete, measure the total depth of the well.

19. Close and lock the well.

Field Parameter Measurement (SOP #2)

Field parameters will be monitored during purging of the monitoring wells and prior to surface water sampling, utilizing a Horiba® U-22 water quality meter or equivalent. Measurements will be conducted in accordance with the manufacturer's instructions and the following procedure:

1. Calibrate the water quality meter as per manufacturer's instructions.

2. For low flow purging of the monitoring wells:

   - Attach a flow-through cell to the Teflon-lined polyethylene tubing. Position the water quality meter probe in the flow-through cell. Begin purging the monitoring well, following SOP#1.

   - After the cell has been "flushed" at least twice, begin monitoring the field parameters, and continue approximately every 3 to 5 minutes during purging. All water quality measurements will be recorded in the appropriate field logbook or on a well purge data sheet.

   - When the indicator parameters have stabilized for three consecutive readings (see Step 12 of SOP #1), the well is considered stabilized and ready for sample collection. Remove the flow-through cell from the tubing.

3. For surface water sampling, measure field parameters immediately prior to sample collection by positioning the probe directly in the water body.

4. Decontaminate the probe of the water quality meter between wells/surface water locations (SOP #5).

5. Record water quality measurements in the appropriate field logbook, noting well identification or surface water location, sample date and time, and observations.

Water Level Measurements (SOP #3)

1. Prior to the commencement of measurements, check the electronics of the water level indicator with a jar of water.

2. Slowly lower the probe portion of the water level indicator into the monitoring well. The electronic water level indicator must have ruler markings on the cable in increments of 0.01 foot or less.

3. Suspend lowering the probe when the light and/or buzzer signals contact with the top of water.

4. Carefully measure the groundwater level at the established reference point, normally identified by a painted mark at one point on the upper edge of the inner well casing.

5. Record the measurement in the field logbook, along with the well identification, date and time, and weather conditions.

6. Decontamination the water level indicator cable, tape and probe between wells (SOP #5).

Decontamination [Non-disposable Chemical Sampling Equipment] (SOP #4)

Decontamination of non-disposable sampling equipment used to collect samples for chemical analyses (i.e., scoops, trowels, bowls, split-spoons, etc.) will be conducted as described below:

1. Alconox detergent and potable water scrub.

2. Potable water rinse.

3. 10 percent nitric acid rinse (ultra pure grade) when sampling for inorganics. Carbon steel split-spoons will be rinsed with a 1 percent nitric acid solution to avoid stripping of metals.

4. Deionized water rinse.

5. Methanol rinse followed by a hexane rinse (solvents are pesticide grade or better) for equipment involved in the sampling of organics.

6. Deionized water rinse (volume at least five times amount of solvent used in rinse step above).

7. Air dry.

8. Wrap or cover exposed ends of equipment with aluminum foil for transport and handling.

Decontamination of sampling equipment will be kept to a minimum in the field and, wherever possible, dedicated disposable sampling equipment will be used. Decontamination fluids will be stored in DOT-approved 55-gallon drums or in an on-site storage tank (liquids only) until disposal. Personnel directly involved in equipment decontamination will wear appropriate protective clothing, as stated in the HASP.

Decontamination [Field Instrumentation - Probes, Water Quality Meters, etc.] (SOP #5)

Field instrumentation (such as interface probes, water quality meters, etc.) will be decontaminated between sample locations by rinsing with deionized water. If visible contamination still exists on the equipment after the rinse, an Alconox detergent scrub will be added, and the probe thoroughly rinsed again.

Any decontamination fluids generated will be stored in DOT-approved 55-gallon drums or in an on-site storage tank (liquids only) until disposal. Personnel directly involved in equipment decontamination will wear appropriate protective clothing, as stated in the HASP.