ENVIRONMENTAL GROUP, INC.
ENGINEERING, ARCHITECTURE & SURVEYING, PC

DYNAMIC SYSTEMS, INC.

SUPPLEMENTARY SITE INVESTIGATION-PHASE II WORK PLAN

DEC SITE NO. 442040-P

TOWN OF POESTENKILL
RENSSELAER COUNTY, NEW YORK

Prepared for:

Dynamic Systems, Inc.
323 State Route 355
Poestenkill, New York 12140

Prepared by:

Spectra Environmental Group, Inc.
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June 2014
Spectra Project No. 11124

DYNAMIC SYSTEMS, INC.
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TOWN OF POESTENKILL, RENSSELAER COUNTY, NEW YORK
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PROFESSIONAL ENGINEER'S CERTIFICATION

I hereby certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Frank R. Peduto, PE

PE License No. 052728-1

Date: June 23, 2014

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1.0 INTRODUCTION

On behalf of Dynamic Systems, Inc. (DSI) located at 323 State Route 355 in Poestenkill, New York, Spectra Environmental Group, Inc. is submitting this Supplementary Site Investigation-Phase II Work Plan (SSI-2) for review and approval.

Information reviewed prior to the investigation includes the Phase I Environmental Site Assessment (September 2010), the Phase II Site Investigation Report, with addendum (December 2010), conducted by GaiaTech Inc.; the monthly and quarterly well monitoring result; and the most recent Supplemental Site Investigation-Phase I (SSI-1) Report (January 2014 and April 2014 (revised)) using the “Membrane Interface Probe” (MIP) technology conducted in November 2013.

Over the course of the last two years, groundwater monitoring has shown increases in the TCE concentration in one primary downgradient well (MW-3). In light of those results, and consistent with DSI’s desire to be proactive, a supplemental investigation was initiated. The Supplemental Site Investigation (SSI-1) was conducted in accordance with the September 23, 2013 Investigation Plan submitted to and approved by the NYSDEC on September 26, 2013.

The results of the investigation were presented in the SSI-1 report dated January 9, 2014. After NYSDEC review and comments, the report was revised and resubmitted on April 15, 2014. Based on the SSI-1 and its qualitative findings, this SSI-2 work plan is submitted for NYSDEC review and approval.

1.1 SITE LOCATION, PHYSICAL SETTING

The one acre site (Site) is located on the 82 acre property at 323 State Route 355, Poestenkill, New York (See Figure 1 – Site Location Map). The Site is developed with an approximate 29,000 square foot light industrial building. The building contains offices, production areas, testing areas, a painting room, a machine shop, and a warehouse. A leach-field based septic system is located on the building’s west side and a water supply well is located on the northern side. The water supply well is located north of the parking lot on the north side of the building. It is approximately 180 foot deep and was installed in 1966 (See Figure 2 – Site Plan Map). Municipal water became available in the town in January 2011. The well was disconnected in June 2011 when the facility changed over to the municipal public water supply system. The site and the site area slope to the east toward a wetland area and Newfoundland Creek.

1.2 SITE OCCUPANTS AND OPERATIONS

The site is occupied exclusively by DSI personnel. DSI conducts assembly and testing of equipment used for thermal testing of metals. A small vapor degreasing unit, installed in 1966, used trichloroethylene (TCE) to clean components of equipment prior to use in the operation. The degreasing unit was decommissioned and removed in July 2011. It was replaced by a water-based ultra-sound unit. All TCE inventory was properly removed from the premises at that time.

2.0 HISTORICAL INVESTIGATION AND REMEDIATION

In November 2010, a limited Phase II was conducted in which six (6) soil borings were advanced in the area of the degreaser unit and septic leach field area. TCE was detected at concentrations of 0.1 mg/kg which is below the NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives of 0.47mg/Kg for both Unrestricted Use and Protection of Groundwater requirements, thus allowing for any use of the industrial building.

In December 2010, a supplemental Phase II Investigation was conducted which included the installation of three (3) temporary monitoring wells and five (5) permanent groundwater monitoring wells. The Phase II Investigation Report identified elevated levels (3800 ppb) of TCE in groundwater in one temporary monitoring well (GP5) located inside and adjacent to the vapor degreasing unit.

In May, 2011 DSI hired Spectra to oversee the removal of the degreaser unit and remediation of the soil beneath the degreaser pit.

On February 14, 2012 the degreaser unit was removed and the target soils, located in the interior of the DSI facility beneath the concrete floor, were removed to a depth at or just below the measured groundwater level (approximately 6 feet). Post excavation soil sample were collected and PID readings were taken in the air space following the exposure of the sub grade soil and were recorded as ND. With the exception of one shallow soil sample along the south wall of the pit (PID readings of 50 ppm), no other soil indicated any soil contamination.

Post excavation soil sampling results (see Table 1 below) showed all subsurface pit samples were below SCOs criteria for protection of groundwater and unrestricted use (0.47 mg/Kg).

Table 1
Post Excavation TCE Analytical Results

VOCs	Unrestricted Use	Protection of Groundwater	North Wall	South Wall	East Wall	West Wall	Pit Bottom	Pit Bottom MS/MSD
TCE	0.47	0.47	0.12	0.015	0.065	0.46	0.033	0.039

Notes: 1. All units in ppm or mg/kg.

As a preventive measure, the bottom of the pit was then covered with 10 gallons of HRC-X®, a liquid chemical additive sold by the Regenesis Corporation. HRC-X® is a hydrogen release chemical used to accelerate the degradation of chlorinated hydrocarbons like TCE. After the HRC-X® was applied; the excavation was backfilled with #2 pea stone to floor grade.

Quarterly groundwater monitoring was showing increased concentrations of TCE in MW-3.

Given that the depths of the original wells were different (e.g., MW-1 – 54 ft; MW-2 – 15 ft; and MW-3 – 27 ft; it was impossible to identify where the concentrations of the contaminant zones existed. In November 2013, a Membrane Interface Probe (MIP) technology was implemented to more accurately locate the depth of the TCE contamination in groundwater. The complete report on that investigation is contained in the previously submitted Supplemental Site Investigation Report – Phase I. The qualitative result of that investigation is the genesis of this quantitative investigation plan.

3.0 SUPPLEMENTAL SITE INVESTIGATION – PHASE II (SSI-2)

3.1 OBJECTIVE

Using the Membrane Interface Probe technology data collected from the SSI-1 investigation, quantitatively characterize the location of trichloroethylene contamination in soil and groundwater at the DSI facility.

3.2 INVESTIGATION PLAN, RATIONALE AND METHODS

Characterizing the site will require the collection of critical groundwater and soil data. Using the data gathered in the SSI-1 investigation as a guide, Spectra will implement the following activities:

3.2.1 Monitoring Well Plan

1. Replace existing well MW-3 with a new well DSI-1 at a screened interval of 13'-18' below ground surface (bgs);

2. Install a new monitoring well (DSI- 4) at a screen interval of 5-10' bgs to the east of MW-4, near B-12;

3. Install two additional monitoring wells (DSI-2 and DSI-3) at screened intervals of 9-19' bgs and 19-24' bgs respectively;

4. Determine whether a new monitoring well needs to be installed near MW-1 by advancing a soil boring, continuously collecting and monitoring the soil samples in the field with a PID;

5. Collect groundwater samples from all new wells. Groundwater samples will be analyzed for VOCs and SVOCs; and

6. Decommission MW-3, MW-4, and MW-5 as per DER-10 Guidelines. MW-3 and MW-4 are being replaced and, based on data gathered from the SSI-I and past groundwater monitoring flow data, there is no evidence suggesting contaminated groundwater is travelling to MW-5.

(See Figure 3 for proposed well locations)

3.2.2 Monitoring Well Installation

Four (4) new monitoring wells will be installed (See Figure 3). Proposed screened intervals of monitoring wells are based on the vertical extent of the ECD response at each boring (See Table 2 below). Soil samples will be collected during well installation and boring completions at depths concurrent with high ECD responses. In addition, soil samples will be collected from any interval with an elevated PID value (>20 ppm).

Table 2
Proposed Screen Intervals

Proposed Well	Associated Boring	Depth of Max ECD Response (feet bgs)	Proposed Screen Interval (feet bgs)
DSI-1	B-1	13-18	13-18
DSI-2	B-25	9-20	9-19
DSI-3	B-17	20-23	19-24
DSI-4	B-12	5-10	5-10

A combination hollow stem auger/geoprobe drill rig will be used to advance the monitoring wells. During the advancement of the wells, soil samples will be continuously collected and screened for VOCs. Frequency of samples will be determined by the ability of either the geoprobe or auger to advance through the subsurface. Soil samples will be collected using standard soil sampling methods and select intervals will be submitted to a NYSDOH ELAP-Certified laboratory for analysis. Soil samples will be analyzed for VOCs by EPA Method 8260 and SVOCs by EPA Method 8270 B/N in accordance with the standard laboratory methods and procedures.

All wells will be constructed with a minimum of 5 feet of 2-inch diameter schedule 40, 0.010-inch PVC well screens, No. 1 graded sand packs, schedule 40 PVC riser (length to be determined during construction), bentonite seals, and depending on final location, stand pipes or protective road boxes. All wells will be surveyed horizontally and vertically.

Monitoring wells will be developed no sooner than 48 hours after installation. All wells will be developed until the turbidity of the recovered groundwater is low based on visual inspection. SPECTRA will perform a complete round of depth to water measurements to determine the stabilized groundwater depths and calculate groundwater elevations.

3.2.3 Monitoring Well Screen Intervals

The compound TCE is a ***DNAPL (Dense Nonaqueous Phase Liquid)*** - "A DNAPL is one of a group of organic substances that are relatively insoluble in water and are denser than water. DNAPLs tend to sink vertically through sand and gravel aquifers to the underlying layer." **-** U.S. Environmental Protection Agency, 2010.

The SSI-1 MIP investigation identified the highest chlorinated VOC responses below the existing water table at each proposed monitoring well. Well screens at the designated intervals are designed for these wells to be screened entirely beneath the water table.

A new monitoring well, DSI-1 will replace the existing MW-3. Since February 2012, the depths to groundwater in MW-2 and MW-3 have been approximately six (6) feet below ground surface (bgs). MW-3 is currently screened from 17.5 to 27.5 feet bgs. The ECD log from adjacent boring B-1 shows the highest level of response begins at approximately 13 feet bgs and extends to a depth of 18 feet bgs. Therefore, MW-3 is not screened across the most effective interval for determining contaminant impacts to groundwater. DSI-1 will be installed proximal to MW-3 and screened from 13 to 18 feet bgs.

A new monitoring well, DSI-2, will be drilled near B-25. The source of the elevated ECD response at B-25 is attributed to the historical placement of dumpsters during a time when cleaning rags containing TCE were being collected prior to being laundered. The high response begins around 9 feet bgs and continues to 19 feet bgs. DSI-2 will be drilled to a depth of 19 feet bgs and screened the final 10 feet to assess potential impacts to groundwater quality.

A new monitoring well, DSI-3, will also be placed near B-17 due to the elevated ECD response from 20 to 23 feet bgs. This well will be drilled to 24 feet bgs and screened from 19 to 24 feet.

A new monitoring well (DSI-4) will be drilled east of the current MW-4 and near B-12. Borings 11, 12, and 13 were completed in order to confirm low concentrations in the area surrounding MW-4. However, boring 12 showed an elevated ECD response from 5 to 10 feet bgs. The well will be drilled to 10 feet bgs and screened from 5 to 10 feet bgs. This screen interval may be adjusted in the field depending on the depth to groundwater.

The existing MW-1 may be decommissioned. The MIP probe reached refusal at a shallow depth at boring 19, adjacent to MW-1. Consequently, there is insufficient data to determine whether this area has any contamination and whether it should be monitored in the future. An adjacent soil boring will be completed and continuously screened in order to best characterize this location. If an elevated PID reading (>20 ppm) is detected, a replacement monitoring well, screened at an appropriate interval, will be installed. If there is no indication of contamination, the existing MW-1 will be decommissioned.

3.3 SOIL BORING PLAN

1. Twelve (12) new soil borings will be completed (see Figure 3).

   - Soils will be continuously collected and monitored with a PID. Soils samples will be collected at the highest PID reading.

   - Soil samples will be analyzed for VOCs and SVOCs. Lithology will be visually described.

   - If recharge time allows, collect an additional groundwater samples from each new boring and analyze for VOCs and SVOCs.

2. In anticipation of the potential need to implement a subsurface interim remediation program or a monitored natural attenuation program, the following soil and groundwater data will be collected:

   - Perform a slug test to determine soil permeability; and

   - Sample soil/groundwater chemistry for:

• SO_4^{-2}	CO_2	CO
• NO_3	TOC	COD
• BOD	Alk/CO_2	
• Methane, Ethane, Ethene		

3.3.1 Soil Boring Method

A geoprobe (hydraulic push drill rig) or hollow stem auger drilling will be utilized to complete soil borings. During the advancement of the proposed borings, soils will be collected continuously to the bottom of each soil boring. Every four (4) foot sleeve will be cut open and immediately screened with a hand-held PID capable of detecting chlorinated volatile organic vapors. Soil lithology will be characterized visually.

All soil borings will be advanced to a depth of at least five feet below the water table or to the highest recorded MIP ECD response, whichever is greater. The boring depths may be increased if field evidence of contamination (e.g. odor, visual appearance, elevated PID readings [>20 ppm]) persists.

Drill cuttings will be placed back in the borings and any excess will be drummed for later disposal. Soil sampling equipment will be decontaminated between sampling events.

3.3.2 Slug Test

The degree to which a particular subsurface material (e.g. unconsolidated soil or rock) is able to transmit fluid through its pore spaces is known as the hydraulic conductivity. Hydraulic conductivity is influenced by the physical properties of the material (i.e. grain size, grain shape, packing arrangement, presence of fracture) and the physical properties (density, viscosity) of the fluid that is being transmitted. It can be measured in the field using a method known as a slug test. To conduct this test, the groundwater level within a monitoring well is changed by introducing or removing a volume of water from the well, and measuring the time that it takes for the groundwater level to return to normal (static) conditions. Alternatively, the groundwater level within the well can be changed by inserting and then removing a physical object, usually a solid or sealed PVC cylinder. After the "slug" is placed or removed from the well, the groundwater levels are recorded electronically with a transducer or data logger. The rate that the groundwater levels return to the original (static) condition is then used to calculate the hydraulic conductivity. Various analytical methods can be used for these calculations, depending upon the well construction, geometry and general aquifer properties.

Since the new monitoring wells are screened at depths concurrent with elevated ECD responses, slug tests will be performed at each new well location during the first round of groundwater sampling. This time frame was chosen because after installation and development, the wells should be the most stable and yield the best results. Slug tests at DSI will be performed using the method outlined in the previous paragraph:

A PVC slug will be inserted into and removed from each well. A transducer will record the time it takes for groundwater to recharge to static conditions. Data generated will be used to calculate hydraulic conductivity in the zones of contamination. Understanding the hydraulic conductivity in the zones of contamination is essential for any potential future remediation.

3.3.3 Survey of Soil Boring and Monitoring Wells

All new soil borings and monitoring wells will be surveyed to provide coordinate and elevation data for each well relative to a local datum. The survey will establish elevation controls in order to ascertain water table elevations at each well location to determine groundwater flow direction.

3.4 SAMPLE COLLECTION

3.4.1 Surface Water Sampling

One (1) surface water sample will be collected from a drainage ditch to the immediate west of MIP boring 25.

3.4.2 Monitoring Well Development and Sampling

Prior to collecting groundwater samples, Spectra will collect depth to groundwater measurements to determine the stabilized groundwater depths, calculate groundwater elevations, and document any LNAPLs or sheens, if present.

Following the collection of depth to water measurements, Spectra will develop each well no sooner than 48 hours after installation. Development will be completed by purging the wells of at least three complete well volumes. Groundwater samples will be collected from all wells approximately one week following their proper development. All groundwater samples will be analyzed for volatile organic compounds by EPA method 8260 TCL, semi-volatile organic compounds by EPA method 8270 B/N, pH, PCBs Method 8082 and RCRA 8 metals. All groundwater and QA/QC samples will be submitted to a NYSDOH certified laboratory. A minimum of two (2) wells will be selected to analyze for soil and groundwater chemistry data as described in Section 3.3(2).

All wells will be sampled using low-flow sampling procedures. A low-flow (e.g., 0.1 to 0.5 L/min) pump will be used for purging and sampling. The pump intake will be set at the approximate mid-screen depth. Well drawdown will be monitored and the pump rate will be adjusted if drawdown exceeds 1 foot. If possible, a flow rate of 0.1 to 0.5 L/min will be maintained during purging. Water quality parameters, including pH, conductivity, temperature, dissolved oxygen (DO), and turbidity will be measured every 5 minutes during sampling. A minimum of 1 L will be purged between readings, and a goal will be to collect samples after stabilization is achieved (three successive readings within: ± 0.1 for pH, ± 3% for conductivity, ± 10 mv for redox, and ±10% for turbidity and dissolved oxygen) and/or once three (3) well volumes have been purged. VOC samples will be collected at a flow rate between 100 and 250 ml/min.

3.4.3 Soil Boring Sampling

Soils will be continuously collected and lithology interpreted visually. A minimum of two soil samples will be collected at each soil boring location (See Figure 3 for proposed boring locations) where elevated PID readings (>20 ppm) or visual/olfactory methods indicate contamination. Samples will be collected based on the following criteria:

- one sample from the zone of highest MIP ECD response from the nearest MIP boring; and
- one sample from highest PID reading (>20 ppm) or the bottom of the boring.

Field adjustments will be made to determine sample depth location. All PID readings will be documented in field notes and boring logs.

Soil samples will be collected using standard soil sampling methods and will be submitted to a NYSDOH Certified Laboratory for analysis. Soil samples will be analyzed in accordance with the standard laboratory methods and procedures. All soil samples will analyzed for volatile organic compounds by EPA method 8260 Target Compound List (TCL) and semi-volatile organic compounds by EPA method 8270 B/N.

4.0 DATA QUALITY OBJECTIVES, QUALITY ASSURANCE/QUALITY CONTROL

4.1 DATA QUALITY OBJECTIVES

The analytical results will be reviewed with respect to laboratory compliance with EPA methods and with the NYSDEC Analytical Services Protocol. All analytical data packages will be provided in Category B (as defined by ASP) deliverable format.

The objectives of the data quality review are to ensure that the evaluation of the data will lead to a proper determination of the significance of the results and a determination of any remedial measures that might be required.

Appendix A contains a complete QA/QC Plan for the remedial investigation of the DSI facility.

4.2 QUALITY ASSURANCE/QUALITY CONTROL

4.2.1 General QA/QC

The selected laboratory will perform all analysis in accordance with accepted EPA SW-846 methods including appropriate QA/QC samples including but not necessarily limited to blind field duplicates, matrix spike / matrix spike duplicates (MS/MSD), and trip blanks. The laboratory will be NYSDOH certified and will be approved for performing all analysis and procedures. QA/QC samples will be collected at a rate of 1 for 20 samples.

4.2.2 Laboratory QA/QC

The laboratory selected to perform the analysis of the collected soil and groundwater samples will perform all required internal QA/QC evaluations consistent with the EPA methods performed and all ELAP/ASP requirements. Any deviations from standards, discrepancies, and data qualifications will be noted.

4.2.3 Data Review

All analytical results will be reviewed by SPECTRA for quality with respect to practicable quantification limits and method detection limits. This review will include an evaluation of all QA/QC samples and the laboratory QA/QC results. Any inconsistencies will be noted and appropriately qualified.

4.2.3.1 Sample QC

The final written SSI-2 Report (see Section 5.2), will document that the goals for accuracy, precision, completeness, representativeness, and comparability have been met by having the required number of field QC samples, verifying that the quality control sample results are consistent with the field sample results, verifying that the spike and surrogate recoveries and RPDs are within allowable limits, and that method detection limits are acceptable.

4.2.3.2 Laboratory Instrument QC

On a limited set of field and laboratory quality control samples, instrument quality control will be assessed (by SOP/NFG standards) for a limited set of contaminants. A DUSR will be prepared to document the assessment of data usability. Instrument quality control will be evaluated for 10% of soil and 10% of groundwater samples, and the supporting laboratory control data, to establish usability by SOP/NFG standards related to TCE, Benzene, Xylene, and Naphthalene. Any modifications of laboratory qualifiers that are recommended in the DUSR will be reflected with the appropriate entries in the electronic data deliverables (EDD) submission (in accordance with Section 4.5.2.11 of the NYSDEC EDD manual).

Consistent with Section 4.5.2.11 of the EPA protocols for Environmental Data Deliverables (EDD), Category B deliverables and the validated results provided in a data usability summary report (DUSR) will include the validator qualifier. Spectra will populate the validation field with a "Y" for all data that will be validated.

5.0 SCHEDULE

5.1 FIELD ACTIVITIES PLAN

Subject to plan approval, coordination with NYSDEC personnel, building operations and site work schedules, it is anticipated that the field investigative measures and report outlined in this SSI-2 plan can be completed within 1-2 months based on the following assumed timeline:

- Soil boring, soil sampling, and monitoring well installation (3 weeks);
- Monitoring well measurements, development, sampling and well survey (1 week following installation); and
- Preparation of a Supplemental Site Investigation Report (1month from receipt of final laboratory analytical report).

5.2 REPORTING

Detailed documentation of the site investigative activities will be maintained during the field activities. Reporting will include discussions of findings and submission of a final written report, including all laboratory documentation to NYSDEC.

5.2.1 Field Documentation

Documentation of the field activities and environmental sampling will include the following:

Field Notebook – Field personnel will maintain a bound field notebook, which will document dates, times and duration of pertinent field occurrences. Notebook entries will be made on consecutive pages.

Calibration Records – Calibration records for field instrumentation will be maintained in the field notebook.

Geologic Logs – Observations pertaining to site geology and hydrogeology made during the subsurface drilling will be recorded in the field notebook or on soil boring logs. Construction logs of monitoring wells will also be recorded on monitoring well installation logs.

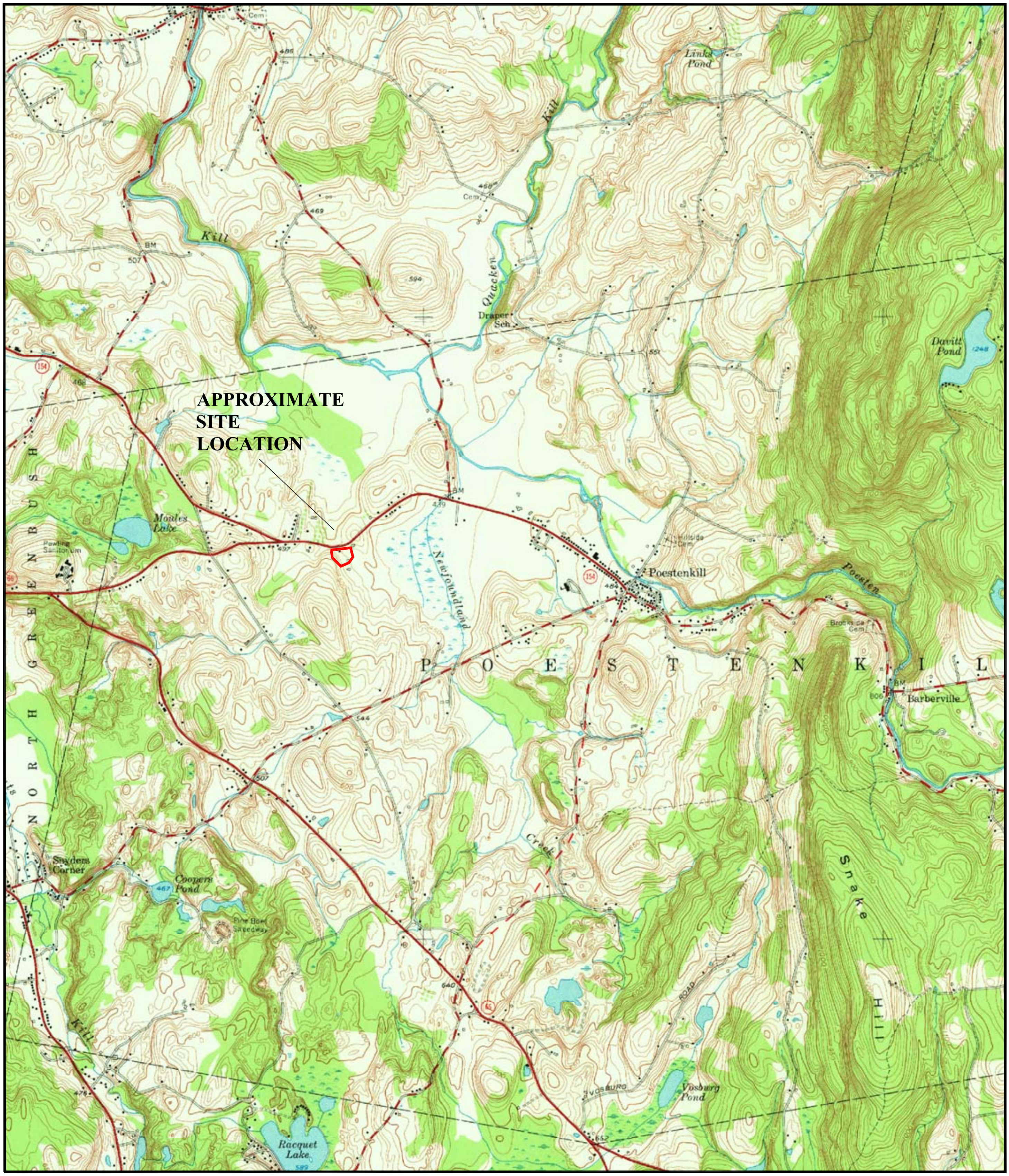
Chain of Custody Forms – Sample handling will be recorded on chain-of-custody forms that will be included in laboratory data reports.

5.2.2 Final Report

Upon receipt and review of the full set of analytical data generated by the investigation, a Supplemental Site Investigation Report (SSIR) will be prepared. The report will be formatted to address the investigative methods, field findings, lab results, and data interpretations. Based on the data collected, the SSIR will provide recommendations for either monitored natural attenuation (MNA) or interim remedial measures as appropriate. Upon review and approval of the SSIR, an Interim Remedial Workplan or MNA monitoring plan will be developed and submitted to the NYSDEC for approval.

All laboratory data will be submitted to EQuIS in accordance with DER-10 guidelines for electronic data submission.

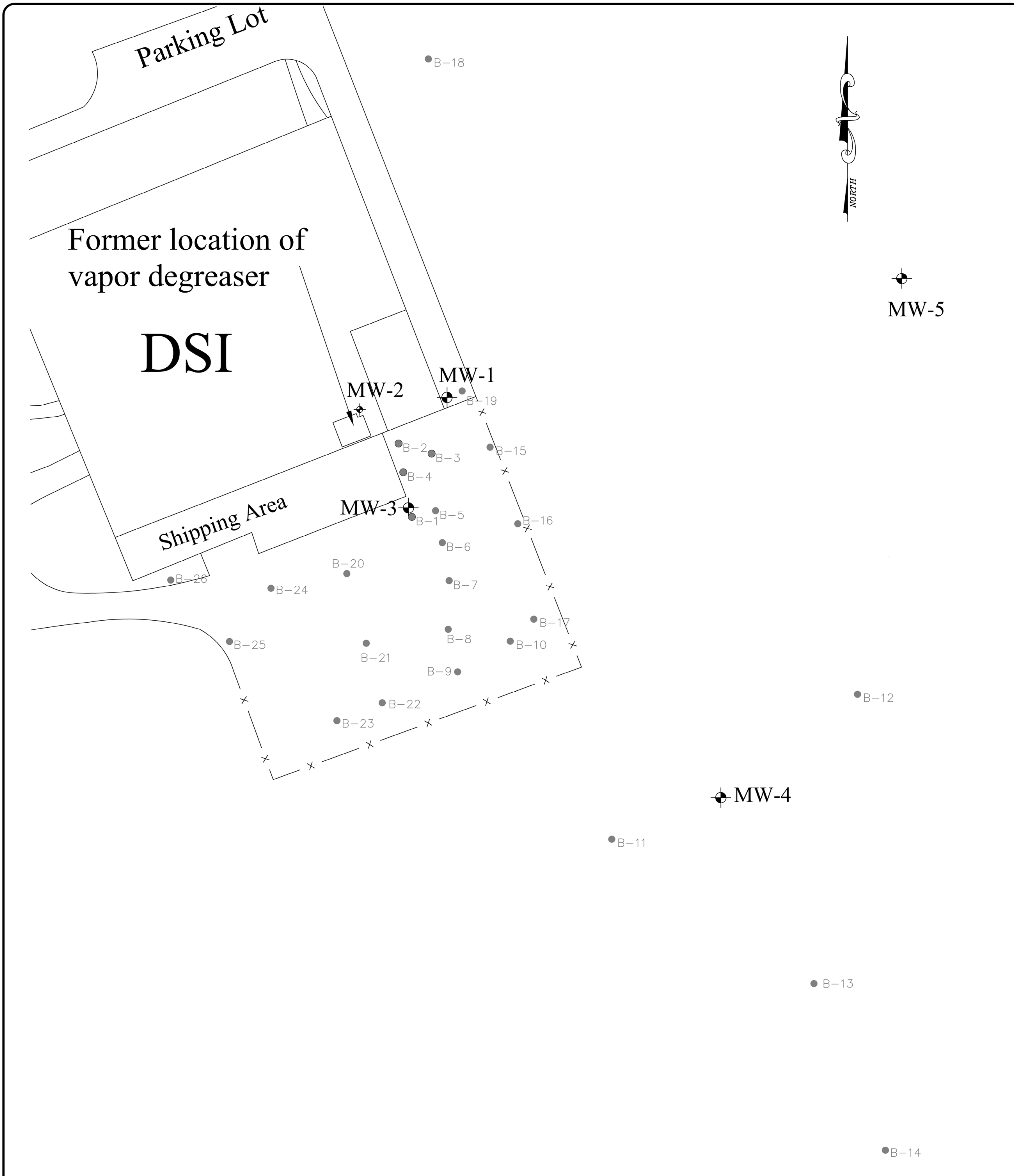
FIGURES



SPECTRA
ENGINEERING, ARCHTECTURE, & SURVEYING, P.C.
SPECTRA ENVIRONMENTAL GROUP, INC.
19 British American Blvd.
Latham, N.Y. 12110

SITE LOCATION
DYNAMIC SYSTEMS, INC.
POESTENKILL, NEW YORK
TOWN OF POESTENKILL RENSSELAER CO.,NY

PROJ. NO.: 11124	DATE: 05/18/12	SCALE: 1"=100'	DWG. NO.: SAMPLING...	FIGURE: 1



MONITORING WELL

COMPLETED PROBE POINTS

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NO.	DATE	RECORD OF WORK	DRN	CKD	APPR

PROJECT	
PROJ. ENGR.:	FP
PROJ. NO.:	11124
PREPARED BY:	FP
DRAFTED BY:	JCK
CHECKED BY:	FP
APPROVED BY:	
DATUM:	
CONTOUR INTERVAL:	

0 12.5 15 30

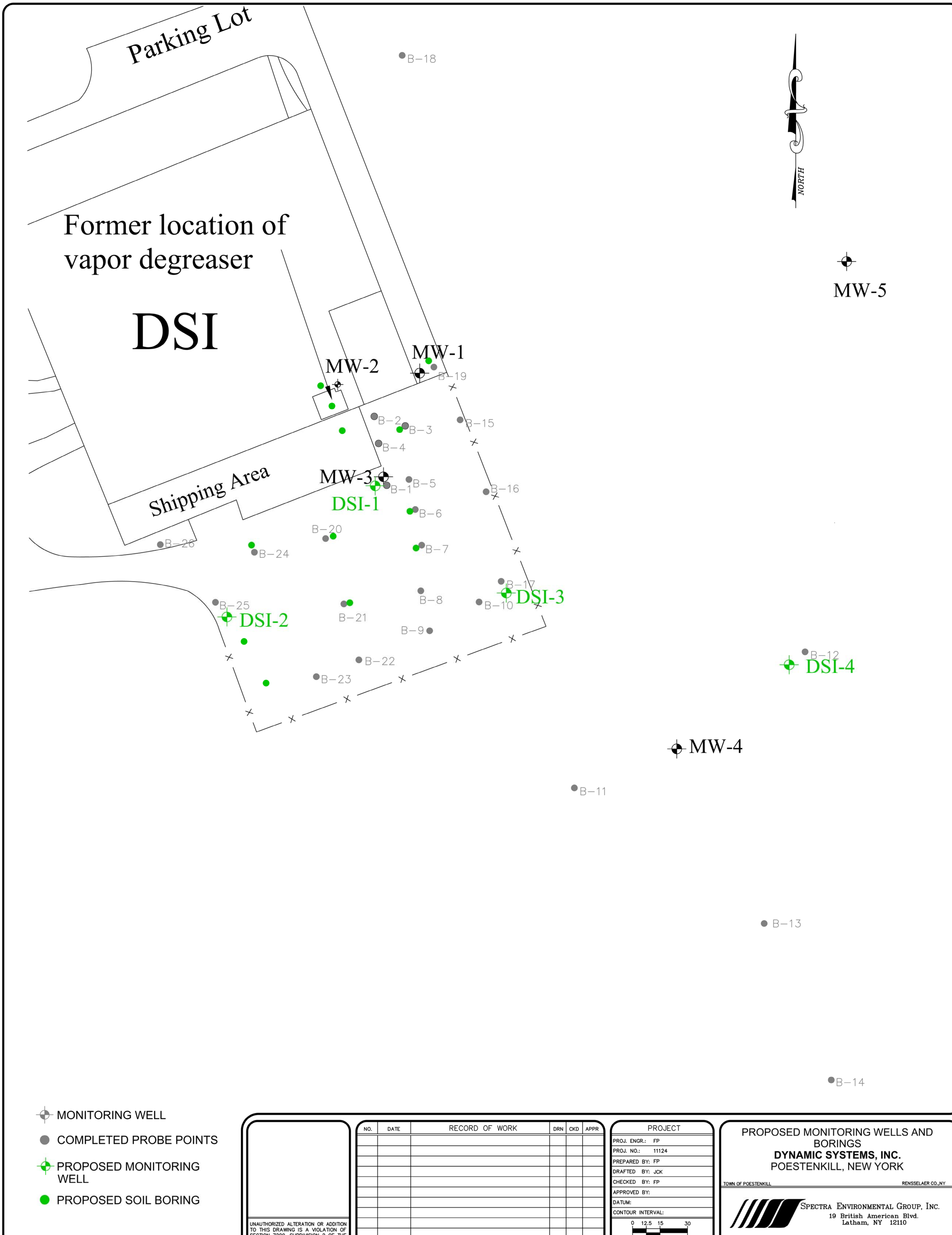
1"=30'

SITE MAP
MIP BORING LOCATIONS
DYNAMIC SYSTEMS, INC.
POESTENKILL, NEW YORK

TOWN OF POESTENKILL RENSSELAER, NY

SPECTRA ENVIRONMENTAL GROUP, INC.
19 British American Blvd.
Latham, NY 12110

DATE: 5/5/13	SCALE: 1" = 30'	DWG: SSI-2	FIGURE 2



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PROJECT

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PREPARED BY:	FP
DRAFTED BY:	JCK
CHECKED BY:	FP
APPROVED BY:	
DATUM:	
CONTOUR INTERVAL:	

0 12.5 15 30
1"=30'

PROPOSED MONITORING WELLS AND BORINGS
DYNAMIC SYSTEMS, INC.
POESTENKILL, NEW YORK

TOWN OF POESTENKILL RENSSELAER CO.,NY

SPECTRA ENVIRONMENTAL GROUP, INC.
19 British American Blvd.
Latham, NY 12110

DATE: 6/10/14 | SCALE: 1" = 30' | DWG: SSI-2 | FIGURE 3

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN
FOR
REMEDIAL INVESTIGATION

DYNAMIC SYSTEMS INC.
323 STATE ROUTE 355
POESTENKILL, NEW YORK

QUALITY ASSURANCE PROJECT PLAN
FOR REMEDIAL INVESTIGATION
REMEDIAL INVESTIGATION
DYNAMIC SYSTEMS INC.
POESTENKILL, NEW YORK

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1.0 PROJECT ORGANIZATION AND RESPONSIBILITY

This QAPP provides for designated qualified personnel to review sampling procedures, laboratory test methods, data results and data interpretations. This QAPP also outlines the approach to be followed to ensure that the remedial investigating results are of sufficient quality. This plan will provide for direct and constant operational responsibility, clear lines of authority, and the integration of QA activities. The various QA functions of the project positions are explained in the following subsections.

Project Manager

The project manager will have overall responsibility for ensuring that the project meets the objectives and quality standards as presented in the Work Plan and this QAPP. He/she will be responsible for implementing the project and will have the authority to commit the resources necessary to meet project objectives and requirements. The project manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The project manager will provide the major point of contact and control for matters concerning the project. In addition, he/she will be responsible for technical quality control and project oversight, and will be the primary point-of-contact.

Team Leaders

The project manager will be supported by a team leader or leaders who will be responsible for leading and coordinating the day-to-day activities of the various resource specialists under their supervision. The team leader is a highly experienced environmental professional who will report directly to the project manager.

Technical Staff

The technical staff (team members) for this project will be drawn from corporate resources and appropriately qualified subcontractors. The technical team staff will be used to gather and analyze data, and to prepare various task reports and support materials. The designated technical team members will be experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work.

Project QA Director

The Project QA Director will be responsible for maintaining QA for the project. The position may be filled by the Project Manager, Team Leader, or another designated staff person.

2.0 QA OBJECTIVES FOR DATA MEASUREMENT

Measurements will be made to ensure that analytical results are representative of the media and conditions measured. Unless otherwise specified, data will be calculated and reported in units consistent with other organizations who report similar data to allow comparability of databases among organizations.

The key considerations for the QA assessment of generated data are accuracy, precision, completeness, representativeness, and comparability. These characteristics are defined below:

Accuracy: Accuracy is the degree of agreement of a measurement or average of measurements with an accepted reference or "true" value and is a measure of bias in the system.

Precision: Precision is the degree of mutual agreement among individual measurements of a given parameter.

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

Representativeness: Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition or and environmental condition.

Comparability: Comparability expresses the confidence with which one data set can be compared to another.

2.1 GOALS

The QA/QC goal will focus on controlling measurement error within the limits established and will ultimately provide a database for estimating the actual uncertainty in the measurement data.

Target values for detection limit, percent spike recovery and percent "true" value of known check standards, and relative percent difference of duplicates/replicates are provided in the referenced analytical procedures. It should be noted that target values are not always attainable. Instances may arise where high samples concentrations, non-homogeneity of samples, or matrix interferences preclude achievement of target detection limits or other quality control criteria. In such instances, the laboratory will report reasons for deviations from these detection limits or noncompliance with quality control criteria.

3.0 SAMPLING PROCEDURES

The sampling of various environmental media will be completed as part of the investigation activities. The proposed analytical testing for the site including location, matrix and analytical requirements, is contained within the investigation work plan.

3.1 SAMPLING PROTOCOL

The following sections outline the sampling procedures for the collection of environmental media samples of soils and groundwater. Groundwater monitoring well installation procedures are described in the Work Plan.

3.1.1 Soil Samples from Geoprobe Soil Borings

Continuous soil samples will be collected from Geoprobe soil boring to the target depth as outlined in the Work Plan. An experienced geologist will observe the work associated with the soil borings.

Collected soil samples will be described according to soil type, color, texture, grain size, moisture content, and will be visually noted for physical indications of contamination, such as staining, oils, fill material and/or odor.

Each soil sample interval will be screened with a photoionization (PID-Minirae Model 2000 or equivalent) with a 10.6 eV lamp for the presence of elevated levels of volatile organic vapors.

During the drilling operations, the most impacted soil, based on field screening and visual observations, will be obtained from each sample sleeve or split spoon. A portion of this apparently contaminated soil will be containerized and the accumulated vapors within the container will then be subjected to headspace analysis for VOCs using the PID.

The VOC data from the headspace analysis, soil type and depth of sample will be used to select which soil sample is submitted for laboratory analyses.

Soil samples to be submitted for chemical analysis will be extracted from samplers using a stainless steel trowel, knife, or latex glove. Each sample container will be handled, packaged, and shipped in accordance with the procedures as outlined in Section 4.0.

3.1.2 Groundwater Samples from Monitoring Wells

New and existing groundwater monitoring wells will be developed prior to purging and sampling using disposable polyethylene bailers, dedicated inertial pumps or dedicated peristaltic pump tubing. Prior to development, wells will be allowed to equilibrate for at least 48-hours following installation. All development water will be collected and stored on site in 55-gallon drums. All drums will be labeled with paint markers according to matrix, location, and date of generation.

Turbidity readings and the number of consecutive well volumes removed will be recorded during well development. The wells will be developed to reduce sediment and turbidity to the maximum extent possible.

Following well development, each well will be allowed to equilibrate for at least 24-hours prior to purging and sampling. Purging of each new and existing well will be performed with a low flow peristaltic pump and dedicated polyethylene tubing or disposable polyethylene bailers. Purging of each well for at least three consecutive well volumes or until dry will allow representative formation water to enter the well prior to sample collection. Visual observations or water quality field parameters (turbidity) will be recorded during the purging and sampling.

Immediately following the completion of purging and monitoring well recovery, groundwater samples will be collected using a dedicated disposable polyethylene bailer or low flow peristaltic pump with dedicated tubing. New latex gloves will be used for collection of each sample. Each sample container will be labeled, handled, packaged, and shipped in accordance with the procedures as outlined in Section 4.0.

3.2 FIELD QUALITY CONTROL SAMPLES

The following quality control samples will be used during the investigation activities:

3.2.1 Field Duplicates

Field quality control samples will be collected to verify reproducibility of the sampling and analytical methods. Field duplicates will be obtained as follows:

- one field duplicate soil sample collected from the Geoprobe soil borings; and
- one field duplicate groundwater sample collected from one groundwater monitoring well.

3.2.2 Trip Blanks

Trip blanks will be used to assess whether samples has been exposed to volatile constituents during sample storage and transport. Trip blanks will be submitted at a frequency of once per cooler for samples to be analyzed for volatile organics. The trip blank will consist of a container filled by the laboratory with analyte-free water. The trip blank will remain unopened throughout the sampling event and will only be analyzed for volatile organics.

3.2.3 Matrix Spike/Matrix Spike Duplicates

Matrix Spike/Matrix Spike Duplicates (MS/MSD) will be obtained as follows:

- one MS/MSD soil sample collected from a representative Geoprobe soil boring; and
- one MS/MSD groundwater sample collected from representative groundwater monitoring well.

3.2.4 Laboratory Quality Control Checks

Internal laboratory quality control checks will also be used to monitor data integrity. These checks include method (equipment) blanks, spike blanks, internal standards, surrogate samples, calibration standards and reference standards.

3.3 SAMPLE CONTAINERS

The volumes and container types required for the sampling activities will be based upon the specific lab procedure and SW-846 methodologies. Pre-washed sample containers will be provided by the laboratory. All bottles are to be prepared in accordance with EPA bottle washing procedures.

3.4 DECONTAMINATION

Dedicated and/or disposable sampling equipment will be used to minimize decontamination requirements and the possibility of cross-contamination.

The water level indicator, stainless steel trowels, split spoons and Geoprobe are pieces of sampling equipment to be used at more than one location. They will be decontaminated between locations by the following decontamination procedures:

- initial cleaning of any foreign matter with paper towels;
- low phosphate detergent wash;
- de-ionized water rinse; and
- air-dry.

3.5 LEVELS OF PROTECTION/SITE/SAFETY

Field sampling will be conducted under a documented Health and Safety Plan (see Appendix B). On the basis of air monitoring, the level of protection may be downgraded or upgraded at the discretion of the site safety officer. Crew members will stand upwind of open boreholes or wellheads during the collection of samples, when possible.

All work will initially be conducted in Level D (refer to Site Specific Health and Safety Plan). Air purifying respirators (APRs) will be available if monitoring indicates an upgrade to Level C is appropriate.

4.0 SAMPLE CUSTODY

This section describes standard operating procedures for sample identification and chain-of-custody to be used for all field activities. The purpose of these procedures is to ensure that the quality of the samples is maintained during collection, transportation, storage and analysis. All chain-of-custody requirements comply with standard operating procedures indicated in USEPA and NYSDEC sample-handling protocol.

Sample identification documents will be carefully prepared so that sample identification and chain-of-custody can be maintained and sample disposition controlled. Sample identification documents include:

- Field records,
- Sample label,
- Custody seals, and
- Chain-of-custody records.

4.1 CHAIN-OF-CUSTODY

The primary objective of the chain-of-custody procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from collection to completion of all required analyses.

4.1.1 Sample Labels

Sample labels attached to or affixed around the sample container must be used to properly identify all samples collected in the field. The sample labels are to be placed on the bottles so as not to obscure any QA/QC lot numbers on the bottles. Sample information must be printed in a legible manner using waterproof ink. Field identification must be sufficient to enable cross-reference with the field sampling records or sample logbook. For chain-of-custody purposes, all QC samples are subject to exactly the same custodial procedures and documentation as “real” samples.

4.1.2 Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. Sample shipping containers (coolers, cardboard boxes, etc., as appropriate) are sealed in as many places as necessary to ensure security. Seals must be signed and dated before use. On receipt at the laboratory, the custodian must check (and certify, by completing logbook entries) that seals on shipping containers are intact. Strapping or other clear packaging tape should be placed over the seals to ensure that seals on shipping containers are not accidentally broker during shipment.

4.1.3 Chain-of-Custody Record

The chain-of-custody record must be fully completed at least in duplicate by the field technician who has been designated by the project manager as being responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g. extraction time or sample retention period limitations, etc.), the person completing the chain-of-custody record should note these constraints in the "Remarks" section of the custody record.

4.1.4 Field Custody Procedures

a. As few persons as possible should handle samples.

b. Sample bottles will be obtained pre-cleaned by the laboratory and shipped to the sampling personnel in charge of the field activities. Coolers or boxes containing cleaned bottles should be sealed with a custody tape seal during transport to the field or while in storage prior to use.

c. The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under chain-of-custody rules.

d. The sample collector will record sample data in a controlled field notebook and/or an appropriate field sampling records.

e. The site team leader will determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

4.2 DOCUMENTATION

4.2.1 Sample Identification

All containers of samples collected from the project will be identified using the following format on a label or tag fixed to the sample container:

- YY – These initials identify the sample matrix in accordance with the following abbreviations:

  S-Soil

  GW – Groundwater

  V-Vapor

- ZZ – Sub Sample Type – Field duplicates, rinsate blanks and trip blanks will be assigned unique sample numbers (if applicable):

  DUP – Duplicate Sample

  TB – Trip Blank

  MS/MSD – Matrix Spike/Matrix Spike Duplicate

Each sample will be labeled, chemically preserved, if required, and sealed immediately after collection. To minimize handling of sample containers, labels will be filled out using waterproof ink and will be firmly affixed to the sample containers. The Sample label will give the following information:

- Name of sampler;
- Date and time of collection;
- Sample number;
- Intended analysis; and
- Preservation required.

4.2.2 Daily Logs

Daily logs and data forms are necessary to provide sufficient data and observations to enable participants to reconstruct events that occurred during the project. All daily logs will be kept in a notebook and consecutively numbered. All entries will be made in waterproof ink, dated and signed. Sampling data will be recorded in the sampling records. All information will be completed in waterproof ink. Corrections will be made according to the procedures given at the end of this section.

4.3 SAMPLE HANDLING, PACKAGING AND SHIPPING

The transportation and handling of samples will be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling and shipping hazardous materials are promulgated by the United States Department of Transportation (DOT) in the Code of Federal Regulations, 49 CFR through 177.

All chain-of-custody requirements will comply with standard operating procedures in the NYSDEC and USEPA sample handling protocol. Field personnel will make arrangements for transportation samples to the laboratory. When custody is relinquished to a shipper, field personnel will telephone the laboratory custodian to inform him of the expected time of arrival of the sample shipment and to advise him of any time constraints on sample analysis. All samples will be delivered to the laboratory no later than 48 hours from the day of collection.

5.0 CALIBRATION PROCEDURES AND FREQUENCY

Instruments and equipment used during sampling and analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations as well as criteria set forth in the applicable analytical methodology references.

5.1 FIELD INSTRUMENTS

A calibrations program will be implemented to ensure that routine calibration is performed on all field instruments. Field team members familiar with the field calibration and operations of the equipment will maintain proficiency and perform the prescribed calibration procedures outlines in the Operation and Field Manuals accompanying the respective instruments. Calibration records for each field instrument used on the project will be maintained on-site during the respective field d activities and a copy will be kept in the project files.

5.1.1 Portable Total Organic Vapor Monitor

Any vapor monitor will undergo routine maintenance and calibration prior to shipment to the project site. Daily calibration and instrument checks will be performed by a trained team member at the start of each day. Daily calibrations will be performed according to the manufacturer's specifications and are to include the following:

Battery check: If the equipment fails the battery check, recharge the battery.

- Gas standard: The gauge should display an accurate reading when a standard gas is used.
- Cleaning: If proper calibration cannot be achieved, then the instrument ports must be cleaned.

5.1.2 pH, Specific Conductance and Turbidity (if applicable)

The following steps should be observed by personnel engaged in groundwater sampling for pH and specific conductance:

- The operations of the instruments should be checked with fresh standard buffer solution (pH 4 and pH 10) prior to each day's sampling.
- The specific conductance meter should be calibrated prior to each day's sampling using a standard solution of known specific conductance.
- The turbidity meter should be calibrated prior to each day's sampling using a standard solution of known turbidity.

More frequent calibrations may be performed as necessary to maintain analytical integrity. Calibration records for each field instrument used on the project should be maintained and a copy kept in the project files.

6.0 ANALYTICAL PROCEDURES

6.1 FIELD

On-site procedures for analysis of total organic vapor and other field parameters are addressed in the Work Plan.

6.2 LABORATORY

Analytical methods to be used for the sampling tasks are referenced in the NYSDEC's Analytical Services Protocols (ASP), 1995 or its most current version.

Specific analytical methods for constituents of interest in soil, groundwater, and air are listed in the RIWP. The laboratory will maintain and have available for the appropriate operators, standard operating procedures relating to sample preparation and analysis according to the methods.

7.0 DATA REDUCTION AND REPORTING

QA/QC requirements will be strictly adhered to during sampling and analytical work. Laboratory data generated will be reviews by comparing and interpreting results from chromatograms (responses, stability of retention times), accuracy (mean percent recovery of spiked samples), and precision (reproducibility of results).

Data storage and documentation will be maintained using logbooks and data sheets that will be kept on file. Analytical QC will be documented and included in the analytical testing report. A central file will be maintained for the sampling and analytical effort after the final laboratory report is issued.

Relevant calculations and data manipulations are included in the appropriate methodology references. Control charts and calibration curves will be used to review the data and identify outlying results. Prior to the submission of the report to the client, all the data will be evaluated for precision, accuracy, and completeness.

Laboratory reports will be reviewed by the laboratory supervisor, the QA officer, laboratory manager and/or director, and the project manager. Analytical reports will contain a data tabulation including results and supporting QC information will be provided. Raw Data will be available for later inspection, if required, and maintained in the control job file.

8.0 INTERNAL QUALITY CONTROL CHECKS

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of glassware and reagents. The procedures to be followed for internal quality control checks are to be consistent with NYSDEC and NYSDOH Programs.

9.0 PREVENTIVE MAINTENANCE

9.1 FIELD

Field personnel assigned to complete the work will be responsible for preventative maintenance of all field instruments. The field sampling personnel will protect the portable total organize vapor monitors, temperature, conductivity, pH and turbidity instruments by placing them in portable boxes and/or protective cases.

Field equipment will be subjected to a routine maintenance program, prior to and after each use. The routine maintenance program for each piece of equipment will be in accordance with the manufacturer's operations and maintenance manual. All equipment will be cleaned and checked for integrity after each use. Necessary repairs will be performed immediately after any defects are observed, and before the item of equipment is used again. Equipment parts with a limited life (such as batteries, membranes and some electronic components) will be periodically checked and replaces or recharged as necessary according to the manufacture's specifications.

10.0 DATA ASSESSMENT PROCEDURES

Laboratory data results will be evaluated for accuracy, precision and completeness of collected measurement data.

10.1 PRECISION

Precision of a particular analysis is measured by assessing its performance with duplicate or replicate samples. Duplicate samples are pairs of samples taken in the field transported to the laboratory as distinct samples. Their identity as duplicated is sometimes not known to the laboratory and usually not known to bench analysts, so their usefulness for monitoring analytical precision at bench level is limited. For most purposes precision is determined by the analysis of replicate pairs (i.e., two samples prepared at the laboratory from one original sample.) Often in replicate analysis the sample chosen for replication does not contain target analytes so that quantification of precision is impossible. Replicate pairs of spiked samples, known as matrix spike/matrix spike duplicate samples, are used for precision studies. This has the advantage that two real positive values for a target analyte can be compared.

Precision is calculated in terms of Relative Percent Difference (RPD), which is expressed as follows:

$$RPD = \frac{(X_1-X_2)}{(X1 + X2)/2} \times 100$$

Where X_1 and X_2 represent the individual values found for the target analyte in the two replicate analyses or in the matrix spike/matrix duplicate analyses.

RPDs must be compared to the method RPD for the analysis. The analyst or his supervisor must investigate the cause of RPDs outside stated acceptance limits. This may include a visual inspection of the sample for non-homogeneity, analysis of check samples, etc. Follow-up action may include sample re-analysis or flagging of the data as suspect if problems cannot be resolved.

10.2 ACCURACY

Accuracy of a particular analysis is measured by assessing its performance with ‘known” samples. These “knowns” can take the form EPA or NBS traceable standards (usually spiked into a pure water matrix), or laboratory prepared solutions of target analytes into a pure water or sample matrix, or (in the case of GC or GC/MS analyses) solutions of surrogate compounds which can be spiked into every sample and are designed to mimic the behavior of target analytes without interfering with their determination. In each case the recovery of the analyte is measured as a percentage, corrected for analytes known to be present in the original sample if necessary, as in the case of a matrix spike analysis. For EPA or NBS supplied known solutions, this recovery is compared to the published data that accompany the solution. For prepared solutions, the recovery is compared to EPA-developed data or historical data as available. For surrogate compounds, recoveries are compared to USEPA CLP acceptable recovery tables. If recoveries do not meet required criteria, then the analytical data for the batch (or, in the case of surrogate compounds, for the individual sample) are considered potentially inaccurate.

For highly contaminated samples, recovery of matrix spike may depend on sample homogeneity. As a rule, analyses are not corrected for recovery of matrix spike or surrogate compounds.

10.3 COMPLETENESS

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the total amount expected to be obtained under normal conditions. Completeness for each parameter is calculated as:

$$\text{Completeness} = \frac{\text{Number of successful analyses x 100}}{\text{Number of requested analyses}}$$

Target value for completeness for all parameters is 100%. A completeness value of 95% will be considered acceptable. Incomplete results will be reported to the client project officer.

10.4 REPRESENTATIVENESS

The characteristic of representatives is not quantifiable. Subjective factors to be taken into account are as follows:

- The degree of homogeneity of a site;
- The degree of homogeneity of a sample taken from one point in a site; and
- The available information on which a sampling plan is based.

To maximize representatives of results, sampling techniques and sample locations will be carefully chosen so that they provide laboratory samples representatives of the site and the specific area.

11.0 QUALITY ASSURANCE SUMMARY

Upon completion of a project sampling effort, analytical and QC data will be included in a comprehensive report that summarizes the work and provides a data evaluation. A discussion of the validity of the results in the context of QA/QC procedures will be made, as well as a summation of all QA/QC activity, and an identification of any analytical problems.