QUALITY ASSURANCE PROJECT PLAN ADDENDUM
FORMER HOOKER/RUCO CHEMICAL SUPERFUND SITE
HICKSVILLE, NEW YORK

Prepared for:

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Final March 22, 2011
220019501

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

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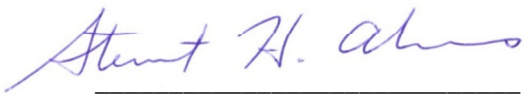
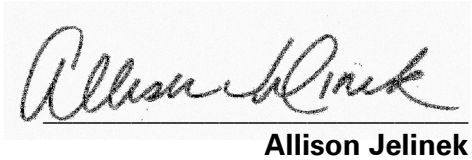


Stewart Abrams
Associate



Allison Jelinek
Assistant Project Manager

Final March 22, 2011
220019501

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) Addendum has been prepared on behalf of Glenn Springs Holdings, Inc. (GSHI). This QAPP Addendum supplements the original QAPP submitted as Appendix G of the May 2005, 100% Biosparge System Final Design Report. The original QAPP, approved by EPA in 2005, defines the quality assurance/quality control (QA/QC) procedures used during collection and analysis of samples in support of the performance monitoring of the biosparge remedy constructed for Operable Unit-3 (OU-3) at the Hooker Chemicals/Ruco Polymer Superfund Site (Hooker/Ruco Site) located in Hicksville, New York. The purpose for this QAPP addendum is to document the necessary QA/QC procedures required to complete the proposed side-by-side evaluation of low-flow and passive sampling techniques. This side-by side evaluation, requested by EPA in their September 29, 2009 and again in March 30, 2010 letters, is being conducted with the end goal of switching sampling methods from low-flow to passive sampling. The initial comparison, conducted by Conestoga-Rovers & Associates (CRA), utilized both Hydrasleeve and passive diffusion bag (PDB) samplers. As such, this comparison will utilize the same methodologies for consistency. Also, the Hydrasleeve approach is typically used for conventional water chemistry parameters.

As described in the original QAPP, the biosparge remedy includes the collection and chemical analysis of groundwater, liquid supplements, and soil vapor samples to monitor remedial performance. The original QAPP identifies procedures for sample preparation and handling, sample Chain-of-Custody, laboratory analyses, and data reporting implemented to ensure the accuracy and integrity of the data generated, in accordance with the following EPA guidelines for the preparation of QAPP documents.

- EPA QA/R-5,October 1997[1]
- EPA Region II QAM, October 1989[2]
- EPA QA/G-4, September 1994[3]

This addendum describes the procedures that will be used to assess the effectiveness of passive sampling methods by statistically comparing groundwater analytical results obtained using the current (conventional) low-flow sampling method with results obtained using the PDBs and Hydrasleeves (in line). In turn, the results of the proposed sampling program

[1] EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations", EPA QA/R-5,October 1997
[2] "Region II CERCLA Quality Assurance Manual", Revision 1,EPA Region II, October 1989
[3] "Guidelines for the Data Quality Objectives Process", EPA QA/G-4, EPA/600/R-96/055, September 1994

described herein may be used to enable the use of passive sampling techniques for site-wide groundwater monitoring. Specifically, this addendum incorporates proposed changes to Section 3.0 (Project Management), Section 5.0 (Sampling Procedures), and Section 9.0 (Data Reduction, Validation, Assessment and Reporting) of the original approved QAPP.

The objective of the QAPP is to provide sufficiently thorough and concise descriptions of the measures to be applied during the sampling program such that the data generated will be of a known and acceptable level of precision and accuracy. Policies and procedures set forth in the original QAPP that are not modified in this addendum will remain in effect for the OU-3 sampling and monitoring program.

A3.0 PROJECT MANAGEMENT

Monitoring activities will be conducted by Langan Engineering and Environmental Services (Langan) and Conestoga-Rovers & Associates (CRA) and various subcontractors, as necessary. CRA remains the overall consultant for the site, with Langan tasked with specific special assignments, including the potential implementation of passive sampling procedures. The project management structure for QA/QC activities associated with the passive sampling assessment is discussed below, along with a brief description of the duties of the key personnel.

<u>Project Manager – Jeffery Kogut – Glenn Springs Holdings, Inc. (GSHI)</u>

- provides overall project management
- ensures professional services provided are cost effective and of the highest quality
- ensures all necessary resources are available on an as-required basis
- participates in key technical negotiations with the agencies involved
- provides managerial and technical guidance to the Project Coordinator

<u>Project Coordinator – Stewart Abrams – Langan</u>

- provides day-to-day project management
- provides managerial guidance to the project technical group
- provides technical representation at meetings as appropriate
- acts as liaison between the technical group and the client
- acts as liaison with the agencies involved
- prepares and reviews reports
- conducts preliminary chemical data interpretation

QA/QC Officer - Analytical Activities – Denise R. Anderson - CRA

- overviews and reviews laboratory activities
- determines laboratory data corrective action
- performs analytical data validation and assessment
- reviews laboratory QA/QC
- assists in preparation and review of final report
- provides technical representation for analytical activities

Responsibilities for the QA/QC Officer for Field Activities, Laboratory Project Manager, Laboratory QA/QC Analytical Contractor, and Laboratory Sample Custodian remain unchanged from the original approved QAPP. Mitkem Laboratories (Warwick, RI) is the analytical laboratory performing the analyses and is certified by the New York State Department of Health (NYSDOH) through the environmental laboratory approval program for the appropriate Contract Laboratory Program (CLP) categories of analysis.

A5.0 SAMPLING PROCEDURES

To assess the effectiveness of the passive sampling method, groundwater samples will be collected from each monitoring well designated in Table 1, initially using PDB and Hydrasleeve samplers (in series), then followed immediately using the low-flow sampling method currently employed. The passive samples will be collected as described below and low-flow samples will be collected in accordance with the original QAPP.

Well Selection

As requested by EPA, four wells were selected for assessing the effectiveness of the passive sampling methods based on the results of previous sampling. Wells selected for the assessment were chosen as they display VOC concentrations that span both the high and low end of concentrations measured at the site and were therefore deemed representative of the site as a whole. The selected wells include MW-61I, MW-61D1, MW-87D1 and MW-88D2. Well construction information for the selected monitoring wells is shown in Table 1. The locations of the wells are shown in Figure 1.

Sample Equipment

The PDB and Hydrasleeve samplers will be purchased from Eon Products, Inc. in Snellville, Georgia (EON). The passive samplers will be assembled, installed, and recovered in accordance with manufacturer's recommendations and the Interstate

Technology & Regulatory Council's (ITRC's) Technical and Regulatory Guidance for Using Polyethylene Diffusion Bag Samplers (ITRC, 2004[4]) and Technology Overview of Passive Sampler Technologies (ITRC, 2005[5]).

The PDB sampler is constructed of a 42 inch-long by 0.75-inch diameter section of low density polyethylene (LDPE) material that is permanently sealed on the bottom and sealed on the other end with a polyvinyl chloride (PVC) plug. The PDB sampler holds approximately 200 milliliters (mL) of water and will be delivered pre-filled with deionized water. The PDB sampler is placed in "Flex-Guard™" polyethylene mesh tubing for abrasion protection and will be attached to a polyethylene tether. The Hydrasleeve samplers are constructed of a 48 inch-long and 12-inch long by 1.75-inch diameter LDPE material that is permanently sealed on the bottom and constructed with a self sealing valve on the top. The Hydrasleeve samplers collect approximately 1.70 Liters and 350 mL of sample water each, respectively. The samplers will be attached to the polyethylene tether above and below the PDB sampler with ring connectors. An in-line stainless steel weight will be attached below the passive samplers to ensure that the samplers are positioned at the correct depth, by assuring that they are not buoyed in the well and the rope remains taut.

Two field events will be required: one for sampler deployment and one for sampler retrieval and low-flow sampling. During the deployment event, groundwater elevations and total well depths will be measured before the passive samplers are installed at the depth intervals specified in Table 1. Because these wells have screened intervals of 10 feet, the center of the PDB sampler will be manually lowered in place as close to the vertical midpoint of the screen as possible and the pair of Hydrasleeve samplers will be placed directly above and three-inches below the PDB sampler. After lowering each tether into place, the tether will be attached to the well cap to secure the samplers at the specified depths. After deployment, well covers will be replaced and locked. The samplers will be left in place and allowed to equilibrate with the formation for a minimum of 14 days prior to removal. All PDB and Hydrasleeve samplers will be

[4] ITRC (Interstate Technology & Regulatory Council). 2004. *Technical and Regulatory Guidance for Using Polyethylene Diffusion Bag Samplers to Monitor Volatile Organic Compounds in Groundwater*. DSP-3. Washington, D.C.: Interstate Technology & Regulatory Council, Authoring Team. www.itrcweb.org.

[5] ITRC (Interstate Technology & Regulatory Council). 2005. *Technology Overview of Passive Sampler Technologies*. DSP-4. Washington, D.C.: Interstate Technology & Regulatory Council, Authoring Team. www.itrcweb.org.

deployed simultaneously and concurrently, i.e., for the same amount of time and installed/collected on the same days. An equipment blank will be collected from the Hydrasleeve samplers and a matrix blank sample of each lot of deionized water used to fill the PDB bags will be collected during deployment from an extra bag provided by Eon and submitted to the laboratory immediately for analysis of VOCs, TOC, nitrite, nitrate, phosphorous, and ammonia. Please note that a Trip Blank will be submitted along with these samples for analysis of VOCs in accordance with the original QAPP. Additionally, a duplicate groundwater sample will be collected from one of the PDB samplers for VOCs, however due to volume requirements this may not be possible. Should the lab indicate an issue with sample volume, Langan will instruct the lab to break the blind duplicate protocol and use the extra volume from the duplicate sample to obtain sufficient volume for analysis of the normal sample. All samples will be validated consistent with current practices described in Section 9.0 of the original QAPP and a copy of the certificate of analysis for each lot of DI water used by the supplier to fill the PDB bags will be included in the validation report.

Immediately after the passive samples are retrieved from the well and samples are poured into the respective containers, samples will be collected by CRA from the wells using a submersible bladder pump using low-flow sampling techniques. A duplicate sample will be collected from one of the wells using the low flow method and will be tested for all parameters. The low-flow samples will be collected consistent with current practices described in Section 5.0 of the original QAPP. The sample depths associated with the submersible pump samples are summarized in Table 1. The low-flow samples will be collected from mid-screen, consistent with samples collected historically at the site and in accordance with the original QAPP.

Upon collection the groundwater samples will be placed on ice in a cooler with an internal temperature of 4°C (±2°C). The samples will be shipped to the laboratory via courier or Fed-Ex and will be accompanied by a laboratory prepared Trip Blank. All samples collected during the evaluation will be submitted to Mitkem Laboratories of Warwick, RI. With exception for the duplicate sample collected from the PDB samplers which will be analyzed for VOCs only, the groundwater samples will be submitted for analysis of VOCs (method SW846 8260), TOC (method SW846 9060), Nitrite/Nitrate (EPA method 353.2), Ammonia (EPA method 350.1), and Phosphorous (method SM 4500). The Trip Blank will be submitted for analysis of VOCs only.

Equipment decontamination, and sample handling and documentation procedures will be consistent with the procedures outlined in the original approved QAPP.

A9.0 DATA REDUCTION, VALIDATION, ASSESSMENT AND REPORTING

Data reduction, validation, and reporting procedures for the PDB, Hydrasleeve, and conventional low-flow samples will be consistent with the procedures outlined in the original approved QAPP. Data assessment procedures for evaluating the results of the passive sampling method, are discussed below. On behalf of GSHI, Langan will prepare and submit a technical memorandum detailing the results of the evaluation and any appropriate recommendations/conclusions as described below.

To minimize variability between sample sets (i.e., conventional and passive samples), the identical laboratory (Mitkem) and analytical protocol that were used for conventional sample analysis will also be used for passive sample analysis. The lab will be instructed to handle the PDB and conventional samples identically to the extent feasible to minimize analytical variability as a source of variation between the two sets of results. Once the data are available, CRA will validate the results consistent with current practices described in Section 9.0 of the original QAPP and, upon validation, Langan will evaluate the correlation of the passive and conventional results.

Correlation Procedure

To evaluate the correlation between the conventional (low-flow) and passive sampling methods and determine if passive sampling is acceptable, we will use the acceptance criteria developed by Parsons Engineering Science, Inc. under contract to the Air Force Center for Engineering and the Environment (AFCEE, 2003)[6] and used by ITRC (ITRC, 2004). These criteria are as follows:

1. Passive ≥ Conventional Criterion: If at least one passive sampler result is greater than or equal to the conventional sampling result, passive sampling will be deemed appropriate for that compound in that monitoring well.

[6] AFCEE (Air Force Center for Environmental Excellence Technology Division). 2003. *Final Comprehensive Results for the Passive Diffusion Bag Sampler Demonstration*. Parsons Engineering Science, Inc.

2. RPD Criterion: If either the passive or the conventional sampling result is three times greater than the laboratory reporting limit (RL), and the passive sampling result is less than the conventional sampling result, the analytical results will be compared using the following relative-percent-difference (RPD) equation:

   RPD = 100*[abs(D-C)]/[(D+C)/2]

   Where:
   abs = absolute value;
   D = passive sampler result; and
   C = conventional sample result.

   A relative percent difference (RPD) of less than or equal to 30% is acceptable (AFCEE, 2003) and passive sampling will be deemed appropriate for that compound in that monitoring well.

3. RL Criterion: If both the passive and conventional sampling results are less than or equal to three times the RL, a value of ± the RL is used as the range of acceptance between the two values. If the RLs for the conventional and passive samples are different, the lower RL is used to determine the acceptance range. If the difference between the passive and the conventional sampling result is less than the lower RL, passive sampling will be deemed appropriate for that compound in that monitoring well.

There may be instances where more than one of the correlation criteria are met; however, as long as at least one correlation criterion is met per the comparison, then passive sampling will be deemed to be an acceptable alternative sampling method for that analyte in that well. Conversely, if none of the passive results for an analyte in a given well meet the conventional sampling result correlation criteria, further review of the well or sample-specific conditions will be performed before the analyte is deemed inappropriate for passive sampling. Review may include:

- The hydrogeology of the material surrounding the well screen;
- Sample handling differences (e.g., holding times, sample preservation);
- Sample collection differences (e.g., time lag between sampling events);
- Sample analysis differences (e.g., laboratory control sample differences); and/or
- Chemical-specific properties that may impact its compatibility with the passive sampling method.

There may be instances where results for some of the analytes detected in samples from a well meet the correlation criteria while results for other analytes in the same well do not. Similarly, there may be instances where results for one analyte meet the correlation criteria in samples from several wells but do not in samples from other wells. Therefore, for each compound and well, a correlation ratio will be calculated by dividing the total number of instances where correlation criteria are met by the total number of instances where correlation is evaluated (and multiplying by 100). AFCEE considers a Percent Correlation of 70% to be "acceptable" and suggests further review of compounds or wells with a lower ratio.

TABLES

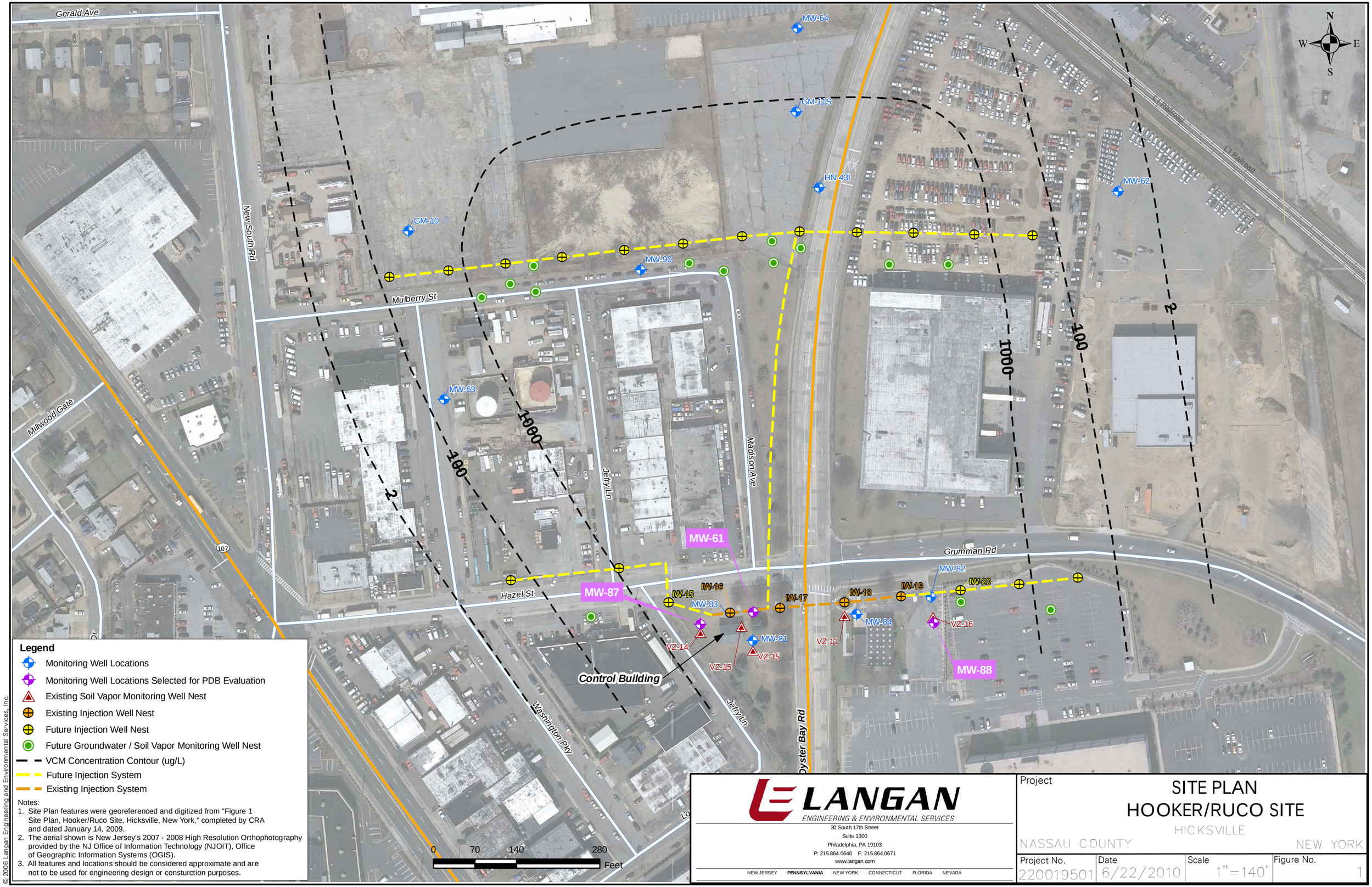
TABLE 1
Well Construction Summary
Former Hooker/Ruco Superfund Site
Hicksville, New York
Langan Project No. 22001950

Well Designation	Date Completed	Ground Surface (ft amsl)	Measuring Point Elevation (1) (ft amsl)	Top of Sandpack (ft bgs)	Top of Sandpack (ft amsl)	Top of Screen (ft bgs)	Top of Screen (ft amsl)	Bottom of Screen (ft bgs)	Bottom of Screen (ft amsl)	Screen Length (ft)	Bottom of Sandpack (ft bgs)	Bottom of Sandpack (ft amsl)	Well Diameter (in)	Well Screen Slot Size	Well Material	Sample Frequency	Sample Parameters
MW-61I	02/22/2002	121.19	120.91	200	-78.8	205	-83.8	215	-93.8	10	220	-98.8	2	10	BI/SS	Semi-Annually (April/Oct)	VOCs & gen. chemistry (TOC, nitrite, nitrate, phosphorous, ammonia)
MW-61D1	02/22/2002	121.19	120.91	265	-143.8	270	-148.8	280	-158.8	10	285	-163.8	2	10	BI/SS	Semi-Annually (April/Oct)	VOCs & gen. chemistry (TOC, nitrite, nitrate, phosphorous, ammonia)
MW-87D1	10/04/2006	121.05	120.55	299.0	-177.95	307.0	-185.95	317.0	-195.95	10	319.0	-197.95	2	10	PVC	Semi-Annually (April/Oct)	VOCs & gen. chemistry (TOC, nitrite, nitrate, phosphorous, ammonia)
MW-88D2	03/22/2006	120.89	120.05	398.5	-277.61	405.6	-284.71	415.6	-294.71	10	416.0	-295.11	2	10	BI/SS	Semi-Annually (April/Oct)	VOCs & gen. chemistry (TOC, nitrite, nitrate, phosphorous, ammonia)

Well Designation	Date Completed	Low Flow Sampling Interval (ft. bgs.)	Hydrasleeve 1					Passive Diffusion Bag					Hydrasleeve 2				
			Diameter (in.)	Length (ft.)	Volume (mL)	Top of Sampler (ft. bgs.)	Bottom of Sampler (ft. bgs.)	Diameter (in.)	Length (ft.)	Volume (ml)	Top of Sampler (ft. bgs.)	Bottom of Sampler (ft. bgs.)	Diameter (in.)	Length (ft)	Volume (L)	Top of Sampler (ft. bgs.)	Bottom of Sampler (ft. bgs.)
MW-61I	02/22/2002	210	1.75	1	350	206	207	0.75	3.5	200	207	210.5	1.75	4	1.7	210.5	214.5
MW-61D1	02/22/2002	275	1.75	1	350	271	272	0.75	3.5	200	272	275.5	1.75	4	1.7	275.5	279.5
MW-87D1	10/04/2006	312	1.75	1	350	308	309	0.75	3.5	200	309	312.5	1.75	4	1.7	312.5	316.5
MW-88D2	03/22/2006	410.6	1.75	1	350	406.6	407.6	0.75	3.5	200	407.6	411.1	1.75	4	1.7	411.1	415.1

Notes:
amsl - above mean sea level
bgs - below ground surface
(1) - Measuring Point is generally top of well riser pipe. Measuring point is marked.

FIGURES



Legend

- Monitoring Well Locations
- Monitoring Well Locations Selected for PDB Evaluation
- Existing Soil Vapor Monitoring Well Nest
- Existing Injection Well Nest
- Future Injection Well Nest
- Future Groundwater / Soil Vapor Monitoring Well Nest
- VCM Concentration Contour (ug/L)
- Future Injection System
- Existing Injection System

Notes:

1. Site Plan features were georeferenced and digitized from "Figure 1 Site Plan, Hooker/Ruco Site, Hicksville, New York," completed by CRA and dated January 14, 2009.
2. The aerial shown is New Jersey's 2007 - 2008 High Resolution Orthophotography provided by the NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS).
3. All features and locations should be considered approximate and are not to be used for engineering design or consturction purposes.

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Project

SITE PLAN
HOOKER/RUCO SITE

HICKSVILLE
NASSAU COUNTY NEW YORK

Project No.	Date	Scale	Figure No.
220019501	6/22/2010	1"=140'	1

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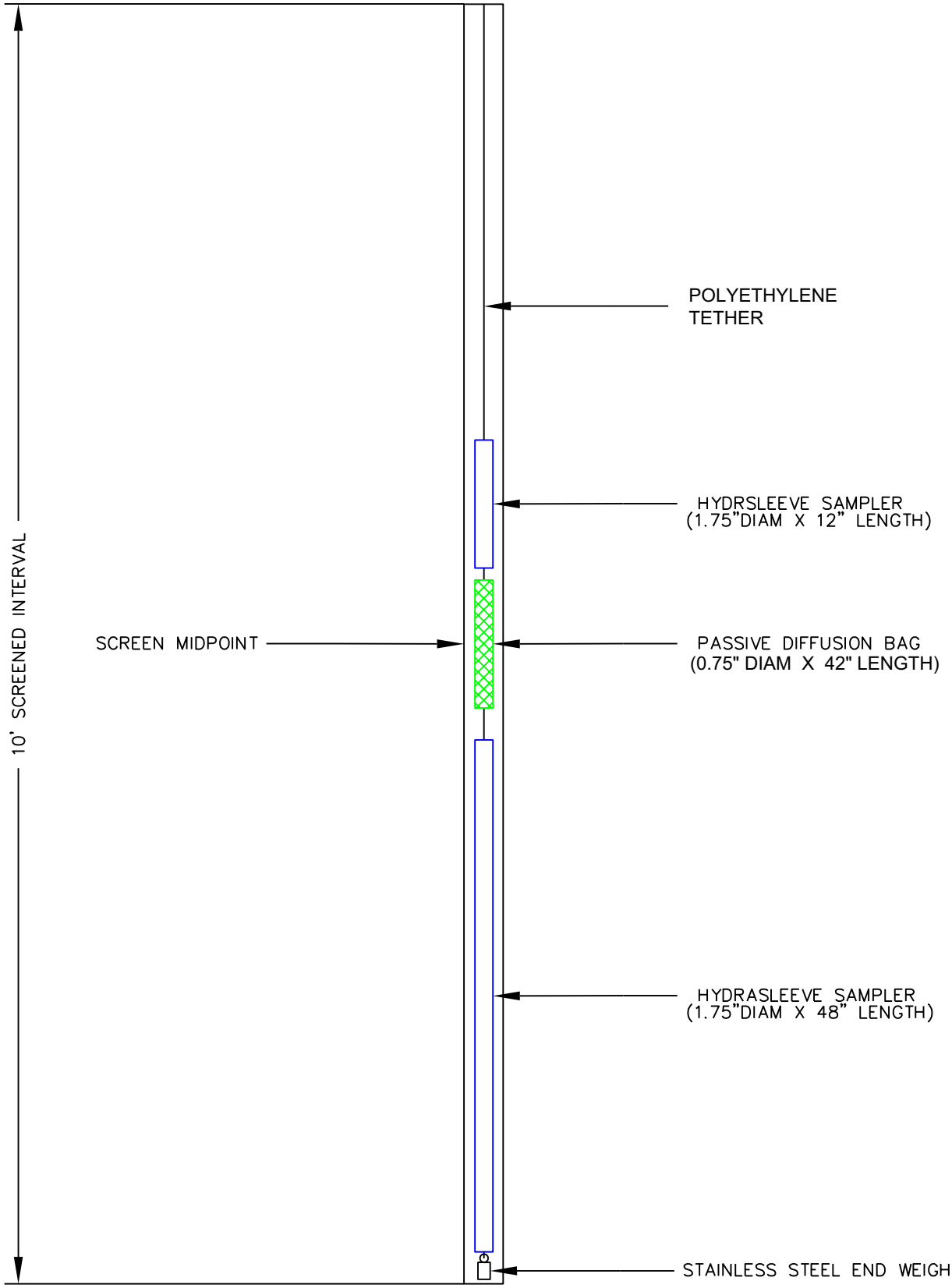

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FORMER HOOKER/RUCO SUPERFUND SITE
DEPLOYMENT CONFIGURATION SCHEMATIC

HICKSVILLE NEW YORK

Project No.	Date	Scale	Fig. No.
220019501	01/25/2011	NTS	2

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