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VIA ELECTRONIC MAIL

June 5, 2014

Paul Patel, P.E.
New York State Department of Environmental Conservation
Division and Solid and Hazardous Materials
625 Broadway, 11th Floor
Albany, New York 12233

Re: Harriman Inactive Waste Disposal Site #336006
Supplemental RI/FS Work Plan

Dear Mr. Patel:

On behalf of the Corporate Defendants, Nepera, Inc. and Warner-Lambert Company, and pursuant to the Stipulation and Order entered on January 24, 2014, and your approval letter dated June 3, 2014, enclosed is the final Supplemental Remedial Investigation/Feasibility Study (RI/FS) Work Plan for the above referenced site.

As referenced in your June 3 approval letter, work will commence with the goal of implementing the work plan in accordance with the approved work plan schedule. However, the Corporate Defendants reserve the right to extend the schedule for the start of field work by an estimated two to three weeks based on availability of personnel and subcontractors, and flow conditions in the West Branch of the Ramapo River (i.e., sediment samples can only be collected under low flow conditions).

Please contact us if you have questions or comments on the enclosed work plan.

Sincerely,
CORNERSTONE ENGINEERING AND LAND SURVEYING, PLLC

A handwritten signature in black ink, reading "Gary DiPippo". The signature is fluid and cursive, with the first name "Gary" and last name "DiPippo" clearly distinguishable.

Gary J. DiPippo, P.E.
Manager, Hydrogeology and Remediation

Enclosure

cc: D. Crosby
A. Guglielmi
G. Heitzman
Corporate Defendants

**SUPPLEMENTAL REMEDIAL INVESTIGATION AND
FEASIBILITY STUDY WORK PLAN**

FORMER NEPERA HARRIMAN SITE

HARRIMAN, NEW YORK

Prepared for
Nepera, Inc. and Warner-Lambert Company
(Corporate Defendants)
June 2014

Prepared by



100 Crystal Run Road, Suite 101
Middletown, New York 10941

Project 140079

**Supplemental Remedial Investigation and Feasibility Study Work Plan
Former Nepera Harriman Site
Harriman, New York**

The material and data in this report were prepared under the supervision and direction of the undersigned.

CORNERSTONE ENGINEERING AND LAND SURVEYING, PLLC


Gary J. DiPippo 6/5/14

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TABLE OF CONTENTS

LIST OF TABLES AND FIGURES	iii
1 INTRODUCTION	1-1
2 BACKGROUND AND PHYSICAL SETTING	2-1
2.1 SITE LOCATION.....	2-1
2.2 SITE HISTORY	2-1
2.3 PREVIOUS INVESTIGATIONS.....	2-2
2.3.1 <i>West Branch of Ramapo River</i>	2-2
2.3.2 <i>Lagoon</i>	2-3
2.3.3 <i>Off-site Soil</i>	2-3
2.3.4 <i>Groundwater</i>	2-4
2.3.5 <i>Parking Lot Area</i>	2-5
2.4 SITE COCs.....	2-5
2.4.1 <i>Surface and Subsurface Soil</i>	2-5
2.4.2 <i>Parking Lot (Area B, Calcium Sulfate)</i>	2-6
2.4.3 <i>Lagoon</i>	2-6
2.4.4 <i>Groundwater</i>	2-7
2.4.5 <i>Surface Water (West Branch of the Ramapo River)</i>	2-7
2.4.6 <i>Sediment</i>	2-7
2.4.7 <i>Off-Site Soil</i>	2-8
2.5 PREVIOUS REMEDIAL ACTIONS.....	2-8
3 SCOPE OF WORK	3-9
3.1 INTRODUCTION	3-9
3.2 INVESTIGATION ACTIVITIES.....	3-9
3.2.1 <i>Ramapo River Stream Bank, Surface Water and Sediment</i>	3-9
3.2.1.1 <i>River Bottom (Sediment) and Surface Water Investigation</i>	3-10
3.2.1.1.1 <i>Approach</i>	3-10
3.2.1.1.2 <i>Sampling Procedures</i>	3-10
3.2.1.1.3 <i>Analyses</i>	3-11
3.2.1.2 <i>Riverbank Soils</i>	3-11
3.2.1.2.1 <i>Approach</i>	3-11
3.2.1.2.2 <i>Sampling Procedures</i>	3-11
3.2.1.2.3 <i>Analysis</i>	3-11
3.2.1.3 <i>Qualitative Exposure Assessment and Fish and Wildlife Resource Impact Analysis</i>	3-12
3.2.2 <i>Lagoon</i>	3-12
3.2.2.1 <i>Approach</i>	3-12
3.2.2.2 <i>Sampling Procedures</i>	3-13
3.2.2.3 <i>Analysis</i>	3-13
3.2.3 <i>Off-Site Soil</i>	3-13
3.2.3.1 <i>Approach</i>	3-13
3.2.3.2 <i>Sampling Procedures</i>	3-14
3.2.3.3 <i>Analysis</i>	3-14

TABLE OF CONTENTS (Continued)

3.2.4	Decontamination	3-14
3.3	PARKING LOT AREA FEASIBILITY STUDY	3-15
3.3.1	Remedy Selection Evaluation Criteria	3-15
3.3.2	Feasibility Study Process.....	3-16
3.3.3	Parking Lot Area Feasibility Study Report.....	3-17
3.4	SUPPLEMENTAL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY REPORT	3-17
3.5	CONCEPTUAL SITE MODEL.....	3-17
3.5.1	Site Hydrogeology.....	3-18
3.5.2	Contaminant Behavior and Distribution	3-20
3.5.3	Conceptual Site Model (CSM)	3-24
4	QUALITY ASSURANCE AND QUALITY CONTROL.....	4-1
4.1	QUALITY ASSURANCE PROJECT PLAN.....	4-1
4.2	PROJECT SCOPE AND GOALS.....	4-2
4.3	DATA QUALITY OBJECTIVES	4-2
4.4	LABORATORY ANALYTICAL PROCEDURES AND REPORTING REQUIREMENTS	4-3
5	HEALTH AND SAFETY	5-4
5.1	HEALTH AND SAFETY PLAN	5-4
6	SCHEDULE	6-1
7	PROJECT ORGANIZATION	7-1
8	REFERENCES	1

APPENDICES

**APPENDIX A CONCEPTUAL SITE MODEL AND REMEDIAL ACTION WORK PLAN
FIGURES 2-1 THROUGH 2-11**

**APPENDIX B QUARTERLY PROGRESS REPORT - TIME SERIES GRAPHS OF BENZENE
CONCENTRATIONS**

APPENDIX C SITE-SPECIFIC HEALTH AND SAFETY PLAN

APPENDIX D PROJECT PERSONNEL RESUMES

LIST OF TABLES AND FIGURES

Tables

- 4-1 Sediment, Surface Water and Soil Sampling Nomenclature and Analyses
- 4-2 Soil, Sediment and Surface Water Sampling Analytical Details by Matrix
- 4-3 Soil, Sediment and Surface Water Sampling Analytical Details by Parameter

Figures

- 1-1 Sample Location Map
- 2-1 Site Plan
- 3-1 Sample Location Plan – West Branch of Ramapo River
- 3-2 Sample Location Plan – Lagoon
- 3-3 Sample Location Plan – Off-Site Properties
- 6-1 Schedule

1 INTRODUCTION

This Supplemental Remedial Investigation/Feasibility Study (RI/FS) Work Plan has been prepared for the Former Nepera Harriman Site (Site) located in Harriman, New York (Figure 1-1). The RI/FS Work plan is submitted in accordance with the Stipulation and Order that was entered into by Nepera, Inc. and Warner-Lambert Company (Corporate Defendants), with the New York State Department of Environmental Conservation (NYSDEC), entered on January 24, 2014.

Appendix B to the Stipulation and Order defines the scope of the Supplemental RI/FS which includes certain activities related to the following:

- Additional investigation of surface water and sediments in the West Branch of the Ramapo River in the site vicinity;
- Additional investigation of the soils on the stream banks of the West Branch of the Ramapo River in the site vicinity;
- Additional investigation of the soils around the lagoon at the Site (referred to as the SPDES lagoon, permitted by the NYSDEC for the current property owner – ELT Harriman);
- Completion of the off-site surficial soils investigation previously started by ELT Harriman's consultant, Brown and Caldwell, on properties for which access had not previously been granted;
- Presentation of the site conceptual model for groundwater;
- A feasibility study of remedial alternatives for the parking lot area.

Section 2 of the Supplemental RI/FS Work Plan presents an overview of the Site with respect to location, site history, prior site investigations, contaminants of concern, and prior remedial actions. Section 3 presents the Scope of Work and is structured consistent with the tasks called for in the Stipulation and Order. For each task in Section 3, a subsection is devoted to describe the task, the approach or technical rationale for how the work will be completed, and a description of the work. In addition, the Stipulation and Order calls for a presentation and discussion of the Site Conceptual Model as a part of the Work Plan. As such Section 3 concludes with the Site Conceptual Model presentation and discussion, which also includes a discussion of site geology, hydrogeology and contaminant transport (which is not repeated as background in Section 2). Section 4 details Quality Assurance and Quality Control (QA/QC) requirements and Section 5 describes Health and Safety requirements for the remedial investigation. The schedule for completion of the work, described in this Work Plan, is presented in Section 6, followed by a description of the project organizational structure in Section 7. The site-specific

Health and Safety Plan for the implementation of the field activities is attached as Appendix C.

2 BACKGROUND AND PHYSICAL SETTING

The following sections provide an overview of the physical setting of the site as relates to the elements of the supplemental work, as well as a description of the contaminants of concern and the site history. This former manufacturing site, manufactured fine and bulk pharmaceutical chemicals until 2005. As a result of the operations at the former manufacturing facility various contaminants exist in site media including mercury, several other metals, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), various volatile compounds (e.g., benzene, toluene), and several site-specific compounds (2-aminopyridine, alpha-picoline, chlorobenzene, pyridine). Additional detail can be found in the "Former Nepera Facility Site-Wide Characterization Summary Report," (CSR) Brown and Caldwell Associates and Cornerstone Engineering and Land Surveying, PLLC, March 2011, and in Section 2.4 of this work plan.

2.1 Site Location

The Former Nepera Harriman Site is located in the Village of Harriman, Orange County, New York (Figure 1-1 Site Location Map). The southwest portion of the Site is located in the Town of Monroe. The boundaries of the Site include: NYS Route 17 to the northwest, West Branch of the Ramapo River to the northeast, and an undeveloped parcel of land (the "Avon parcel") to the south, currently owned by ELT Harriman. The Site encompasses approximately 28 acres and consists of two general areas: (1) approximately 10 acres located to the northeast of Arden House Road, on which the former administrative offices, a parking lot, and the former wastewater, now SPDES, lagoon are located, and (2) approximately 18 acres to the southwest of Arden House Road, on which the former manufacturing facilities are located.

2.2 Site History

The Former Nepera Harriman Site is currently owned by ELT Harriman. A detailed history of the site is presented in the Site-Wide CSR (2011).

The Site was previously used to manufacture fine and bulk pharmaceutical chemicals from 1942 to 2005. During the period 1945 through 2005 chemical by-products were incinerated on the Site, initially through open pit burning and subsequently in a RCRA Part B permitted incinerator. The on-site incinerator was shut down in 2005. Calcium sulfate material, used as part of the manufacturing processes, was disposed of in the northwestern portion of the Site that now includes the former administration building and the parking lot area. Drums were buried in areas near former Buildings 67 and 75, and proximate to the southern boundary of the Site (Area F). These drums were subsequently removed in the mid-1980s. As part of the remedy selected in the Record of Decision

(ROD) under the NYSDEC Inactive Hazardous Waste Disposal Site (State Superfund) program (Site No. 336006) additional soil source material and drum fragments were removed from Area F and near former Building 53. In addition, Oxygen Release Compound (ORC) was injected within both Area F and near Building 53 to treat remaining concentrations in soil beneath the water table. Surface soil was also removed from Area K (the Avon Parcel).

The existing wastewater lagoon was constructed in the 1960s, southeast of the parking lot area. The Lagoon is reportedly lined with compacted clay and has a storage capacity of 5.5 million gallons. The lagoon had served as a settling pond for aluminum hydroxide and magnesium silicate precipitates generated during the manufacturing process. Additionally, wastewater consisting of boiler blowdown, and non-contact cooling water, storm water runoff and treated groundwater, were also discharged to the lagoon prior to the plant shutdown. The lagoon currently stores stormwater runoff and discharges to the west branch of the Ramapo River under a SPDES permit. The original SPDES permit expired in 2010, and the current property owner, ELT Harriman, applied for a new SPDES permit which was subsequently issued on August 26, 2011. ELT Harriman currently operates a treatment and discharge system for the lagoon.

2.3 Previous Investigations

As a result of past site investigations (described below), the nature and extent of contamination at the Site has been extensively evaluated. A detailed summary of the investigations at the Site is presented in the Site-Wide CSR, (Brown and Caldwell and Cornerstone 2011). The following is a summary of previous investigations related to the elements of the supplemental work.

2.3.1 West Branch of Ramapo River

The West Branch of the Ramapo River borders the northern limit of the Site, and the riverbank has been the subject of various investigations and interim remedial measures (IRMs) at NYSDEC's request.

A test pit investigation program was completed, in September 2005, between NYS Route 17 and the eastern edge of the parking lot area and immediately south of the West Branch of the Ramapo River. The resulting data were used to quantify the volume, and delineate the extent of the calcium sulfate material adjacent to the riverbank.

Surface water and sediment sampling was conducted in the West Branch of the Ramapo River as part of Remedial Investigation (RI) activities (*Remedial Investigation/Feasibility Study – Harriman Site, Village of Harriman, Orange County, New York, Conestoga-Rover Associates, July, 1995*). Sampling results indicated that there was no measurable impact from Site contaminants on water quality within the West Branch of the Ramapo River, based on the investigation results. A Fish Study of the West Branch of the Ramapo River was also conducted by the NYSDEC, including surface water and sediment

samples. This study was focused on mercury. The purpose of the study was to assess potential sources contributing mercury to the River, including the Orange County Sewer District outfalls and the former Nepera Site. The results of the fish tissue testing did not indicate levels above fish consumption advisory level of 1,000 ng/g. The NYSDEC also concluded that while there were no substantial differences in mercury concentrations between up- and down-stream locations, there was insufficient information regarding the downstream mercury levels (e.g., at Sloatsburg) to assess whether the Orange County Sewer District outfalls, the Site, or other environmental factors were the cause.

The County of Orange also completed an Environmental Impact Statement for the expansion of its Harriman wastewater treatment plant, and this study may also contain data on surface water, to the extent the information is available.

2.3.2 Lagoon

Lagoon solids samples collected during the RCRA Facility Investigation (RFI) indicated low levels of polynuclear aromatic hydrocarbons (PAHs) and metals. As reported in the RFI Report (Brown and Caldwell 2007) low levels of some SVOCs and metals were also detected. No VOCs or PCBs were detected, and none of the lagoon solids samples were characterized as hazardous waste. Four sediment samples were collected from the lagoon as a part of the Pollutant Minimization Plan work (2002) and analyzed for mercury.

A composite surface water sample collected from the lagoon during the RI (Conestoga-Rovers Associates, July, 1995), indicated low concentrations of the VOCs acetone and toluene; and detections of various inorganic constituents with concentrations below USEPA and NYSDEC Ambient Water Quality Criteria. There were no detections of SVOCs, pesticides or PCBs.

ELT Harriman has implemented an upgraded treatment system (i.e., reverse osmosis) for compliance with the SPDES permit.

2.3.3 Off-site Soil

An investigation of the Mary Harriman Park, located west of the Site, across NY Route 17, was conducted by NYSDEC in February through March 2000, to assess whether there were drums buried beneath the park's baseball fields. The results of the investigation confirmed that drums were not buried in the park.

Off-site soil sampling was also conducted as part of a Supplemental RCRA RFI in June 2008, in accordance with the NYSDEC-approved Phase II (Supplemental) RFI Work Plan, at adjacent properties to the east of the Site, namely the Avon parcel and the Village of Harriman property, including the above-noted baseball fields. Samples were collected from the 0-2" and 2"-24" depth intervals for each of the off-site locations. In addition, at the sample locations adjacent to the ballfield property, SB-15 and SB-16, a sample was collected at an additional depth interval of 5 to 6 feet. Off-site soil samples results

indicated low mercury concentrations. All detections of mercury in off-site soil samples were below the Commercial and Industrial Soil Cleanup Objectives (SCOs), and PCBs were non-detect. The mercury results on the ballfield property in two instances (SB-15 in the 2"-24" depth sample, and SB-16 in the 0-2" depth sample) were nominally greater than the Restricted Residential SCO of 0.81 mg/kg (1.01 and 0.989, respectively). However, the Restricted Residential SCO is based on the presence of elemental mercury and the assumption of inhalation of mercury vapor, whereas the predominant forms of mercury associated with the Site are complexed and mineral-bound forms (e.g., mercury salts), for which the Restricted Residential SCO would be 5.8 mg/kg. In addition, based on only two out of six samples being nominally higher than the Restricted Residential SCO, the applicability of the flexibility provided for in DER-10, Section 5.4 would be considered in the final evaluation of these data against the cleanup objective.

Due to a lack of property access, data gaps remain for off-site soils on properties across the Ramapo River, and at the property situated on the other side of the railroad, to the south and southwest of the Site. Samples from these locations could not be collected during the Supplemental RFI activities.

2.3.4 Groundwater

Groundwater investigations commenced in 1989 and monitoring has continued since. The 1989 Phase I Hydrogeologic Investigation and Interim Remedial Measures described additional findings with respect to groundwater and described a program to pump contaminated groundwater (principal compounds of concern – BTEX and pyridine compounds) from three existing wells and treat the water prior to discharge to the on-site storm water/cooling water lagoon prior to discharge to the West Branch Ramapo River under a SPDES permit. Following design and approval, the IRM system was installed in 2001 and operated until September 2004. The IRM included pumping from wells RW 1S, RW 3 and MW 1S. Pumping ceased due to fouling problems at the wells. Well RW-1R was installed to replace well RW-1S but was not put into service based on the groundwater monitoring (i.e., results indicated groundwater quality achieved at sentinel wells) and use of the alternative biosparge system.

The 1995 *Remedial Investigation Report* summarized additional groundwater investigation findings and presented the chemical fate and transport evaluation. The work performed during the RI included a comprehensive suite of analyses comprised of volatile organics, semi-volatile organics, pesticides/PCBs, and inorganics.

In 2008 a *Supplemental Remedial Action Work Plan*, was implemented with the addition of six monitoring wells installed to collect additional water quality data along projected groundwater flow paths and at additional locations adjacent to the West Branch of the Ramapo River. Since the installation of the new monitoring wells and for every routine monitoring event since the analytical data have consistently demonstrated that concentrations of compounds of concern (COCs) are below standards, criteria, and guidance (SCGs) at plume fringe and sentinel wells. The new well installations also

provided analytical data in the area of the Site where the coarser grained deposits predominate and groundwater flows preferentially, as described in the 2008 report and work plan.

2.3.5 Parking Lot Area

In November 2009 the NYSDEC requested that additional sampling and delineation be conducted for the material in the Area B parking lot. Area B is defined as the area encompassed by The West Branch of the Ramapo River to the north, Arden House Road to the south, Route 17 to the west and the western berm of the lagoon to the east. A field investigation was implemented during the period January 25 through January 29, 2010 with the objective of delineating the vertical and horizontal extent of the calcium sulfate material and to further characterize this material relative to the presence of mercury and volatile organic compounds.

Mercury is present within the calcium sulfate material as a byproduct from the manufacture of niacinamide. Total mercury concentrations within individual samples ranged from 1.1 to 1900 mg/kg, while total mercury concentrations in composite samples ranged from 356 to 598 mg/kg. The collective data indicate that the mercury is present in an insoluble form and is not a source of dissolved mercury to surrounding soils and groundwater. Similarly, testing for volatile organic compounds indicates the calcium sulfate is not a source of VOCs.

The calcium sulfate is currently covered with asphalt within the parking area and an interim remedial measure (IRM) consisting of geotextile and stone along the river bank, to prevent erosion. The condition of the asphalt and IRM are inspected quarterly and repairs are made as necessary. Based on current conditions at the Site, the calcium sulfate is not a significant source to groundwater, surface water, or sediment.

2.4 Site COCs

Presented below is a summary of COCs at the Site by medium.

2.4.1 Surface and Subsurface Soil

The results from testing of 150 samples from the RI and RFI sampling are discussed in detail in the CSR and should be referenced for additional information. In general, the data indicate that exceedences of the applicable SCO for mercury are distributed in shallow soils over most of the Site. Exceedences for other compounds and metals, including polynuclear aromatic hydrocarbon (PAH) compounds, polychlorinated biphenyl compounds (PCBs), arsenic and copper have been identified in more localized areas of the Site.

The results of subsurface sampling (total of 202 samples) indicate that benzene is the only VOC detected in subsurface samples at concentrations above its Commercial or Industrial SCO. A number of SVOCs (all PAH compounds) exceeded their respective Commercial or Industrial SCOs at five locations, including the warehouse/water filtration facility in the northwest corner of the Site, the aforementioned wastewater tank farm, the engineering offices and the truck scale. The concentrations of the site-specific SVOCs alpha-picoline, beta-picoline and pyridine in the subsurface samples were generally non-detect to less than 1 mg/kg, and exceeded 10 ppm at no more than three locations. The PCB Aroclor 1254 was detected in subsurface soil samples; its concentration exceeded the Commercial SCO at five locations. As with the shallow soil samples the only metal with widespread exceedences of the SCOs was mercury. Arsenic, barium, cadmium, copper and lead were the only other metals detected in subsurface soil at concentrations above their respective SCOs, with exceedences occurring in relatively few, localized areas.

Speciation for mercury was performed during the RFI for further characterization of the form of mercury predominant at the Site. For the soils at the Site, the predominant forms of mercury were the highly complexed and mineral-bound forms (F4 and F5 fractions), indicating a high level of immobility. Methyl mercury was found in very low proportions (maximum of 0.035%)

2.4.2 Parking Lot (Area B, Calcium Sulfate)

The investigations of the parking lot (Cornerstone, April 2010) and adjacent river bank area (Arcadis 2001) delineated the lateral and vertical extent of calcium sulfate material. Based on the delineation work, the volume of material underlying the parking lot and the adjacent river bank is calculated at approximately 22,000 cubic yards. The calcium sulfate contains mercury at concentrations ranging from 1.1 to 1,900 mg/kg, and VOCs were not evidenced in the data. Based on the data collected in these investigations and from groundwater monitoring, mercury is present primarily in an insoluble form and is not a source of dissolved mercury to surrounding soils, groundwater, or surface water.

2.4.3 Lagoon

Samples of lagoon solids collected during the RFI indicate that the solids contain low levels of PAHs and metals. Mercury speciation performed on one sample of the lagoon sediment indicated the predominant fraction was F3, organic, although methyl mercury represented only 0.009% of the total mercury measured. Surface water samples have been collected from the lagoon for compliance with the State Pollutant Discharge Elimination System (SPDES) permit, and ELT Harriman has implemented an upgraded treatment system (i.e., reverse osmosis) for compliance with the SPDES permit.

2.4.4 Groundwater

Groundwater contamination has been found at the site as evidenced by the contaminants of concern (COCs) consisting of benzene, toluene, ethylbenzene, xylene (collectively identified as BTEX compounds), chlorobenzene, pyridine, alpha-picoline, 2-amino pyridine and mercury. Benzene is present at various sampling locations which define the groundwater plume, and at the highest concentrations. Benzene has, therefore, been routinely used as a groundwater surrogate at the Site. Concentrations above groundwater quality standards remain in the area of the former main plant operations as a result of contamination present in the low-permeability soils. However, both the groundwater extraction and treatment IRM and the biosparging system have been shut down with NYSDEC approval, and groundwater testing since 2008 has consistently demonstrated that down-gradient groundwater quality meets standards through natural degradation of residual contamination.

2.4.5 Surface Water (West Branch of the Ramapo River)

Surface water has been characterized as a part of the RI and a supplemental investigation performed by the NYSDEC specifically focused on mercury. The RI did not indicate differences in upstream and downstream water quality and concluded that the Site had no measurable impact on water quality within the West Branch of the Ramapo River. The mercury investigation by NYSDEC generally indicated similar findings, however, the highest concentration of mercury, albeit below the then selected SCG, was reported at the outfall to the Site's groundwater treatment system discharge (no longer present). As a result, the NYSDEC also conducted a fish study within the West Branch of the Ramapo River and concluded that concentrations of mercury detected in the fish samples were below the fish consumption advisory level of 1,000 ng/g.

2.4.6 Sediment

Sediment sample characterization performed for the RI and in the NYSDEC's supplemental mercury investigation generally indicate comparable if not generally higher concentrations of SVOCs, metals, and TPH upstream in the West Branch of the Ramapo River in comparison to the downstream sampling locations. Mercury was detected in the sediment in the upstream and downstream locations at similar levels, although slightly less in the upstream locations, and the highest detected concentration adjacent to the site suggesting some localized influence on mercury concentrations, although all of the values are below the NYSDEC's Record of Decision (ROD) selected SCG. The NYSDEC's fish study did not indicate mercury levels above the fish consumption advisory level of 1,000 ng/g.

2.4.7 Off-Site Soil

The results of off-site soil samples collected on the adjacent Avon parcel and Village of Harriman property indicate that only mercury was detected, and in all cases was below the commercial/industrial SCO. PCBs were not detected during the off-site soil investigation.

2.5 Previous Remedial Actions

The site has been subject to the implementation of various remedial actions under the New York State Inactive Hazardous Waste Disposal Site program, including interim remedial measures (IRMs) and final remedies.

An IRM was implemented at the site starting in 1990, which consisted of groundwater extraction and treatment. After documenting declining VOC concentrations within the extracted groundwater, as well as decreased well efficiencies and pumping rates from the recovery wells, operation of the IRM was suspended in 2004 in favor of on-going operation of an alternative biosparge system, with the approval of the NYSDEC.

A biosparge system was installed in October 2002, and was operated until September 2008. This system was shut down in accordance with the NYSDEC-approved *Supplemental Remedial Action Work Plan* (HydroQual 2008). Groundwater sampling and analyses performed as part of the approved work plan and continuing to date, consistently demonstrate that groundwater impacts are restricted to the site and that samples collected from perimeter sentinel wells meet SCGs.

Remedial actions, in accordance with the selected remedy detailed in the ROD that was issued by the NYSDEC in March 1997, have also been implemented at the site. Work included drum and contaminated soil source materials removal, and the injection of Oxygen Release Compound (ORC) as further described in the CSR (2011).

Over the years 2002 through 2005, a number of activities were completed on the northern side of the lagoon, including the installation and sampling of monitoring wells and soil borings and a three-point biosparge system that was operated for two years.

An IRM for erosion control was installed along the stream bank of the West Branch of the Ramapo River, consisting of stapled geotextile with an overlying gravel cover. The IRM serves as a control measure against the potential for erosion of calcium sulfate material. The IRM was enhanced by replacing the gravel layer with heavier rip-rap material following a flooding event in April 2007. The IRM is subject to routine inspections, and maintenance.

3 SCOPE OF WORK

3.1 Introduction

The following sections present the scope of work to be completed under this work plan and are structured consistent with the tasks called for by the Stipulation and Order. For each task, three subsections are included that describe the task, the approach and procedures for how the work will be completed, and a description of the analyses or deliverable associated with that task. The sampling and analysis programs are described in Section 4 of this Work Plan.

3.2 Investigation Activities

3.2.1 Ramapo River Stream Bank, Surface Water and Sediment

Additional investigation of surface water, sediments, and stream bank soils will be conducted in the vicinity of the site in and along the West Branch of the Ramapo River.

Sediment, surface water, and river bank soil sample locations will be collected along transects to provide co-located data for comparative purposes. As such, samples will be collected along 7 transects, with each transect consisting of samples collected along each side of the stream bank (2 samples), a sample of the stream sediment (1 sample) and a co-located surface water sample (1 sample). Transects were established at 200 foot intervals, starting from the northwest corner of the Site, downstream of the point at which the effluent from the Orange County Sewer District (OCSD) #1 wastewater treatment plant discharges to the Ramapo River (which is approximately 20 feet upstream of the site boundary), to approximately 1,200 feet downstream of that point, as shown on Figure 3-1.

Additionally, a visual reconnaissance of the river downstream of the site will also be conducted in order to identify areas of potential sediment deposition, so that a decision can be made as to whether additional sampling is warranted. The NYSDEC will be notified of the scheduled reconnaissance visit five working days in advance so that the NYSDEC may have a representative present, if desired. Criteria for additional sample locations include:

- An area of significant fine-grained sediment accumulation that is not close to a defined transect; and

- An area of fine-grained sediment that appears to exhibit visual evidence of contamination (e.g., sheen, discoloration, odor)

The resulting data from the investigation will be compared to the appropriate NYSDEC SCGs and form part of the basis for a Fish and Wildlife Resource Impact Analysis (FWRIA), Part 1, per DER-10 3.10.1.

Sampling within the West Branch of the Ramapo River will begin at the downstream locations and work upstream. Surface water samples will always be collected first, followed by sediment sampling. For the purpose of this workplan it is assumed that sampling will be conducted during a period of low to moderate flow using waders to access the locations. Sampling from a boat during periods of high flow rates and surface water levels is not contemplated.

The sample nomenclature will identify the samples by location number, position, and type of sample (S for sediment and W for surface water). Ramapo River bottom samples are identified by the prefix “RR” and, river bank sediment samples by the prefix “RB” (as presented in Section 4).

3.2.1.1 River Bottom (Sediment) and Surface Water Investigation

3.2.1.1.1 Approach

Sediment samples will be collected at 0-6 inches, 6-12 inches and 12-24 inches below the riverbed (or to the maximum depth to which the sampler can be driven into sediments or the maximum depth of river deposited sediment, whichever is less), if sediment is present at each depth interval. The suitability of sediment for sampling, which is not intended to include semi-consolidated sand and gravel (i.e., kame and esker deposits), glacial till or other glacially derived materials, will be assessed in the field, in consultation with a representative of the NYSDEC, if present. Sampling locations may be adjusted in the field, as close to the originally designated location as possible, in order to collect an appropriate sediment sample.

Surface water samples will be collected from the mid-point of the water column.

3.2.1.1.2 Sampling Procedures

Sediment samples will be collected using a core sampler equipped with disposable acetate sleeves. The collected samples will be placed in laboratory provided glass or plastic ware and stored on ice pending delivery to the analytical laboratory.

A surface water sample will be collected from the same location as the sediment sample, at mid-depth within the water column, directly into laboratory provided sample containers. Samples will be collected from the “upstream” side of the individual collecting the sample and sample collection will proceed in a “downstream” to upstream”

direction. Surface water samples will always be collected first, followed by sediment sampling.

3.2.1.1.3 Analyses

Sediment and surface water samples collected from the upstream (RR1-S and RR1-W), two mid-point (RR3-S & RR3-W and RR5-S & RR5-W) and downstream (RR7-S and RR7-W) transect locations will be analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semi-volatile compounds (SVOCs) and Target Analyte List (TAL) metals. The remaining samples, both sediment (RR2-S, RR4-S, and RR6-S) and surface water (RR2-W, RR4-W, and RR6-W), will be analyzed for mercury.

3.2.1.2 Riverbank Soils

3.2.1.2.1 Approach

As noted above, the riverbank soil samples will be obtained along transects corresponding to the water and sediment sampling locations (Figure 3-1), i.e., each transect will include soil samples on both sides of the stream, and sediment and surface water samples within the stream. Riverbank soil samples will be collected, at 0-2, 2-6, and 18-24 inches below ground surface (bgs), at a total of 14 sample locations. Within each transect, river bank samples will be collected within the area located between the mean high water level and extending back from the stream to the 100 year flood elevation, or a minimum of 25 feet into the site (See Figure 3-1). Sampling will not take place in areas identified as containing calcium sulfate through previous sampling (i.e., river bank at the parking lot area), as the extent and character of the calcium sulfate material has been previously defined (Parking Lot Investigation Report, Cornerstone, April 2010).

3.2.1.2.2 Sampling Procedures

Riverbank soil samples will be collected using a core sampler equipped with disposable acetate sleeves. The collected samples will be placed in laboratory provided glass or plastic ware and stored on ice pending delivery to the analytical laboratory. The sample boreholes will be backfilled with remaining material. If any waste material is observed in the sampling locations, the borehole will be backfilled with soil to cover the waste materials

3.2.1.2.3 Analysis

Riverbank soil samples obtained from the upstream (RBN1-S and RBS1-S), two mid-point (RBN3-S & RBS3-S and RBN5-S & RBS5-S), and downstream (RBN7-S and RBS7-S) transect locations will be analyzed for TCL VOCs/SVOCs and TAL metals. The remaining samples (RBN2-S, RBN4-S, RBS2-S and RBS4-S) will be analyzed for mercury.

3.2.1.3 Qualitative Exposure Assessment and Fish and Wildlife Resource Impact Analysis

A qualitative exposure assessment, including a Fish and Wildlife Resource Impact Analysis (FWRIA) Part 1 evaluation, will be completed in accordance with DER-10, Section 3.3(c)4. The work will be completed using the data collected from the supplemental RI described in this work plan, along with previously collected data including:

- 2001 NYSDEC Fish and Surface Water Sampling Investigation
- 1995 NYSDEC Surface Water Sampling of the West Branch of Ramapo River
- County of Orange Environmental Impact Statement for expansion of the Harriman wastewater treatment plant, to the extent available.

The qualitative exposure assessment will be performed in accordance with the requirements of DER-10 and the FWRIA will be performed under the direction of a qualified biologist. The documentation and results of the Part 1 analysis will be submitted to NYSDEC. If the Part 1 resource evaluation indicates the need for further assessment, a work plan for completion of a Part 2 analysis will be submitted with the Part 1 results, in accordance with DER- 10. Section – 3.10.2.

3.2.2 Lagoon

An investigation of the soils in the areas around and adjacent to the SPDES Lagoon will be conducted to evaluate the effectiveness of the lagoon in preventing mercury from entering the Ramapo River. Delineation of the extent of waste and/or source material, proximate to the lagoon, if any is encountered, will also be completed.

3.2.2.1 Approach

Soil samples will be taken on an approximate 50-foot grid along the area between the lagoon embankment and the West Branch of the Ramapo River, as shown on Figure 3-2. The sample intervals are targeted to assess potential contaminant transport from surface water runoff, seepage, or subsurface flow. As such, surficial soil samples will be collected from each of the sample locations along the length of the lagoon's berm, approximately 1/3rd of the way down, where the phreatic surface would be anticipated to develop when the lagoon is at capacity. In addition, a set of samples will be located at the toe of the berm, which is where seepage from the lagoon would have most likely manifested, if it were to have occurred.

Soil samples collected at the base lagoon berm will be obtained at the target depth intervals: 0-2 inches bgs (e.g., with obvious organic matter [e.g., grass] or other non-soil [e.g., pavement] removed, 6-12 inches bgs, and 6 inches above the groundwater table. If any waste/source material is identified, additional samples of this material will also be collected for analysis. If sample results indicate the potential for migration of mercury from the lagoon to the Ramapo River is a threat to public health or the environment, or if

waste/source material is identified, the scope of the lagoon investigation may be expanded, pending discussion with NYSDEC.

3.2.2.2 Sampling Procedures

For surficial soil samples (0-2 inch interval), the ground surface will be carefully cleared by removing existing vegetation layers, surface debris, or the upper one centimeter of soil surface. Surficial soil samples within the berm will be collected using new disposable hand scoops at each sample location. Samples designated for VOCs will be collected using an EncoreTM Sampler. This sampling device will be inserted into the exposed soil surface (either the ground surface or soil core sampler as described below), and the retrieved sample will be capped and prepared for transport for laboratory testing.

Sampling at the base of the berm will be conducted using a GeoProbe® drill rig. Soil cores will be collected continuously from each borehole using a 4-foot long by 2-inch diameter “macro-core” soil sampler, with a clear acetate liner. After completing sample collection, excess soils will be placed back into the borehole, and clean sand will be used to fill the remainder of the borehole to the ground surface.

The sample nomenclature will identify the samples by location number, position, and type of sample (LS for lagoon soil, as presented in Section 4).

3.2.2.3 Analysis

The samples will be analyzed for TCL VOCs/SVOCs and TAL metals.

3.2.3 Off-Site Soil

A soil sampling program will be implemented in off-site areas per a November 14, 2007 work plan previously approved by the NYSDEC. This does not include the Avon Parcel to the southeast, or the Village of Harriman property to the northwest, at which sampling has been completed previously, and no additional sampling is required. The scope of the sampling program will be consistent with the NYSDEC-approved “Phase II RCRA Facility Investigation Work Plan,” (Brown and Caldwell, November, 2007). Execution of off-site sampling will depend on securing access to off-site properties. Efforts to obtain access will be documented and relayed to the NYSDEC, if access is denied.

3.2.3.1 Approach

The sample locations for the off-site investigation are depicted on Figure 3-3. The sample locations on the northern off-site properties have been minimally adjusted, as compared to the locations shown in the 2007 Work Plan referenced above, to coincide with the transect locations described above and as shown on Figure 3-1. Two soil samples will be collected at each sample location. One sample will be taken at 0-2 inches bgs, and another, at 2-24 inches bgs, that will be composited in the field. Soil sampling will then

continue, in a continuous manner, to the top of the water table. In cases where suspected calcium-sulfate sludge or other fill material is encountered, the sample will be collected from such material. Otherwise, a sample will be collected from the 6 inch interval above the water table, and subjected to analysis if the samples from the 0-2 and 2-24-inch intervals indicate impacts.

If observations of the presence of calcium sulfate sludge material or other evidence of impact, additional samples may be collected to further investigate areas. Because these activities will be performed on property owned by others in accordance with access agreements, decisions will be made in the field regarding how such samples will be collected and submitted for analysis to meet schedule requirements and access constraints.

3.2.3.2 Sampling Procedures

Sampling will be completed using a GeoProbe® drill rig. Soil cores will be collected continuously from ground surface to the depth of the water table at each borehole using a 4-foot long by 2-inch diameter “macro-core” soil sampler, with a clear acetate liner. Samples for analysis will be collected from the soils within the acetate sleeve. After completing sample collection, excess soils will be placed back into the borehole, and clean sand will be used to fill the remainder of the borehole to the ground surface.

The sample nomenclature will identify the samples by location number, position, and type of sample (OPN for northern off-site properties, and OPS for southern off-site properties, as presented in Section 4).

3.2.3.3 Analysis

Soil samples will be analyzed for PCBs and Mercury.

3.2.4 Decontamination

Samples for laboratory analysis will be collected with clean disposable equipment (e.g., acetate sleeves for soil collection) whenever feasible. In the event that field decontamination of sampling equipment is necessary, the following procedure will be utilized:

1. Laboratory grade glassware detergent plus tap water wash;
2. Generous tap water wash;
3. Distilled and deionized (ASTM Type II) water rinse;
4. 10% Nitric Acid rinse (trace metal or higher grade HNO₃ diluted with distilled and deionized (ASTM Type II) H₂O);
5. Distilled and deionized (ASTM Type II) water rinse;
6. Acetone (pesticide grade) rinse;
7. Total air dry or pure nitrogen blow out;

8. Distilled and deionized (ASTM Type II) water rinse; and
9. Document decontamination activities in field notes.

Steps one through 5 applies for samples to be analyzed for metals, while steps 6, 7 and 8 apply when samples are to be analyzed for organics.

All sampling equipment decontaminated via this procedure will be wrapped and/or sealed, in order that it does not come in contact with potentially contaminated equipment or surfaces. Investigation-derived waste (IDW) generated as part of decontamination activities, including wash and rinse water, will be containerized on-site pending proper disposal.

3.3 Parking Lot Area Feasibility Study

A Feasibility Study (FS) will be performed of remedial alternatives to manage the soil/material located under the parking lot area and along the stream bank at the Site. An FS Report will document the development and evaluation of the alternatives to support the selection of an alternative. The specific work items associated with the FS for the parking lot and stream bank area are described in the sections that follow. In addition, to the extent that the results of the Supplemental RI indicate that an FS should be performed for other media or aspects of the site as governed under the Stipulation and Order, the scope of such an FS will be coordinated with the NYSDEC before proceeding with the completion of the FS.

3.3.1 Remedy Selection Evaluation Criteria

In accordance with DER-10 Section 4.2, the alternatives for the parking lot and stream bank area will be evaluated using the following criteria:

- Threshold Criteria
 - Protectiveness of public health and the environment;
 - Compliance with SCGs;
- Primary Balancing Criteria
 - Long-term effectiveness and permanence;
 - Reduction of toxicity, mobility, or volume;
 - Short-term impacts and effectiveness;
 - Implementability;
 - Cost effectiveness; and
 - Land use.

The threshold criteria must be satisfied in order for an alternative to be eligible for selection. The balancing criteria are used to assess the relative merits of the alternatives.

3.3.2 Feasibility Study Process

The FS process is divided into three phases: (1) the development of alternatives, (2) evaluation of alternatives, and (3) selection of a recommended alternative. Typically development and screening of alternatives is performed as one general step. Alternatives will be developed by assembling combinations of technologies and the media to which they would be applied, into alternatives that address the media and contaminants underlying the parking lot area and along the stream bank of the Site. In accordance with DER-10 4.3(a), the FS process will involve the following seven steps:

1. Identification of the remedial goals for the parking lot area and the stream bank.
2. Development of remedial action objectives (RAOs) which would include goals related to contaminant specific SCGs.
3. Identification of the general response actions based on RAOs. General response actions define treatment, containment, excavation, disposal, institutional controls or other actions, singly or in combination, that may be taken to satisfy the RAOs; and identify the volume and areas of contaminated media, in order to take into account the chemical and physical characteristics of the parking lot area and the stream bank. Inappropriate response actions will be eliminated from further consideration in this step.
4. Identification and screening of technologies applicable to each general response action, for effectiveness and implementability. This step involves the screening of technologies, on a media-specific basis in order to eliminate those that cannot be technically implemented; and, as applicable, select a representative process for each technology to be retained for further consideration. To the extent that different process options may have a significant bearing on selection of a remedy, a representative suite of process options will be used in the evaluation.
5. Assembly of the selected representative technologies into alternatives. Potential technologies are assembled on a media-specific basis and developed into remedial alternatives. Each alternative is developed at the conceptual level and will include the overall size and configuration of process options; the estimated duration for remediation; spatial requirements; disposal options; permit requirements; limitations or other factors affecting the evaluation of the alternatives; and typical beneficial or adverse impacts on environmental resources. Estimates of remedial action costs will also be developed, along with the net present worth of remedial action costs over the duration of the remedial action implementation period. Remedial alternatives that are not technically implementable or are cost prohibitive relative to the other alternatives will be eliminated from further consideration in this step. In developing the various alternatives, integration of the parking lot and stream bank will also be considered, as components of the alternatives can equally apply to both areas of the Site (e.g., a containment barrier for the parking lot would also provide erosion protection along the stream bank).
6. Analysis of the alternatives based on the evaluation criteria described above. A detailed analysis of the remedial alternatives retained from Step 5, will be

performed with respect to the eight evaluation criteria outlined above in Section 3.3.1. These criteria serve as a basis for conducting the detailed analysis and for subsequently selecting the recommended remedial action. Each alternative is evaluated individually using the eight criteria; followed by a comparative analysis. At the conclusion of the detailed evaluations, an alternative is recommended for implementation.

7. Recommendation of a remedy. The recommended remedy is identified and basis for the recommendation summarized in this step.

3.3.3 Parking Lot Area Feasibility Study Report

The work described in Section 3.3.2 will be presented in an FS Report. As outlined in DER-10 Section 4.4(b)4, the Parking Lot Area FS Report will generally include the following sections:

- Narrative to provide background and historical information.
- Description and summary of the hydrologic, hydrogeologic and geologic characteristics as relevant to the parking lot area.
- Description and summary of the nature and extent of contamination.
- Discussion of remedial goals and remedial action objectives.
- Description of general response actions.
- Description and summary of the remedial alternatives development and screening process, including identification of potential remedial technologies, development and screening of alternatives, the detailed analysis of the alternatives, and with tables, maps, figures and other pertinent data, as appropriate.
- Discussion of the results of the FS and description of the recommended remedy.

3.4 Supplemental Remedial Investigation and Feasibility Study Report

Following the completion of the remedial investigation activities and feasibility study, a Supplemental Remediation Investigation and Feasibility Study (RI/FS) Report will be prepared to document the findings. The report will be supported by various maps, illustrating sample locations, and summary tables of analytical testing results. Copies of the laboratory data will be included as an appendix to the Supplemental RI/FS Report. To the extent practicable, the RI/FS Report will also include relevant data from other sources (RCRA RFI data, NYSDEC fish study, Orange County, etc.).

3.5 Conceptual Site Model

The conceptual site model (CSM) represents a written description or understanding of the site conditions that dictate contaminant fate and transport. The development of a conceptual site model starts with an understanding of the site hydrogeology and groundwater flow followed by a discussion of the site analytical data. The site hydrogeology and groundwater flow were previously summarized above, but are

reiterated here for completeness of the conceptual site model. Based upon the observations regarding the site hydrogeology and groundwater flow, the site conceptual model is then presented.

The conceptual site model was originally developed and presented in a report prepared by HydroQual (2008), although the project organization presented in Section 7 includes the personnel that developed the original CSM. However, for correct attribution of the work product, the figures used to portray the CSM are provided as an attachment (see Appendix A) in their original form.

3.5.1 Site Hydrogeology

The site is underlain by a layer of fill material overlying a complex sequence of glacially derived clay, silt, sand and gravel. Near surface, immediately underlying any fill material, is a fine grained Clay and Silt with interbedded, discontinuous layers of Silt and fine Sand. This fine grained unit represents a glacial lacustrine or lake deposit that is present throughout the entire site with the exception of the area near PZ-1 near the west-central portion of the facility. Underlying the Clay and Silt deposits is a glacial outwash or stream deposit that varies across the site from fine to coarse Sand. Generally speaking, the sand is finer near the southeast end of the facility and coarser and thicker near the central portion. Also within the central portion of the facility, the coarse Sand deposits immediately overlie bedrock. Within the northeast side of the Site, the glacial lacustrine and glacial outwash deposits are underlain by a kame or esker deposit which is characterized by a mix of clay, silt, sand and gravel that is weakly cemented. Glacial till, consisting of a dense silt and clay matrix with lesser amounts of sand and gravel, is present intermittently at various locations immediately overlying bedrock. The entire site is underlain by fractured dolomite bedrock.

Appendix A, Figure 2-1 presents a map of the site along with the orientation of three cross sections that are presented in Appendix A as Figures 2-2 through 2-4. The cross sections illustrate the relationship between the various glacially derived deposits described above and visually depict the layer of glacial lacustrine silt and clay overlying the coarser-grained sand and gravel as well as the kame and glacial till deposits. Appendix A, Figure 2-5 presents an isopach map of the thickness of the glacial outwash deposits. This map illustrates a thicker sequence of sand and gravel underlying the central portions of the facility as illustrated by the light blue shading.

Conceptually, the depositional history can be envisioned as glacial ice moving southward across the region while depositing the glacial till. As the glaciers melted, fast moving water carrying sand and gravel eroded channels into the glacial till, with the deepest channels cutting completely through the glacial till to the underlying bedrock. As the melt waters subsided, the coarse sand carried by these melt water streams fell out of suspension and was deposited within these channels. Over the course of multiple thaw and melt cycles, the melt water would overflow the banks of these channels and fine

sands and silts suspended in the water were deposited along the banks. The thicker glacial outwash deposits underlying the central portion of the site, as illustrated in Appendix A, Figure 2-5, represent the channel cut into the underlying glacial till by the glacial melt water. Likewise, the observed finer grained sands represent materials deposited to the sides of the channel. The edges of the channel are reflected in cross section C-C' (Appendix A, Figure 2-4) where the coarse sand deposits abruptly intersect the glacial till deposits between wells R-3D and MW-27D.

The kame deposits, illustrated on the northern end of cross section A-A' (Appendix A, Figure 2-2) and comprised of an unsorted mix of silt, sand and gravel, represent localized deposition of materials immediately adjacent to the edge of a glacier. Finally, as the glaciers retreated farther to the north, the area was repeatedly flooded by glacial lakes which deposited the fine grained clay and silt deposits that are present over the majority of the site.

The variations in grain size and the thickness of the glacial deposits described above and illustrated in Appendix A, Figures 2-2 through 2-5 represent the controlling factors relative to groundwater flow beneath the facility. Water levels collected on October 15, 2007 are plotted on the cross sections presented in Appendix A, Figures 2-2 through 2-4 and are used as control points for construction of the equipotential lines illustrated in blue. These data consistently indicate principally vertical (downward) flow paths within the near surface, fine grained glacial lacustrine deposits and more horizontal flow paths in the coarser-grained outwash deposits. Collectively, this indicates that the finer grained silt and clay deposits represented by the Glacial lacustrine deposits, glacial till and to a slightly lesser degree the kame deposits, serve as aquitards, limiting the volume of water moving through them and principally demonstrating downward, vertical flow paths. Hydraulic conductivity estimates of the near surface glacial lacustrine deposits, at 10^{-6} cm/sec, further support this interpretation. Conversely, the coarser-grained outwash deposits represent an aquifer with the ability to transfer larger volumes of water in a preferentially horizontal orientation. This is supported by aquifer tests completed within the thicker, more coarse grained portions of the outwash channel, which suggest permeability on the order of 5×10^{-2} cm/sec; and water quality data as discussed further below. Note that this estimated permeability is likely high in that the referenced aquifer test was completed in an area where the outwash is in direct hydraulic communication with the bedrock, and therefore, the resulting hydraulic conductivity represents a combination of both the bedrock and the outwash. In addition, as one moves out of the channel of thicker coarse-grained outwash to where finer-grained sands predominate, the hydraulic conductivity will further decrease.

Hydrogeologically, the data indicate that the glacial lacustrine deposits represent an aquitard while the outwash deposits serve as an aquifer. As illustrated in the cross sections, both units underlie the majority of the site. However, the extent to which the aquifer can transmit significant volumes of water is dictated by grain size and thickness. Accordingly, greater flow volumes are anticipated near the central portion of the site where the outwash is thickest and coarse grained. Conversely, lower flow volumes will

be present where the outwash is finer grained and thinner. The extent to which the channeling of the coarser-grained outwash deposits influences groundwater flow is further evident in the southeastern portion of the site where the aquifer is apparently blocked, or at least limited, by the abrupt intersection of the glacial outwash with the glacial till as shown in Section C- C' (Appendix A, Figure 2-4). This observation, coupled with water quality data discussed further below, and the knowledge that thicker, coarse-grained outwash deposits are present to the north of this area underlying the central portions of the site, suggest that groundwater flow is diverted around the low permeability till towards the central portion of the site before again moving eastward.

Monitoring wells completed within the overburden aquifer (i.e., outwash deposits) have been used to construct a potentiometric surface map as illustrated in Appendix A, Figure 2-6. In a homogeneous, isotropic aquifer, groundwater flow paths would be oriented perpendicular to the equipotential lines. As an example, under isotropic conditions, one would anticipate groundwater flow in the southern portion of the site to travel roughly from the MW-25 location towards the MW-12/MW-13 location. As noted above, however, the system is not homogeneous or isotropic, therefore, groundwater flow would not be perpendicular to the equipotential lines. Further, the boring logs indicate that there are thicker, coarser-grained outwash deposits underlying the central portion of the site that have the potential to transmit greater volumes of groundwater. Finally, water quality data indicate elevated concentrations of site COCs at the MW-25S location but non-detectable (ND) to trace level ("J" qualified) concentrations at MW-12S and MW-13S (with the exception of one detection of 18 ppb of benzene). This observation is true as far back as 1985, prior to any remedial actions. These data provide further evidence that groundwater flow is not perpendicular to the equipotential lines but at an angle, consistent with what one would expect in an anisotropic medium.

Collectively, the data suggest that groundwater flow is controlled by the thick channel of coarser-grained outwash underlying the central portion of the site. As a result, groundwater flow is not perpendicular to the equipotential lines but at an angle, with a conceptualized flow path sweeping generally from the MW-25S area towards MW-16S, RW-1R and MW-18S. Similar flow paths would be present at other locations across the site with the predominant flow paths converging towards the coarser-grained, thicker outwash deposits underlying the central portion of the facility.

3.5.2 Contaminant Behavior and Distribution

As described above, the grain size of the glacially derived deposits underlying the site range from fine-grained silt and clay to coarse-grained sand and some gravel. To better understand how the site COCs behave in response to these variables and to assess changes in concentration with time, benzene concentrations have been plotted for wells MW-8S, MW-11S and MW-16S in Appendix A, Figures 2-7 through 2-9, respectively, from the earliest available data through the point just prior to shutdown of the biosparge system. As described in greater detail by Arcadis (October 2007), benzene is consistently

detected at concentrations above that of other COCs and fluctuations in concentration of other constituents through time are consistent with those observed for benzene. Therefore, plotting of the benzene concentrations provides a good representation of COC concentrations in the aquifer.

Well MW-11S (Appendix A, Figure 2-8) represents a location near the central portion of the facility where the outwash deposits are coarse grained. MW-8S represents a transitional area comprised of interlayered coarse and fine sand. Finally, MW-16S is within principally fine sand. As illustrated in Appendix A, Figures 2-7 through 2-9, all three locations illustrate declining concentrations with time. However, MW-11S started out at lower concentration than the other two locations and responded quickly to the groundwater pumping IRM implemented in September 1990. Benzene concentrations reached non-detectable levels in the mid to late 1990s and have remained at these levels since that time. MW-8S started out at higher concentrations than MW-11S. However, even though this well is closer to the IRM pumping well (RW-1R) than MW-11S, the benzene concentrations respond slowly to the IRM pumping and only reach consistently non-detectable levels in 2006. Finally, MW-16S represents the highest initial starting concentrations of benzene and while it appears that the IRM pumping helped to reduce benzene concentrations (a downward trend is noted prior to the start of pumping) the concentrations reach an asymptotic level in the mid-1990s (fluctuating in the hundreds of parts per billion) and have remained at these levels.

While the starting concentrations are partially a function of where the well is located (i.e., spatial variability, proximity to former releases, etc.), both the starting concentration and how these concentrations behaved with time are strongly related to grain size. At MW-11S, where the aquifer materials consist of coarse sand and some gravel, the groundwater velocities are high (in comparison to other locations on site) and contaminants are quickly flushed through the system. Further, the coarser-grained materials do not lend themselves readily to adsorption and retardation of the COCs, so that the concentrations do not linger. MW-8S represents a transition in the aquifer materials from the coarse-grained deposits at MW-11S to the fine-grained deposits at MW-16S. As a consequence, both the starting concentrations and declining trends with time illustrate an intermediate point between that observed in MW-11S and MW-16S. The portion of the aquifer materials at MW-8S that are finer grained do not transmit groundwater as rapidly as the coarser-grained materials and they also tend to adsorb and retard the COCs more readily. As a result, it takes longer for the concentrations to decline following implementation of the IRM, as the contaminants slowly release from the finer-grained materials. The lower permeability of the finer grained soils also does not allow the oxygenated water provided by the biosparge system to move readily through the aquifer and enhance aerobic biodegradation. These limiting factors are most evident in MW-16S. Consequently, MW-16S demonstrates the highest concentration of these three wells and detectable concentrations still remain after implementation of the IRM pumping and biosparge systems.

As described in detail within the Arcadis, October 2007 Report, the site COCs (specifically benzene, pyridine, and picoline) are all biodegradable, both aerobically and anaerobically, and there is strong evidence that biodegradation is contributing to the observed decline in concentrations. This declining trend is particularly evident when comparing concentrations and plume maps prior to remedial actions, circa 1988, versus those in January 2007 (Arcadis, October 2007). A further assessment of the changing conditions with time has been completed by comparing the soil gas results obtained in 1991 versus recent soils analytical data collected as part of the RCRA Facility Investigation (RFI), Brown and Caldwell April, 2007, and a Geoprobe investigation conducted by Arcadis (October 2007). Comparison of the RFI data to the 1991 soil gas results is presented in Appendix A, Figure 2-10. RFI soils data reporting elevated concentrations of benzene and locations that were completed in the vicinity of elevated soil gas measurements are tabulated and plotted in Figure 2-10. For ease of reference, boring locations with benzene concentrations above 10 mg/kg are plotted in magenta while those with concentrations below 10 mg/kg or not detectable, are plotted in green. As detailed in the table on Appendix A, Figure 2-10, most of the locations plotted in green represent trace to non-detectable benzene concentrations.

Comparison of the RFI soils data to the 1991 soil gas concentrations does not indicate a good correlation. For example, while the RFI samples with the highest benzene concentrations (magenta) are plotted just to the north of an area with elevated soil gas readings, there are other RFI locations to the northwest that are within areas with low soil gas. Further, there are numerous locations (green) with low to non-detectable levels of benzene that are associated with areas identified with elevated soil gas concentrations.

Similarly inconsistent results were found as part of the Geoprobe Investigation conducted by Arcadis (October 2007). Appendix A, Figure 2-11 illustrates the location of the Geoprobe borings in comparison to the soil gas readings, as well as the analytical results from soil and groundwater samples collected from these borings. As illustrated, the Geoprobe borings are adjacent to an area identified as having high soil gas concentrations. However, the soil concentrations are comparable to those reported in RFI samples 50-B-001 and A-B-012, which are located in an area with low soil gas readings. In addition, while the soil and groundwater samples were not collected from the same depth (soil samples were collected from intervals with the highest PID reading and groundwater samples were collected from the most productive water-bearing interval) the soil sample and the groundwater results do not correlate well.

These data provide further evidence of the influence of biodegradation, effects of the remedy components that have been implemented at the site, and declining groundwater concentrations with time and that the 1991 soil gas results are no longer representative of current conditions. This observation is consistent with the data indicating that benzene, as well as other site COCs, are undergoing biodegradation.

Following the initial development of the CSM, in accordance with an NYSDEC-approved *Supplemental Remedial Action Work Plan*, additional wells were installed to

provide monitoring locations that would represent flow along the preferred groundwater pathway in the coarse-grained deposits as described above. These wells were installed in 2008, and following installation, a routine monitoring program was implemented. The initial sampling constituted a baseline event, and sampling was then conducted semi-annually thereafter through April of 2012, when on the basis of the consistency of the data, the NYSDEC approved a sampling frequency of every five quarters.

At the time of the baseline and then first post-biosparge shutdown monitoring, the groundwater quality confirmed that the biosparge system could be shut down. The conclusions at that time (based on October 2008 groundwater monitoring data) were as follows:

- None of the data indicate that concentrations of site constituents were increasing down-gradient, along the axis of the preferred groundwater flow path. For example, groundwater concentrations of site constituents (benzene, toluene, ethylbenzene, xylene, pyridine, alpha-picoline, and 2-aminopyridine) in monitoring well MW-8S located less than 50 feet down-gradient from biosparge wells 17, 18 and 19, remained at non-detect.
- Following shutdown of the biosparging system, concentrations of site constituents continued to be below SCGs at plume fringe and sentinel wells.
- After shutdown of the biosparging system, concentrations of some site constituents, principally benzene, increased in wells within the former operations area (i.e., MW-16S, OW-6, and OW-7), but at less than historical levels. This was not unexpected based on the Site Conceptual Model (constituents remain in the low-permeability overburden deposits that can locally affect groundwater quality).

Since that time, each monitoring event has consistently shown that the concentrations of COCs are below SCGS at the plume fringe and sentinel wells, and that fluctuations in water quality in the low-permeability overburden deposits are a consequence of the character of the formation and not a representation of any change in the site conceptual model (i.e., constituents remain in the low-permeability overburden deposits that can locally affect groundwater quality and are affected by local recharge events). Trend plots have been provided with each quarterly report since the semi-annual monitoring started following the biosparge system shutdown, and the most recent trend plots submitted with the third quarter of 2013 quarterly progress report to the NYSDEC are provided in Appendix C. As these trend plots illustrate the understanding of the distribution of contamination at the site is well understood and has been verified through over six years of groundwater monitoring.

3.5.3 Conceptual Site Model (CSM)

On the basis of the information presented above, the conceptual site model (CSM) may be described as follows:

- Groundwater flow in the near surface glacial lacustrine deposits (aquitard) is principally vertical with discharge into the underlying glacial outwash. Horizontal flow in the aquitard is limited to localized and discontinuous lenses of sand.
- A channel of coarser-grained sand and some gravel outwash, underlying the central portions of the site, is the primary conduit for groundwater flow and contaminant transport. While the outwash aquifer is present underlying most, if not all of the site, these deposits thin and become finer grained to the north and south, thus limiting their ability to transmit groundwater.
- The variable thickness and grain size of the outwash aquifer deposits result in a non-homogeneous, anisotropic aquifer. As a consequence, groundwater flow is not perpendicular to the equipotential lines. Rather, groundwater flow will travel at an angle to the equipotential lines toward the coarser-grained, thicker deposits underlying the central portion of the site.
- Groundwater flow through the glacial outwash aquifer is generally to the northeast with discharge to surface water (West Branch of the Ramapo River) and adjacent wetlands. However, due to the contribution to flow from the upstream Harriman Wastewater Treatment plant, portions of the stream can be losing (i.e., flow is downward from the stream into groundwater), although overall the surface water and wetlands are the ultimate discharge point for groundwater.
- Groundwater travel times vary depending on the grain size and associated permeability of the aquifer material. Travel times through the coarser-grained, thicker deposits underlying the central portion of the site are likely on the order of 600 to 800 feet/year and therefore, groundwater from this region of the site is, and has been for some time, manifested in the down-gradient plume fringe and sentinel monitoring wells.
- COC concentrations are declining as a result of past remedial activities (excavations, pumping, biosparging) and natural degradation. As a result, COC concentrations are below SCGs at plume fringe and sentinel wells, and have been sustained below SCGs even after shutdown of the biosparge system in 2008.
- The lower permeability fine sands and silts of the aquifer, and silt and fine sand of the aquitard, retain residual levels of COCs, but these are not contributing to groundwater contamination at levels that cause SCG exceedences at the down-

gradient plume fringe and sentinel wells. Groundwater contamination is restricted to the Site. As such, the remedial measures previously completed (source material removal, groundwater pumping, biosparging) were effective in removing source material. The limited contaminant flux from the low-permeability deposits along with biodegradation of the Site COCs is controlling down-gradient groundwater contamination.

Based on the above understanding of the Site hydrogeology, groundwater flow, and contaminant distribution, the CSM provides the basis for the conclusion that groundwater contamination that remains on site will not impact off-site areas, bedrock or the Ramapo River.

Sample ID/Location	Parameters
<u>Off-site Properties:</u> <i>North: OPN-1 through OPN-4/0-2, 2-24, x-x (depth below GS of 6" above GW/ Date</i> <i>South: OPS-1 through OPS-6/0-2, 2-24, x-x (depth below GS of 6" above GW/ Date</i>	PCBs and Mercury

The sample naming convention shown in Table 4-1 is that sediment and surface water samples will be identified by the location number, position, and type of sample (S for sediment and W for surface water), followed by the depth interval and then the date. Ramapo River bottom sediment samples are identified by the prefix "RR", river bank sediment samples by the prefix "RB", followed by the location number (i.e. 1,2,3, etc.), and "S" for sediment. Sampling intervals 0-2, 2-6, 6-12, and 18-24 identify which depth interval the sediment was collected from. The date format should be without hyphens, i.e. 031514 for March 15, 2014. Surface water samples from the same locations are identified by the prefix "RR", followed by the location number, and "W" for water, then the date.

Field blanks and trip blanks will be identified by the prefix "FB" or "TB" followed by the date of collection. Duplicate samples will be identified by DUP1, DUP2, etc., with the location of the duplicate sample identified in the field book.

4.2 Project Scope and Goals

The supplemental remedial investigation for the Site consists of soil, sediment and surface water sampling. The data collected during this field investigation will be used for characterizing the quality of the soil, sediment and surface water, defining the horizontal and vertical extent of site-related constituents, assessing potential human health and ecological risks, and supporting remedial planning.

4.3 Data Quality Objectives

Data collected under this work plan must be suitable for the purpose of characterizing the media (soil, sediment and surface water), determining the presence of contaminant concentrations above applicable criteria and delineation of areas of contamination. In order to meet these data needs, the samples submitted for laboratory analysis must be collected, handled, and analyzed in accordance with consistent, standardized procedures. Detection limits for soil samples must be suitable for comparison to appropriate soil cleanup objectives (SCO) listed in 6NYCRR Subpart 375-6.8. Detection limits for surface water samples must be suitable for comparison to water quality standards listed in Table 1 of Subpart 703.5. Detection limits for sediment must be suitable for comparison to NYSDEC's technical guidance.

4.4 Laboratory Analytical Procedures and Reporting Requirements

Samples will be submitted to a laboratory that is accredited pursuant to the NYS Department of Health (DOH) Environmental Laboratory Accreditation Program (ELAP) for the category of parameters analyzed. Analytical details are presented in the Analytical Methods/Quality Assurance Summary Tables, Table 4-2 and 4-3, which are organized by matrix and parameter, respectively. The laboratory will maintain on file current method detection limit (MDL) studies to demonstrate their ability to meet or better the recommended reporting limits. In addition, the laboratory may establish laboratory-specific reporting limits or practical quantitation limits (PQLs) that are verified by the MDL studies and included in the laboratory's analytical reports.

Analytical results will be reported by Category B laboratory data deliverables reporting requirements. The Category B deliverable package includes a formal assessment of the quality of the data and undergoes a rigorous internal data validation procedure. A non-conformance summary checklist is supplied with the Category B deliverables package. This is filled out by the laboratory manager/director as he/she reviews the report in its entirety, utilizing supervisor reviewed data submissions from the various departments. This summary will help with the assessment of the usability of the data in light of analytical performance and whether project data quality objectives have been met by the reported data. The data will be evaluated for usability and applicability to the data quality objectives, and per DER-10, a Data Usability Summary Report (DUSR) will be prepared by Leslie Sparrow.

5 HEALTH AND SAFETY

5.1 Health and Safety Plan

A Site-Specific Health and Safety Plan (SSHASP) for the investigation activities has been prepared in accordance with the Occupational Safety and Health Administration (OSHA) requirements, set forth in 29 CFR and other applicable federal and state regulations.

The SSHASP is presented in Appendix C.

6 SCHEDULE

A schedule for implementation of this Supplemental Remedial Investigation and Feasibility Study Work Plan is depicted in Figure 6-1. The schedule was developed based on the scope of work and sequence of work as described in the Work Plan, along with the following assumptions:

- The schedule will be updated upon approval of the work plan, following NYSDEC review and comment, and final preparation of this work plan.
- The NYSDEC will be advised a minimum of 5 business days in advance of the start of sampling.
- The start date for investigation activities will depend on the availability of GeoProbe® drill rig equipment.
- Laboratory analyses, as described above, are assumed to be on a standard laboratory turnaround time of 3 to 4 weeks for initial reporting of data, unless otherwise specified above.
- The schedule assumes that access to off-site properties will be available at the time that investigation activities are to commence. If access is denied documentation will be provided to the NYSDEC. Denial of off-site property access could affect the schedule.
- Health and Safety considerations, due to non-conductive weather conditions or river flow velocities, may delay sampling. Sampling activities within the West Branch of the Ramapo River will be conducted during periods of low to moderate flow and surface water levels such that work can be conducted safely using waders. The use of a boat for sampling activities is not contemplated.

7 PROJECT ORGANIZATION

The project roles and responsibilities for the supplementation remedial investigation activities for the Former Nepera Harriman Site are presented below. Technical personnel will be as shown or equivalently qualified.

- Seth Levine of Settling Defendant Cambrex Corporation is the project coordinator with overall responsibility as the Corporate Defendants' representative for implementation of the Supplemental Remedial Investigation and Feasibility Study Work Plan. Mr. Levine's contact information is as follows:
 - Mr. Seth Levine
Cambrex Corporation
One Meadowlands Plaza
East Rutherford, New Jersey 07073
201-804-3038
seth.levine@cambrex.com
- Christopher Clark is the project liaison for Settling Defendant Pfizer Inc. Mr. Clark's contact information is as follows:
 - Christopher J. Clark
Pfizer Inc
Environmental Engineering, Remediation & Transactions
235 E. 42nd Street 219/05/01
New York, NY 10017
212-733-5997
christopher.j.clark@pfizer.com
- Cornerstone Engineering and Land Surveying, PLLC (Cornerstone) will serve as the Corporate Defendants' on-Site representative, functioning as the Engineer of Record and Project Manager for the Supplemental Remedial Investigation and Feasibility Study (RI/FS) Work Plan. The primary contact for Cornerstone is:
 - Mr. Gary DiPippo, P.E.
Cornerstone Engineering and Land Surveying, PLLC
100 Crystal Run Road, Suite 101
Middletown, New York 10941
845-695-0200
gary.dipippo@cornerstoneeg.com

The field investigation will be managed by the remedial investigation task manager, whose contact information is as follows:

- Mr. Timothy Roeper, P.G.
Cornerstone Engineering and Land Surveying, PLLC
100 Crystal Run Road, Suite 101
Middletown, New York 10941
845-695-0200
tim.roeper@cornerstoneeg.com

The contact information for the Project Quality Assurance Officer is:

- Leslie Sparrow, P.G.
Cornerstone Engineering and Land Surveying, PLLC
100 Crystal Run Road, Suite 101
Middletown, New York 10941
845-695-0200
leslie.sparrow@cornerstoneeg.com

The FWRIA will be managed by Tiffany Medley:

- Tiffany Medley
Cornerstone Environmental Group, LLC
754 Route 18, Suite 104
East Brunswick, NJ 08816
845-695-0265
tiffany.medley @cornerstoneeg.com

Resumes of the project personnel are included in Appendix D.

8 REFERENCES

Conceptual Site Model and Supplemental Remedial Action Work Plan, HydroQual, Inc., May 2008.

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USGS Publication 1415B - Hydrogeologic Framework of Stratified Drift Aquifers in the Glaciated Northeastern U.S.

TABLES

Table 4-2. Soil, Sediment and Surface Water Sampling Analytical Details by Matrix

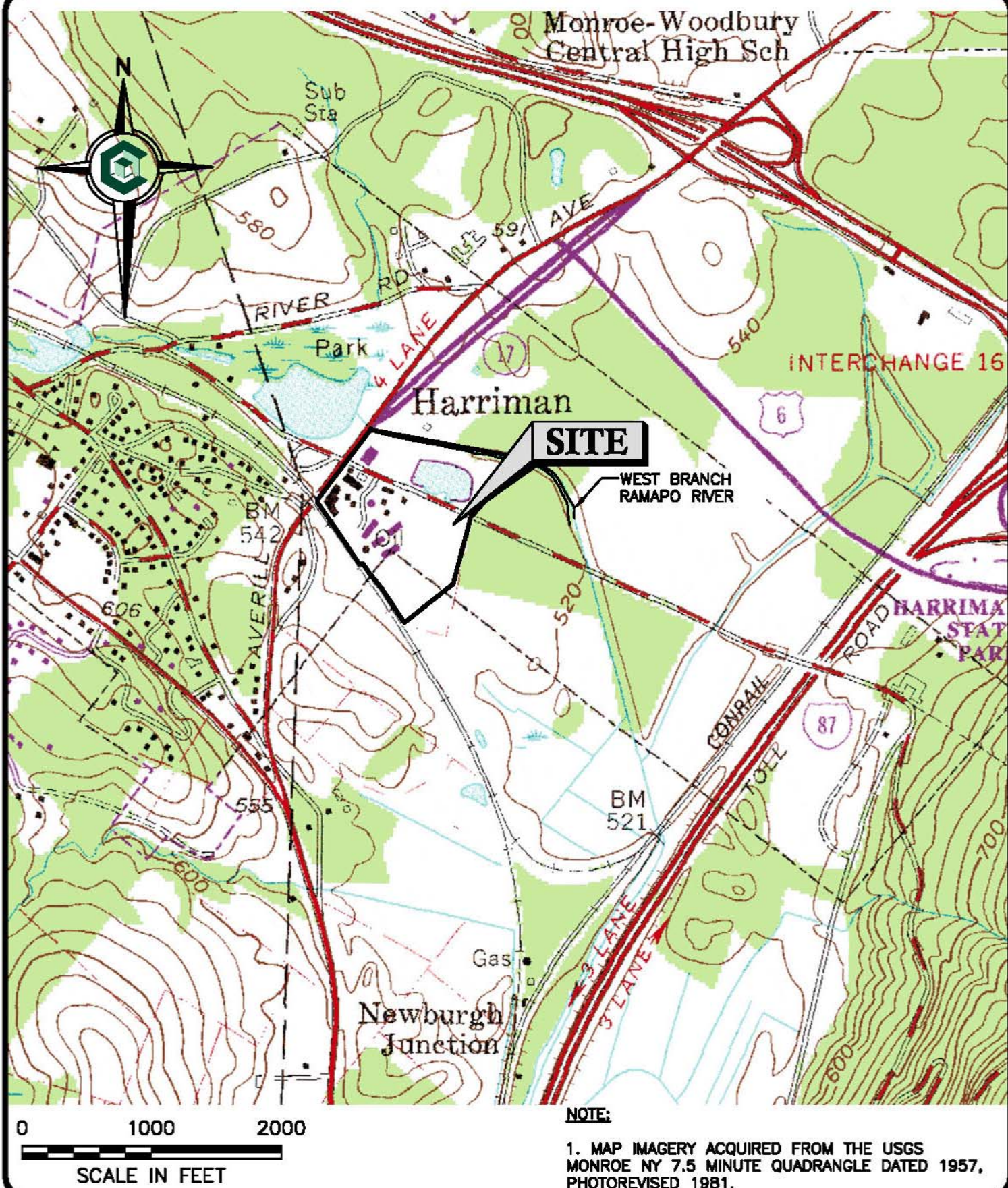
Matrix Type	Soil	Sediment	Surface Water
Field blanks per matrix	1/20 samples	1/20 samples	1/20 samples
Trip blanks per matrix	N/A	N/A	1/shipping container
Analytical parameters to be measured per matrix	TCL VO _s , TCL SVO _s , TAL metals, Off-site: PCBs, mercury only Field Blank – TCL VO _s	TCL VO _s , TCL SVO _s , TAL metals, Selected sites: mercury only Field Blank - TCL VO _s ,	TCL VO _s , TCL SVO _s with SIM, TAL metals, Selected sites: mercury only Trip Blank – TCL VO _s Field Blank - TCL VO _s , TCL SVO _s , TAL metals
Analytical methods to be used per matrix	See Table 4-3.	See Table 4-3.	See Table 4-3.
If proposed, number of MS/MSD samples to be collected	Lab performed	Lab performed	Lab performed
Type of MS/MSD samples			
If proposed, the number of duplicate samples to be collected	1/20 samples	1/20 samples	1/20 samples
Type of duplicate samples to be collected	split	split	split
Sample preservation to be used per analytical method and sample matrix	See Table 4-3.	See Table 4-3.	See Table 4-3.
Sample container volume and type to be used per analytical method and sample matrix	See Table 4-3.	See Table 4-3.	See Table 4-3.
Sample holding time to be used per analytical method and sampling matrix	See Table 4-3.	See Table 4-3.	See Table 4-3.

Table 4-3. Soil, Sediment and Surface Water Sampling Analytical Details by Parameter

Matrix Type	Soil	Sediment	Surface Water
Analytical methods to be used per matrix	TCL VO _s – 8260B TCL SVO _s – 8270C TAL metals – 6010B Mercury – 7471A PCBs - 8082	TCL VO _s – 8260B TCL SVO _s – 8270C TAL metals – 6010B Mercury – 7471A	TCL VO _s – EPA 624 TCL SVO _s – EPA 625 & 8270C (SIM) TAL metals – 6010, 6020 Mercury – 7470A
Sample preservation to be used per analytical method and sample matrix	TCL VO _s – HCl*, Cool 4 ⁰ C TCL SVO _s – Cool 4 ⁰ C TAL metals – Cool 4 ⁰ C Mercury - Cool 4 ⁰ C PCBs – Cool 4 ⁰ C	TCL VO _s – HCl*, Cool 4 ⁰ C TCL SVO _s – Cool 4 ⁰ C TAL metals – Cool 4 ⁰ C Mercury - Cool 4 ⁰ C	TCL VO _s – HCl, Cool 4 ⁰ C TCL SVO _s – Cool 4 ⁰ C TAL metals – HNO ₃ , Cool 4 ⁰ C Mercury - HNO ₃ , Cool 4 ⁰ C
Sample container volume and type to be used per analytical method and sample matrix	TCL VO _s * – Encore sampler TCL SVO _s – 4 oz jar TAL metals – 4 oz jar Mercury – 4 oz jar PCBs – 4 oz jar	TCL VO _s – Encore Sampler TCL SVO _s – 4 oz jar TAL metals – 4 oz jar Mercury – 4 oz jar	TCL VO _s – 3 x 40 ml vials TCL SVO _s – 2 x 950 ml jars TAL metals – 1 x 250 ml poly preserved w/ HNO ₃ Mercury – included w/ TAL Metals or 1 x 250 ml poly preserved w/ HNO ₃
Sample holding time to be used per analytical method and sampling matrix	TCL VO _s * – 48 hrs/14 days TCL SVO _s – 14 days TAL metals – 6 months Mercury - 28 days PCBs- 14 days	TCL VO _s * – 48 hrs/14 days TCL SVO _s – 14 days TAL metals – 6 months Mercury - 28 days	TCL VO _s – 14 days TCL SVO _s – 7 days TAL metals – 6 months Mercury – 28 days

*In place of field sample preservation, sample will be collected using a field sampling/storing device (i.e. EnCore or equivalent) and shipped to the laboratory within 48 hours of sampling.

FIGURES



NEPERA, INC. AND WARNER-LAMBERT COMPANY
FORMER NEPERA FACILITY
HARRIMAN, NEW YORK

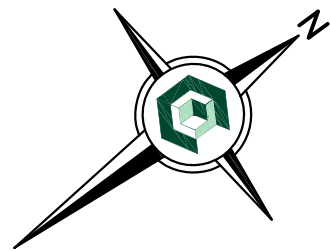
SITE LOCATION MAP

FIGURE NO.

1-1

PROJECT NO.
140079

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BALL FIELD
AREA

BLOCK 108
LOT 5.3

NEW YORK STATE ROUTE 17

ARDEN HOUSE ROAD

BLOCK 108
LOT 15.21

BLOCK 108
LOT 15.22

BLOCK 108
LOT 12

BLOCK 108
LOT 11

BLOCK 108
LOT 10

BLOCK 108
LOT 1.3

BLOCK 108
LOT 1.1

RAMAPO RIVER

LEGEND:

- — — — — PROPERTY BOUNDARIES
- - - - - FORMER NEPERA FACILITY BOUNDARIES
- x - x - x - x - x - EXISTING FENCE LINE
- - - - - EXISTING RAIL ROAD
- ⊕ MW-2S EXISTING MONITORING WELL
- ⊕ PZ-1 EXISTING PIEZOMETER

G

STUDY AREA AS DEFINED
IN 1997 ROD

0 200 400
SCALE IN FEET

NOTE:

1. TAX MAP INFORMATION ACQUIRED FROM TAX MAP DRAWING NAMED "VILLAGE OF HARRIMAN" DATED 10/26/2004, FOR OFF-SITE PROPERTIES.



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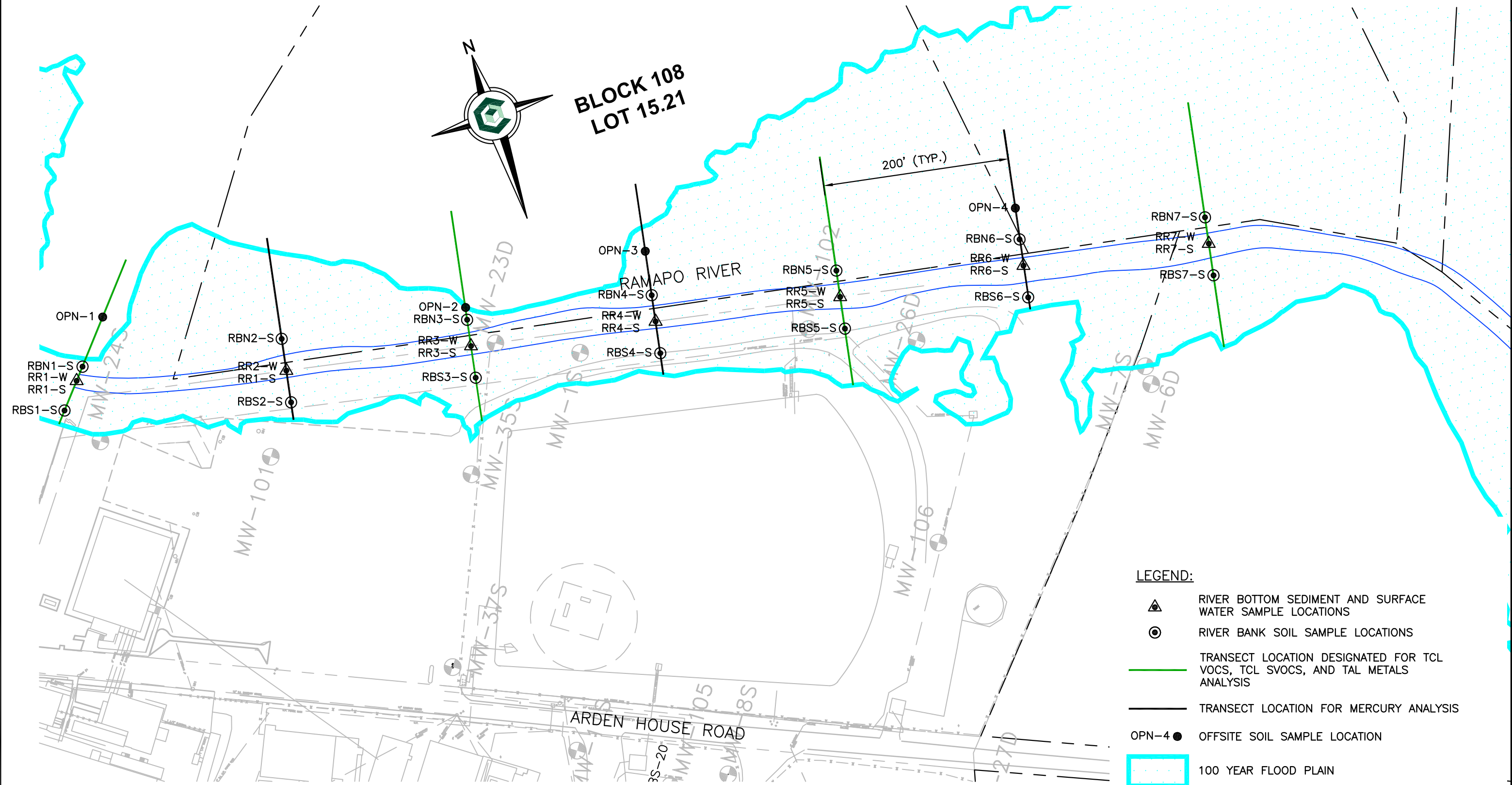
NEPERA, INC. AND WARNER-LAMBERT COMPANY
FORMER NEPERA FACILITY
HARRIMAN, NEW YORK

SITE PLAN

FIGURE NO.

2-1

PROJECT NO.
140079



LEGEND:

-  RIVER BOTTOM SEDIMENT AND SURFACE WATER SAMPLE LOCATIONS
 RIVER BANK SOIL SAMPLE LOCATIONS
 TRANSECT LOCATION DESIGNATED FOR TCL VOCs, TCL SVOCs, AND TAL METALS ANALYSIS
 TRANSECT LOCATION FOR MERCURY ANALYSIS
 OPN-4 ● OFFSITE SOIL SAMPLE LOCATION
 100 YEAR FLOOD PLAIN

NOTE:

1. OFF-SITE PROPERTY SAMPLE LOCATIONS WERE NOMINALLY ADJUSTED TO COINCIDE WITH TRANSECT LOCATIONS.
2. SOURCE OF FLOOD PLAIN DATA ACQUIRED FROM FEMA FLOOD PLAIN MAP NUMBERED 36072C0492E, DATED 08/03/2009.
3. TAX MAP INFORMATION ACQUIRED FROM TAX MAP DRAWING NAMED "VILLAGE OF HARRIMAN" DATED 10/26/2004.

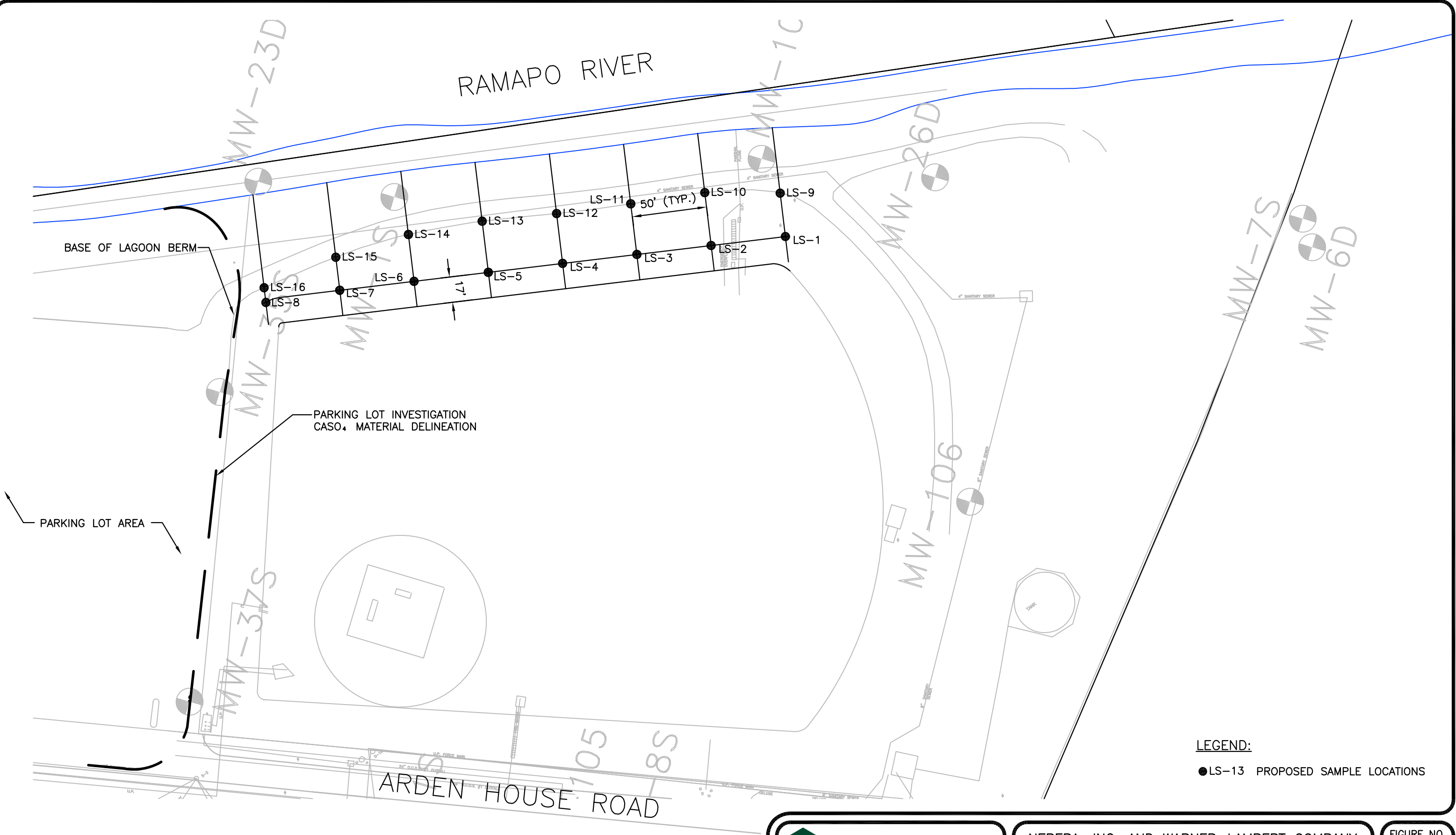
A horizontal scale bar with a black top line and a white bottom line. The top line has tick marks at 0, 100, and 200. The bottom line has tick marks at 0, 100, and 200. The text 'SCALE IN FEET' is centered below the bar.



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NEPERA, INC. AND WARNER-LAMBERT COMPANY
FORMER NEPERA FACILITY
HARIMAN, NEW YORK
SAMPLE LOCATION PLAN
(WEST BRANCH RAMAPO RIVER)

FIGURE NO.
3-1
PROJECT NO.
140079



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NEPERA, INC. AND WARNER-LAMBERT COMPANY
FORMER NEPERA FACILITY
HARRIMAN, NEW YORK
SAMPLE LOCATION PLAN
(LAGOON)

FIGURE NO.
3-2
PROJECT NO.
140079

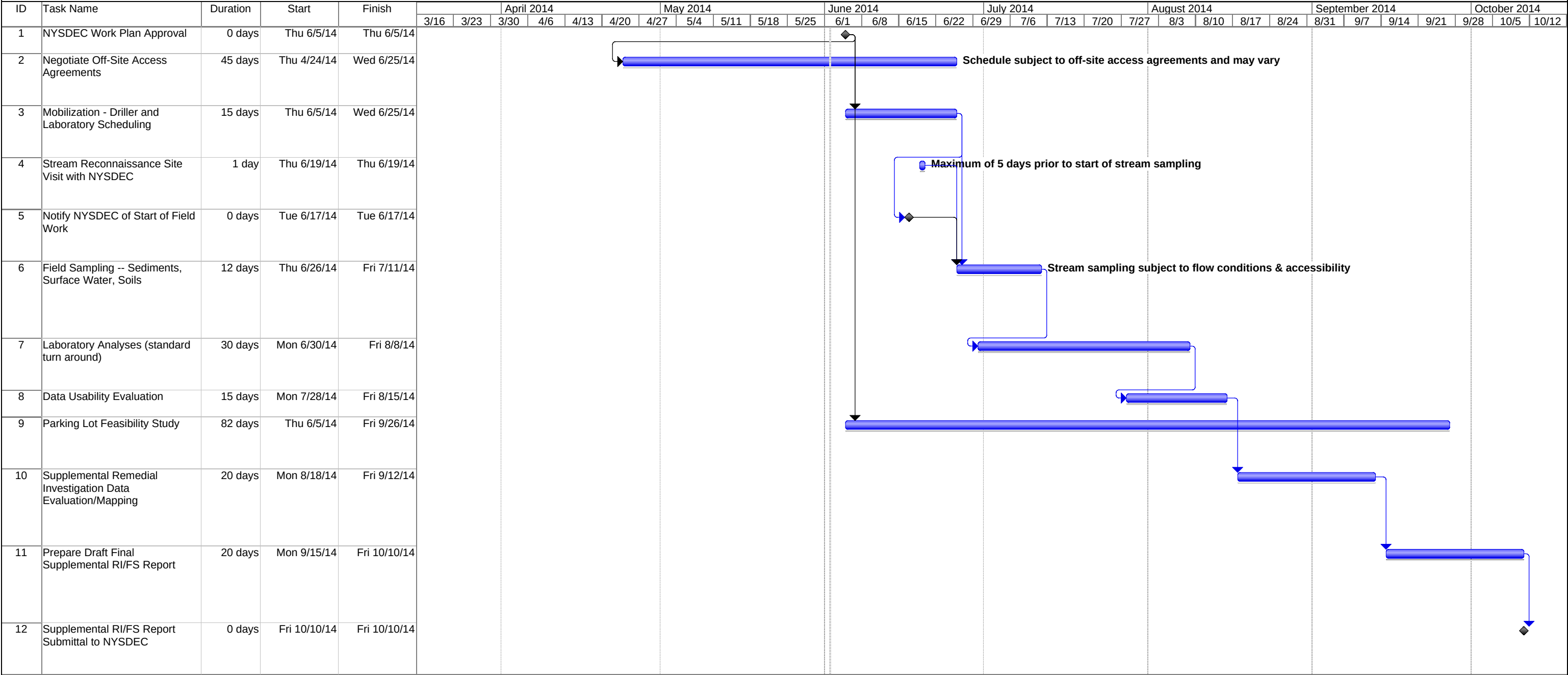


- 
- CORNERSTONE**
Engineering and Land Surveying, LLC

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FIGURE NO.
3-3
PROJECT NO.
140079

Figure 6-1
Former Nepera Harriman Site
Supplemental RI/FS Schedule



Project: MSProj11
Date: Mon 6/2/14

Task
Split



Progress
Milestone



Summary
Project Summary



External Tasks
External Milestone

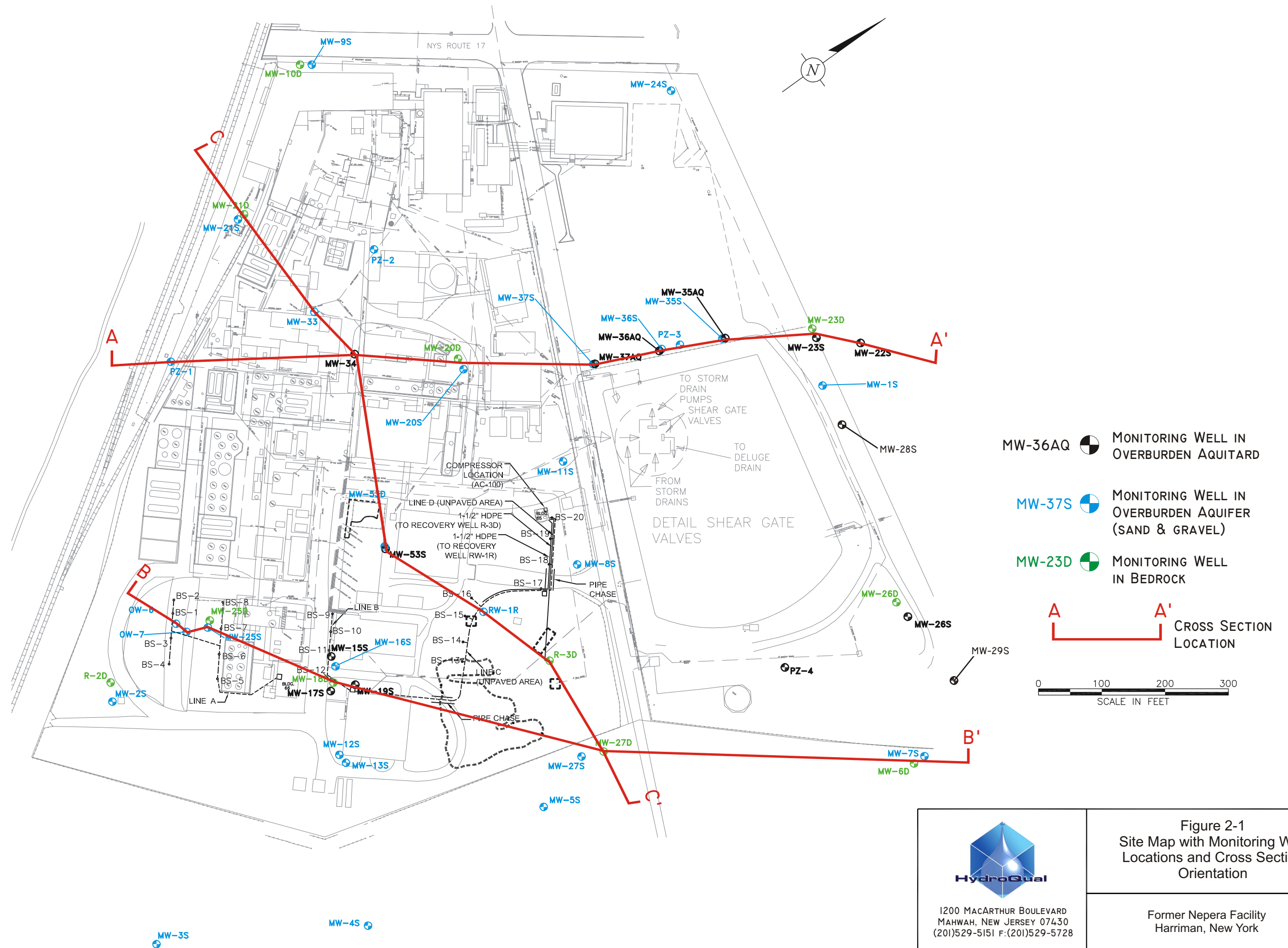


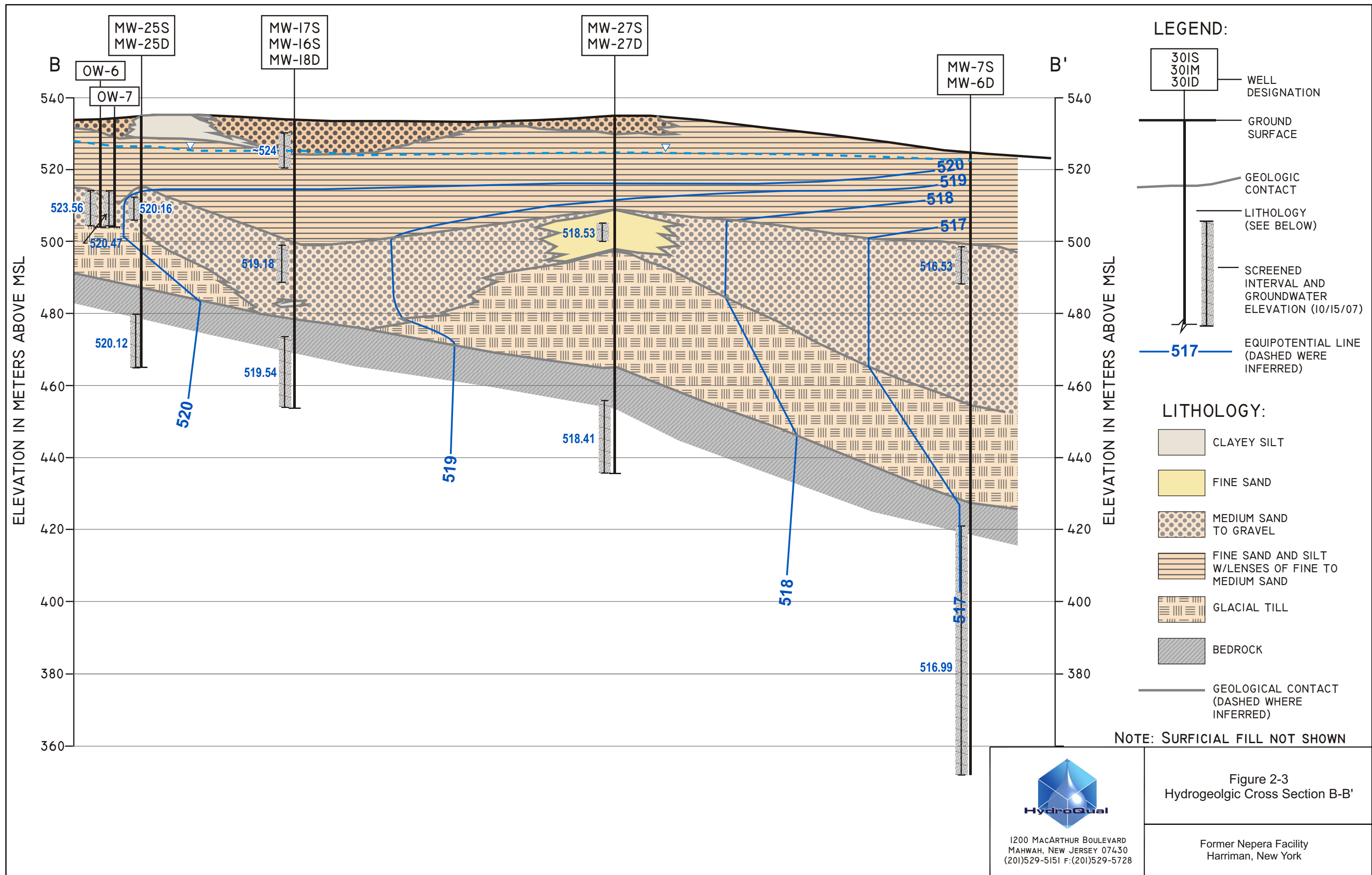
Deadline

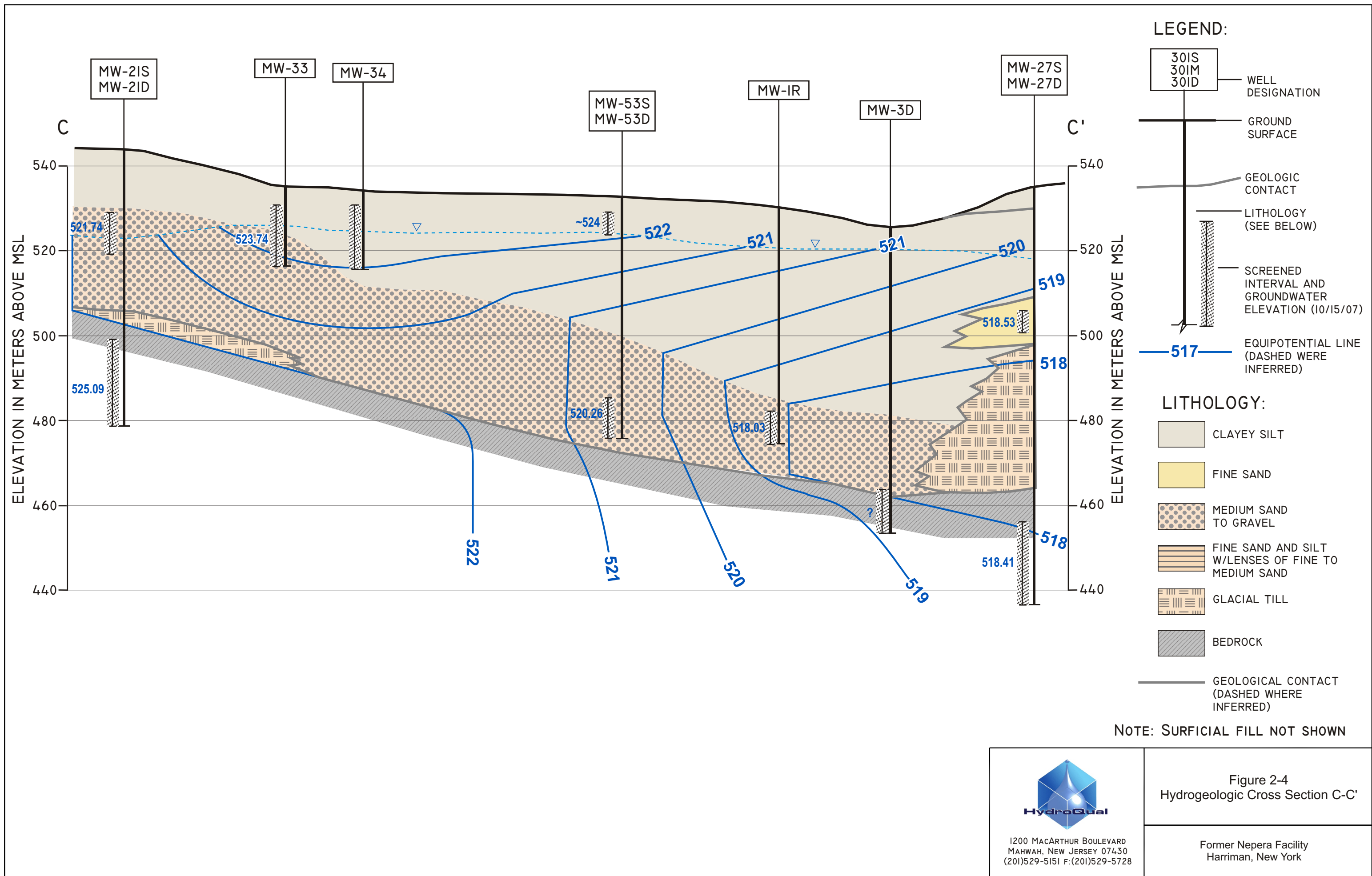


APPENDIX A

CONCEPTUAL SITE MODEL AND REMEDIAL ACTION WORK PLAN FIGURES 2-1 THROUGH 2-11



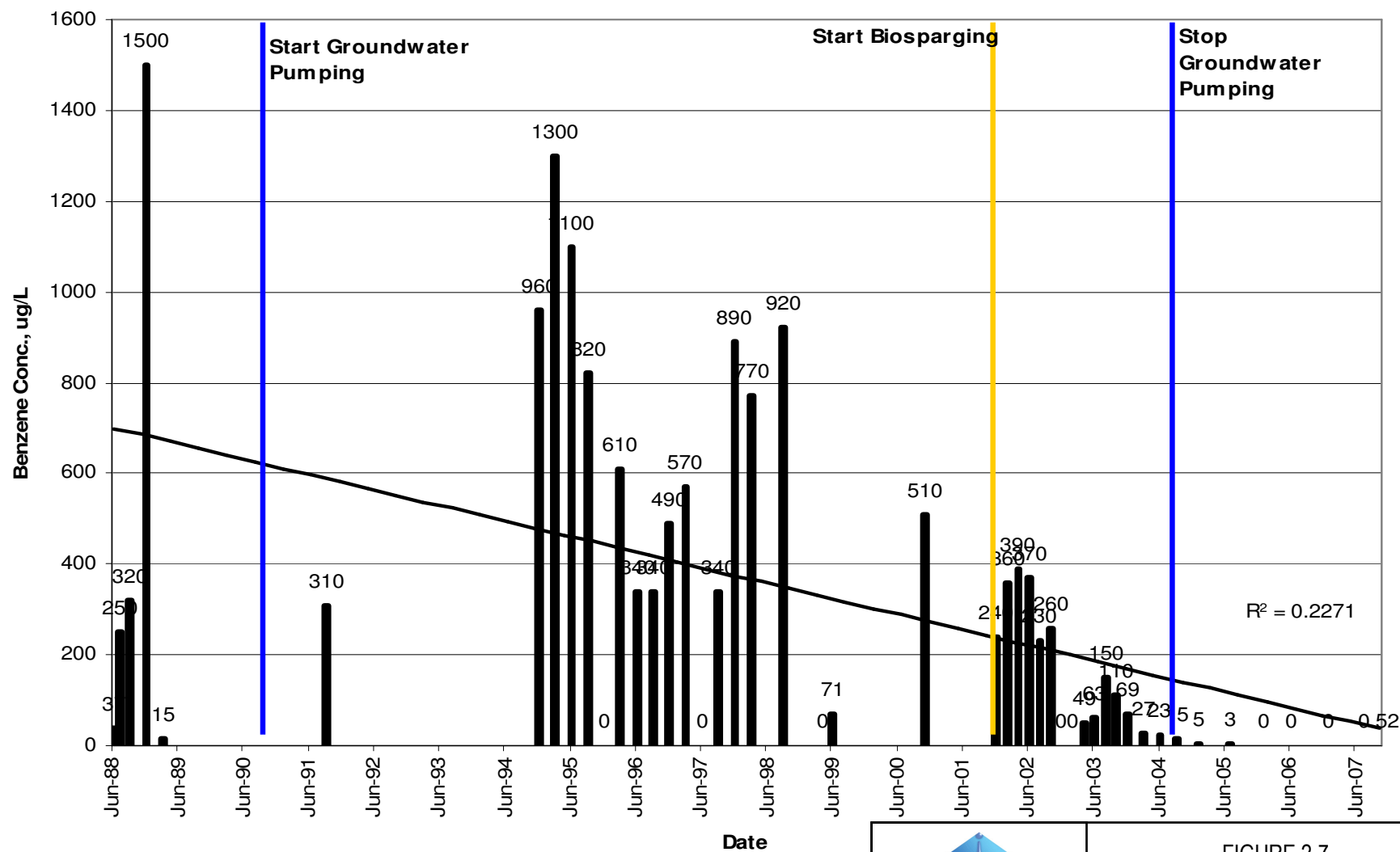




1200 MACARTHUR BOULEVARD
MAHWAH, NEW JERSEY 07430
(201)529-5151 F:(201)529-5728

Figure 2-4
Hydrogeologic Cross Section C-C'

Former Nepera Facility
Harriman, New York



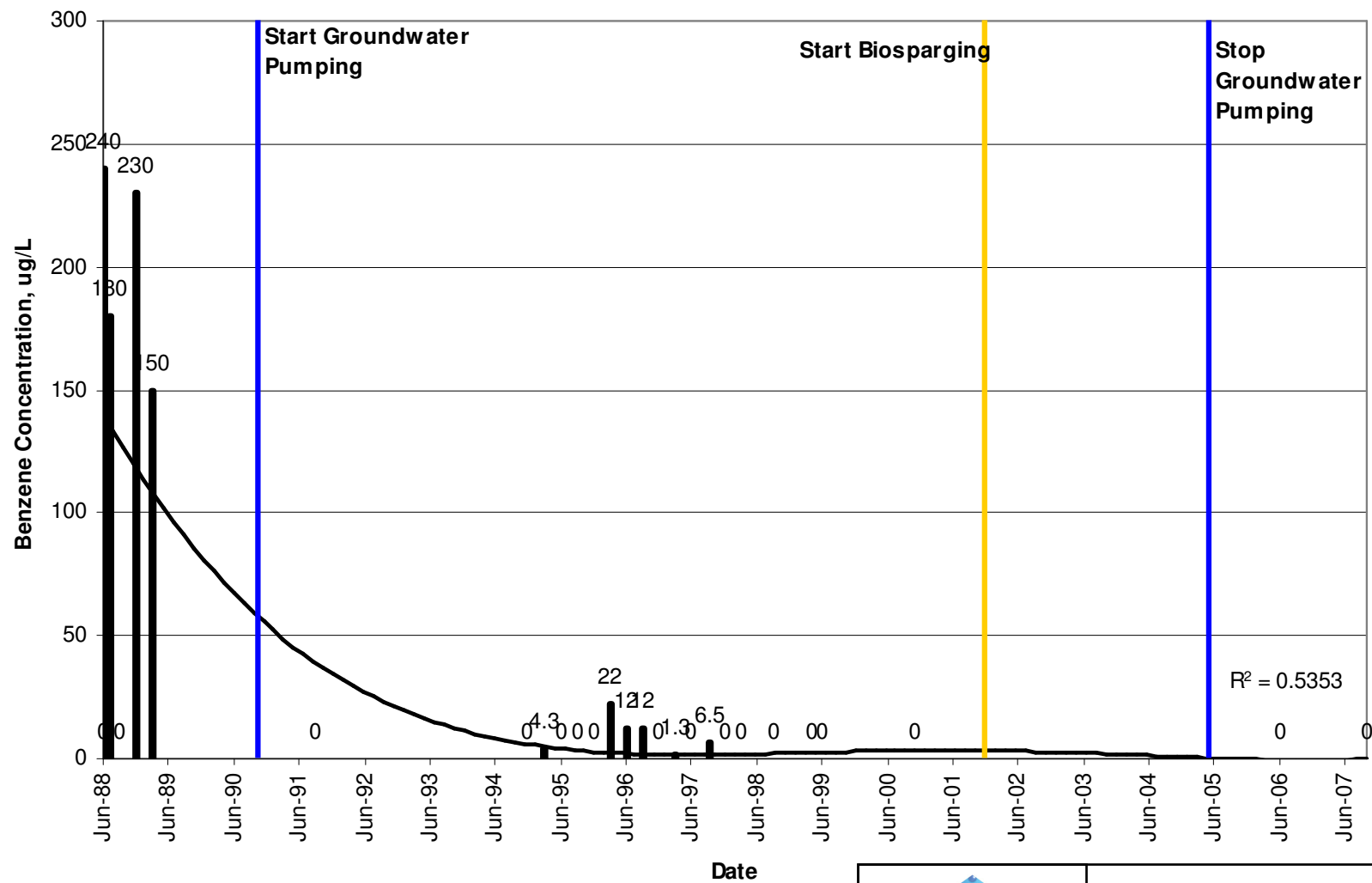
Non-detectable concentrations plotted as "0".



1200 MacArthur Boulevard
Mahwah, NJ 07430

FIGURE 2-7
MW-8S Benzene Trend Plot
(Fine - Coarse Grained)

FORMER NEPERA FACILITY
HARRIMAN, NEW YORK



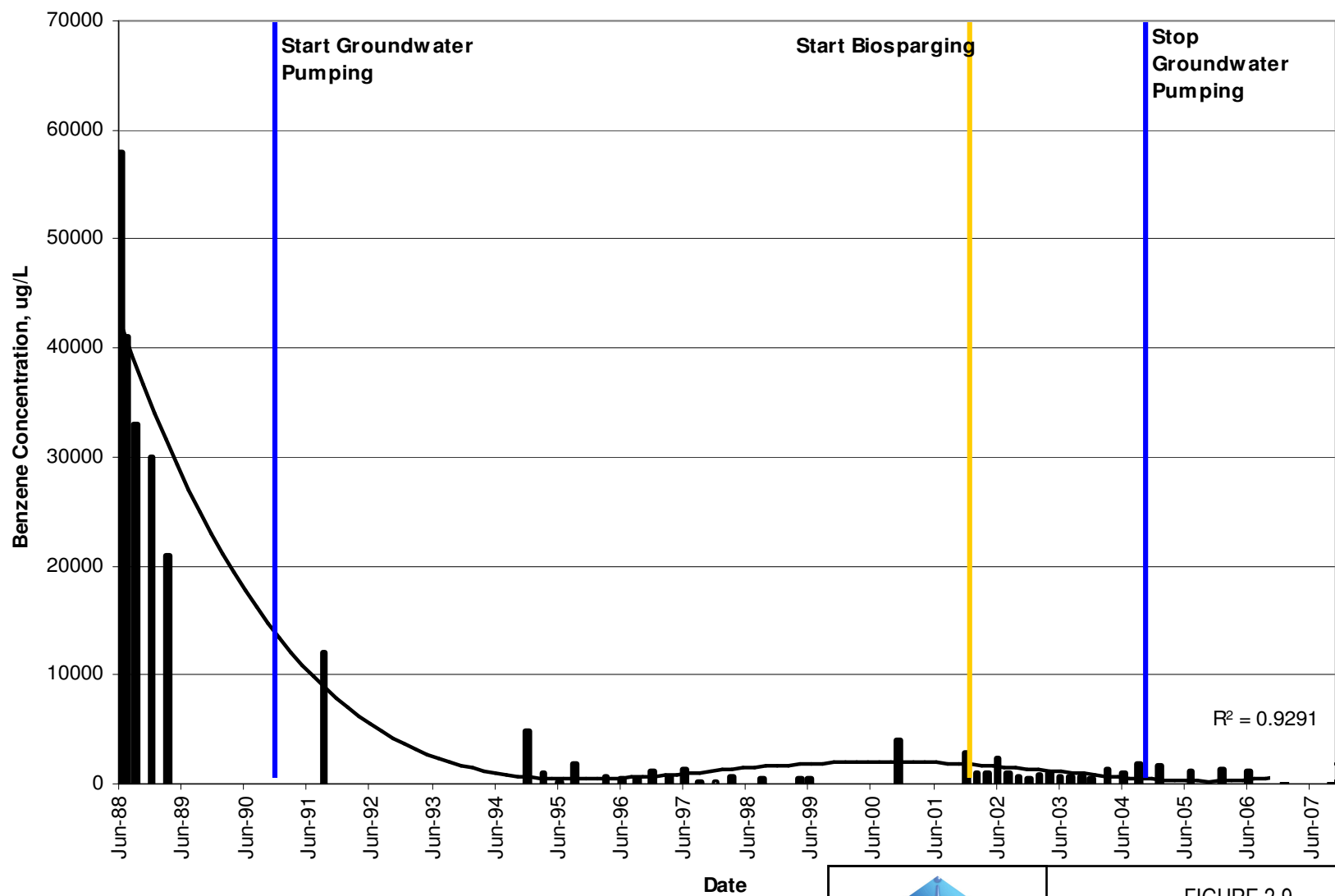
Non-detectable concentrations plotted as "0".



1200 MacArthur Boulevard
Mahwah, NJ 07430

FIGURE 2-8
MW-11S Benzene Trend Plot
(Coarse Grained)

FORMER NEPERA FACILITY
HARRIMAN, NEW YORK



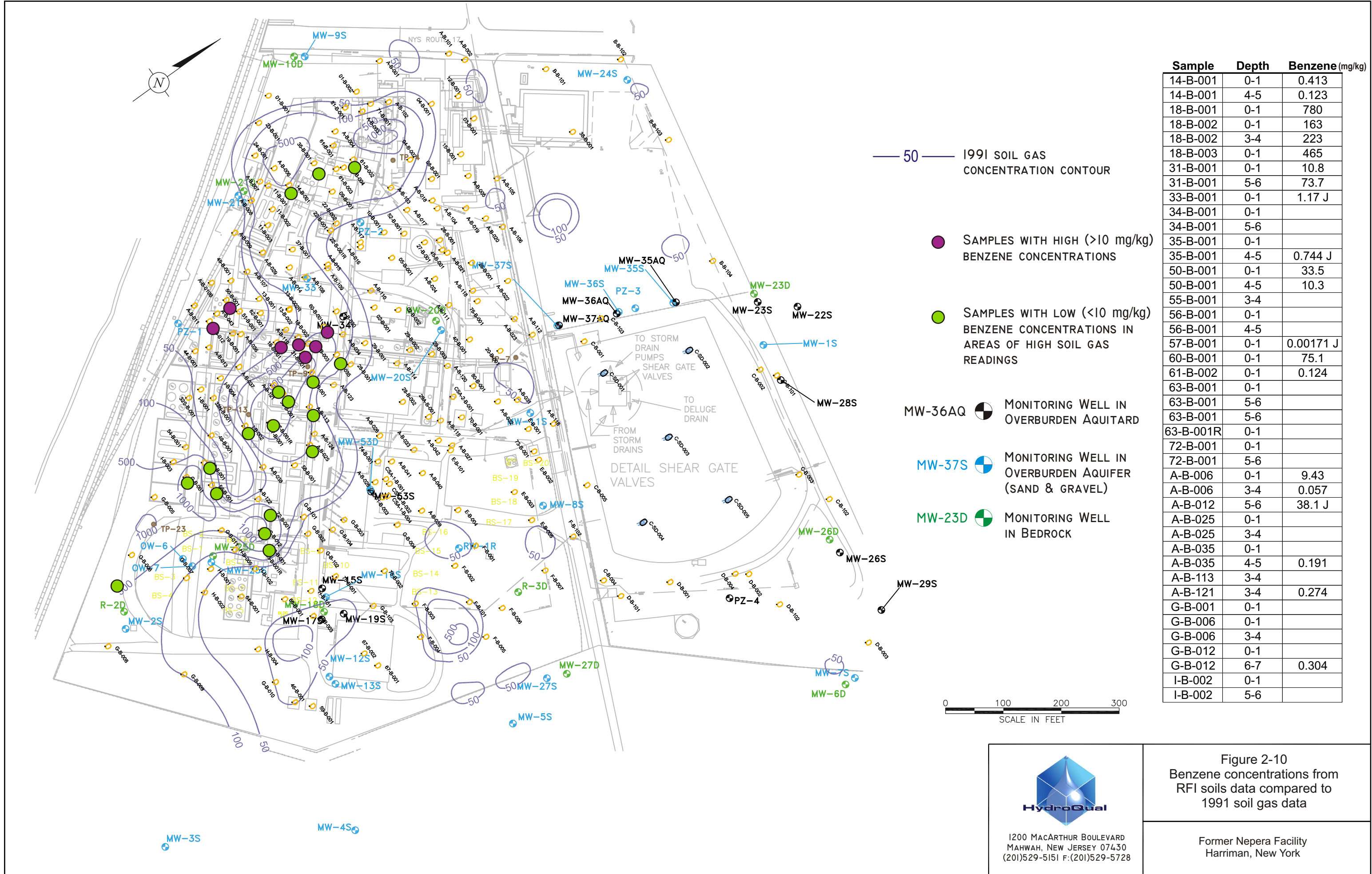
Non-detectable concentrations plotted as "0".



1200 MacArthur Boulevard
Mahwah, NJ 07430

FIGURE 2-9
MW-16S Benzene Trend Plot
(Fine Grained)

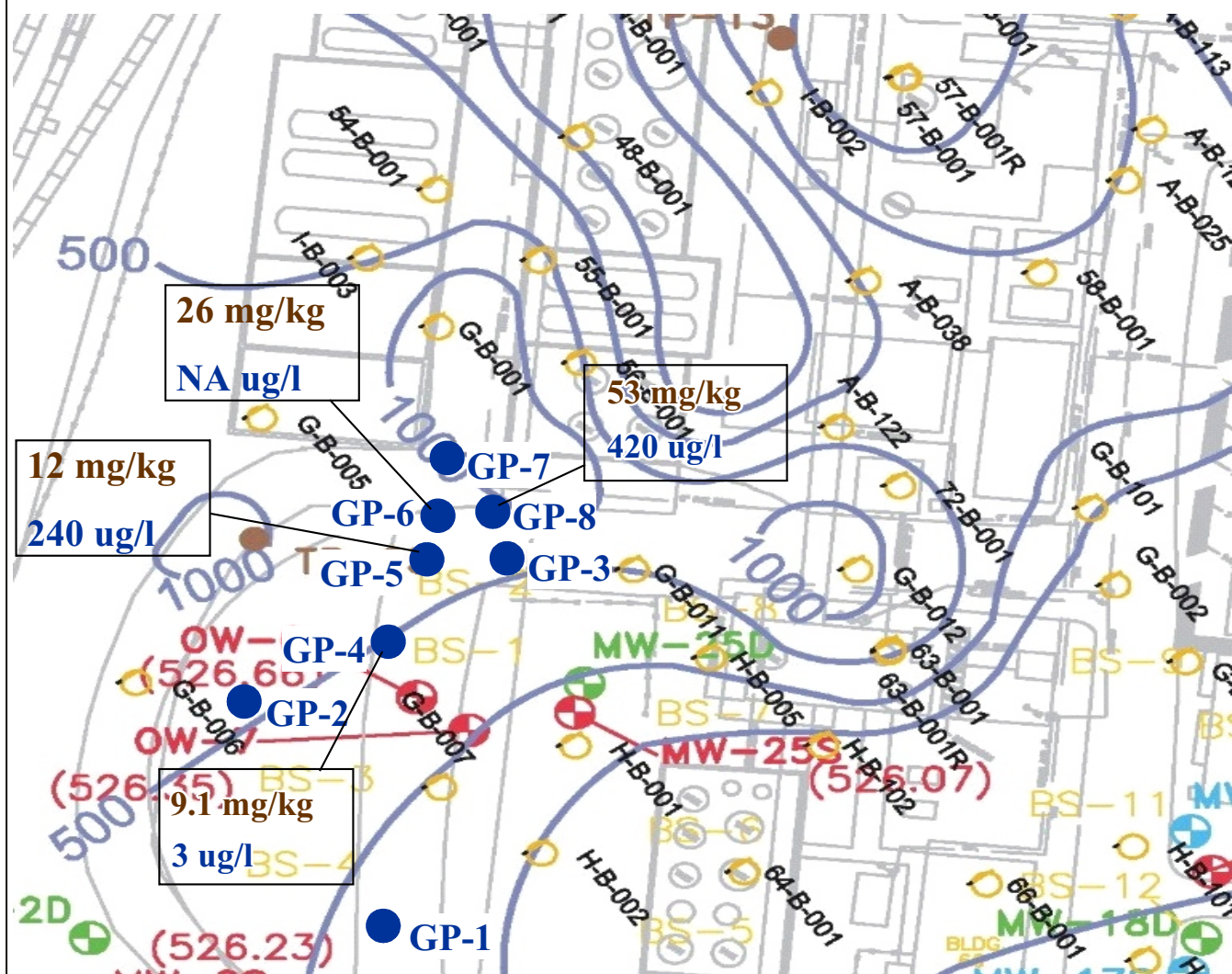
FORMER NEPERA FACILITY
HARRIMAN, NEW YORK



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MAHWAH, NEW JERSEY 07430
(201)529-5151 F:(201)529-5728

Figure 2-10
Benzene concentrations from
RFI soils data compared to
1991 soil gas data

Former Nepera Facility
Harriman, New York



GP-5

Geoprobe boring location
and Benzene concentration
in soil (mg/kg) and
groundwater (ug/L) sample



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MAHWAH, NEW JERSEY 07430
(201)529-5151 F:(201)529-5728

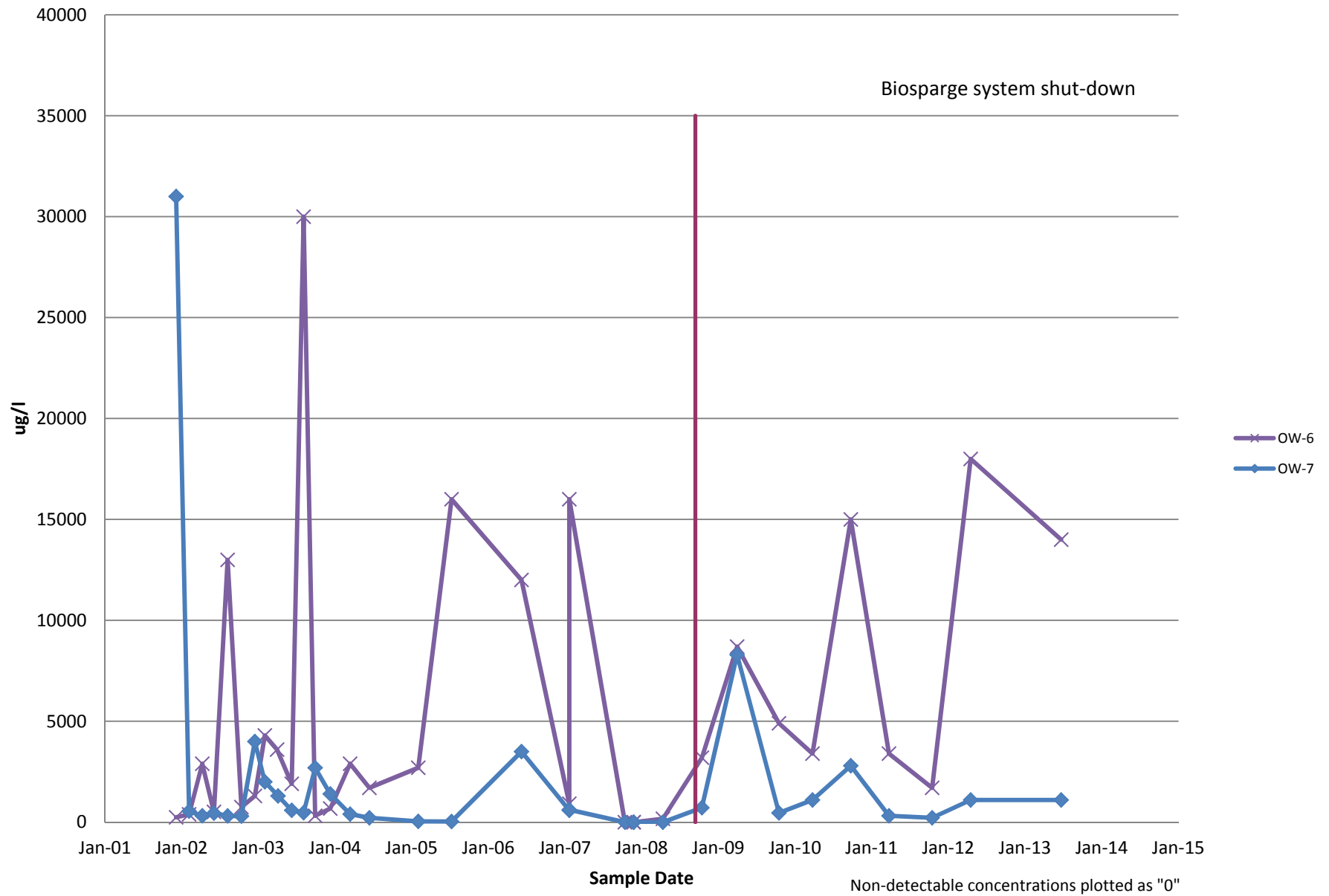
Figure 2-11
October 2006 Geoprobe
Investigation results compared to
1991 soil gas data

Former Nepera Facility
Harriman, New York

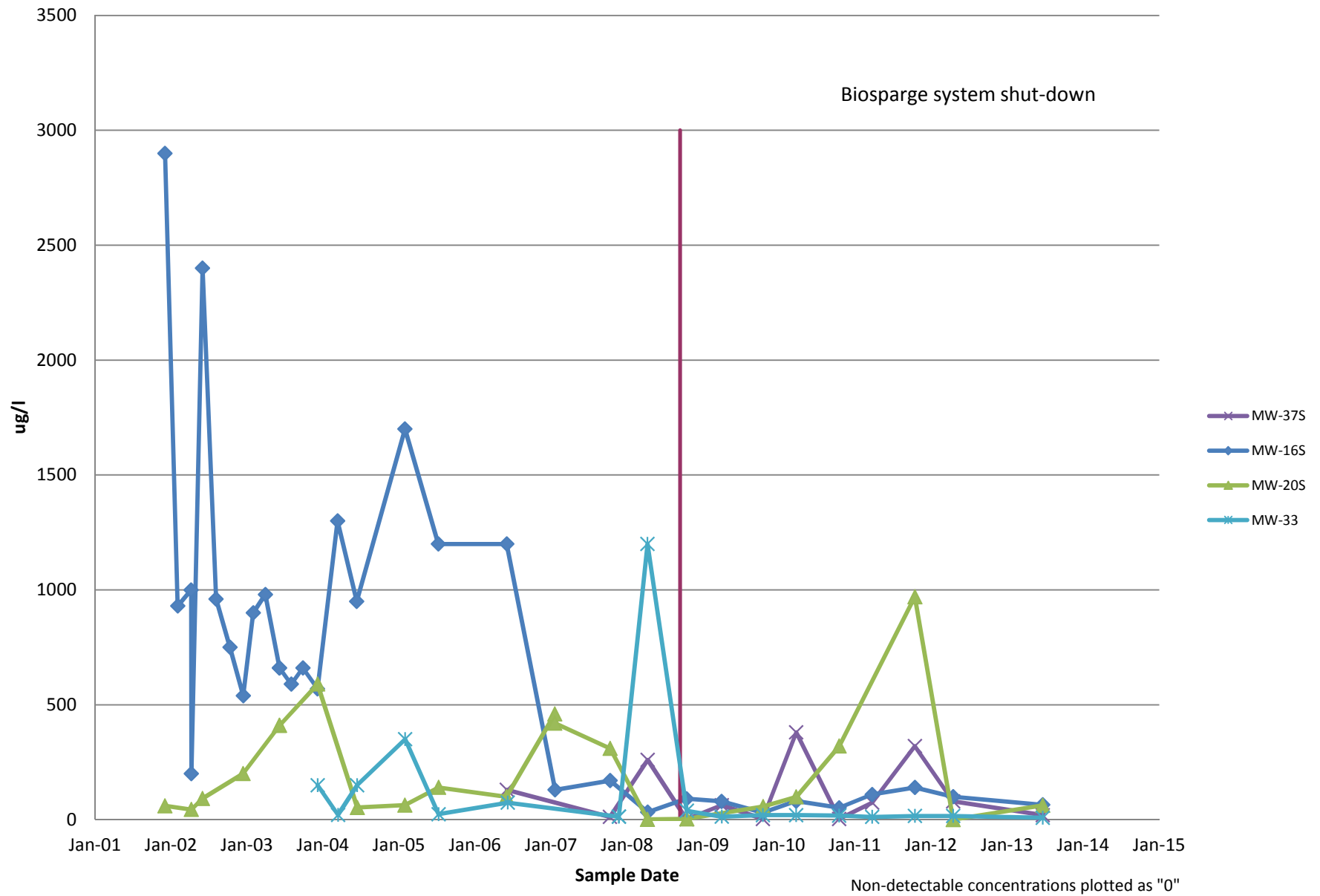
APPENDIX B

QUARTERLY PROGRESS REPORT - TIME SERIES GRAPHS OF BENZENE CONCENTRATIONS

Benzene Concentration with Time



Benzene Concentration with Time



APPENDIX C

SITE-SPECIFIC HEALTH AND SAFETY PLAN



SITE-SPECIFIC HEALTH AND SAFETY PLAN
Cornerstone Engineering and Land Surveying, PLLC

Ramapo River Surface Water and Sediment Sampling
at the
Former Nepera Harriman Site
Harriman, New York

Prepared by

Cornerstone Engineering and Land Surveying, PLLC
90 Crystal Run Road, Suite 201
Middletown, NY 10941

Date:
January 2014

Project:
140079

TABLE OF CONTENTS

LIST OF SECTIONS, TABLES AND ATTACHMENTS	Page #
SECTION 1: GENERAL INFORMATION & DISCLAIMER.....	1
SECTION 2: PROJECT INFORMATION	1
SECTION 3: PHYSICAL HAZARDS INFORMATION	3
SECTION 4: CHEMICAL HAZARDS INFORMATION.....	4
SECTION 5: PROTECTIVE EQUIPMENT LIST.....	5
SECTION 6: HAZARD COMMUNICATION PROGRAM	5
SECTION 7: ENVIRONMENTAL MONITORING.....	6
SECTION 8: HEALTH AND SAFETY TRAINING AND MEDICAL MONITORING PROGRAM....	6
SECTION 9: PERSONAL MONITORING	6
SECTION 10: CONFINED SPACE ENTRY	6
SECTION 11: COMMUNICATIONS PROCEDURES	7
SECTION 12: DECONTAMINATION PROCEDURES.....	7
SECTION 13: EMERGENCY PROCEDURES	7
SECTION 14: EMERGENCY INFORMATION	8
SECTION 15: SAFE WORK PRACTICES	9
SECTION 16: EMPLOYEE ACKNOWLEDGEMENTS	10
TABLES.....	
TABLE 4-1 SITE CONTAMINANTS OF CONCERN	
ATTACHMENTS.....	
ATTACHMENT 2-1 JOB SAFETY ANALYSIS	
ATTACHMENT 3-1 PHYSICAL HAZARD ANALYSIS	
ATTACHMENT 7-1 ENVIRONMENTAL MONITORING	
ATTACHMENT 12-1 DECONTAMINATION/CLEAN-UP PROCEDURES	
ATTACHMENT 13-1 INCIDENT REPORT AND STATEMENT OF INJURY	
ATTACHMENT 13-2 SUPERVISOR'S ACCIDENT INVESTIGATION REPORT	
ATTACHMENT 13-3 SUPERVISOR'S INJURY REPORT	
ATTACHMENT 14-1 DIRECTIONS TO THE NEAREST HOSPITAL	
ATTACHMENT 14-2 DIRECTIONS TO THE NEAREST POLICE STATION	

SITE SPECIFIC HEALTH AND SAFETY PLAN

SECTION 1: GENERAL INFORMATION & DISCLAIMER		
CLIENT NAME: Maybrook and Harriman Environmental Trust	PROJECT NAME: Supplemental Remedial Investigation and Feasibility Study Work Plan	
PROJECT MANAGER: Gary DiPippo		
SAMPLING TEAM LEADER: Rob Laufenberg		
SITE HEALTH & SAFETY OFFICER: Dan Wheeler		
PREPARED BY: Leslie Sparrow		DATE: January 20, 2014
NOTE: This Site Specific Health and Safety Plan (SSHASP) has been prepared for use by Cornerstone employees for work at the site referenced below. It follows and is to be used in conjunction with Cornerstone's Corporate Health and Safety Plan. Cornerstone is not responsible for its use by others. The plan is written for the specific site conditions, purposes, tasks, dates and personnel specified and must be amended and reviewed by those named in Section 16 if these conditions change. Subcontractors working at the Harriman site are required to operate under their own Health and Safety Plan, which is at least as comprehensive as this SSHASP.		
SECTION 2: PROJECT INFORMATION		
(1) SITE INFORMATION		
Site Name: Former Nepera Harriman Site	Site Project Supplemental Remedial Investigation Client Contact: Seth Levine, Cambrex Corp.	
Address: 2156 NY Route 17	Phone No.: 201-804-3038	
Harriman, NY 10926	Site Health & Safety Contact:	
Phone No.:		
(2) SITE CLASSIFICATION (check, highlight or circle all that apply)		
Hazardous (RCRA) ☒ X	Hazardous (CERCLA/State) _____	UST/LUST _____
First Entry _____	Manufacturing _____	Municipal POTW _____
Previously Characterized ☒ X	C and D Landfill _____	Construction _____
Industrial ☒ X	Sanitary Landfill _____	Other _____
Active _____ Inactive ☒ X		

Explanations/Details:																																									
(3) CORNERSTONE ENVIRONMENTAL GROUP TASKS & OBJECTIVES (attach additional sheet if necessary): This HASP applies to Cornerstone personnel working at the Former Nepara Harriman. This SSHASP addresses emergency on-site procedures and health and safety related procedures for the specific work activities, and additional requirements in accordance with 29 CFR 1910.120. The work covered by this SSHASP is related to shallow soil, sediment and surface water sampling on and near the site. Tasks include: • Sediment and surface water sampling in the Ramapo River, • Soil sampling. During sampling activities, contact may occur with sediments, soils and surface water. TASKS PERFORMED BY OTHERS: Geoprobe soil boring advancement																																									
(4) PROJECT ORGANIZATION AND COORDINATION – The following personnel are designated to carry out the stated project job functions on site. (Note: One person may carry out more than one job function, not all positions must be filled for each project.) <table border="1"> <thead> <tr> <th>Job Function</th> <th>Name & Company</th> <th>Phone</th> </tr> </thead> <tbody> <tr> <td>PROJECT MANAGER</td> <td>Gary DiPippo, Cornerstone</td> <td>(845) 695-0251 – direct</td> </tr> <tr> <td>SITE SAFETY OFFICER</td> <td>Rob Laufenberg, Cornerstone</td> <td>(973) 534-6603</td> </tr> <tr> <td>ALTERNATE SITE SAFETY OFFICER</td> <td>Dan Wheeler, Cornerstone</td> <td>(845) 800-7873</td> </tr> <tr> <td>PUBLIC INFORMATION OFFICER</td> <td></td> <td></td> </tr> <tr> <td>SITE RECORDKEEPER</td> <td>TBD</td> <td></td> </tr> <tr> <td>ON-SITE PERSONNEL WITH CPR/FA</td> <td></td> <td></td> </tr> <tr> <td>FIELD TEAM LEADER</td> <td>TBD</td> <td></td> </tr> <tr> <td>FIELD TEAM MEMBERS</td> <td>Rob Laufenberg, Cornerstone Daniel Wheeler, Cornerstone</td> <td>(973) 534-6603 (845) 800-7873</td> </tr> <tr> <td>ON-SITE CLIENT CONTACT</td> <td>Charles Kessler</td> <td>(845) 772-0200 (cell)</td> </tr> <tr> <td>VISITORS (POTENTIAL):</td> <td>FEDERAL AGENCY REPS (i.e., EPA, OSHA)</td> <td>None</td> </tr> <tr> <td></td> <td>STATE AGENCY REPS</td> <td>None</td> </tr> <tr> <td></td> <td>LOCAL AGENCY REPS</td> <td>None</td> </tr> </tbody> </table>			Job Function	Name & Company	Phone	PROJECT MANAGER	Gary DiPippo, Cornerstone	(845) 695-0251 – direct	SITE SAFETY OFFICER	Rob Laufenberg, Cornerstone	(973) 534-6603	ALTERNATE SITE SAFETY OFFICER	Dan Wheeler, Cornerstone	(845) 800-7873	PUBLIC INFORMATION OFFICER			SITE RECORDKEEPER	TBD		ON-SITE PERSONNEL WITH CPR/FA			FIELD TEAM LEADER	TBD		FIELD TEAM MEMBERS	Rob Laufenberg, Cornerstone Daniel Wheeler, Cornerstone	(973) 534-6603 (845) 800-7873	ON-SITE CLIENT CONTACT	Charles Kessler	(845) 772-0200 (cell)	VISITORS (POTENTIAL):	FEDERAL AGENCY REPS (i.e., EPA, OSHA)	None		STATE AGENCY REPS	None		LOCAL AGENCY REPS	None
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	STATE AGENCY REPS	None																																							
	LOCAL AGENCY REPS	None																																							

SUBCONTRACTORS:	SUBCONTRACTOR(S) SITE SAFETY OFFICERS	SUBCONTRACTOR SSHASP YES _____ NO_N/A
All personnel arriving or departing the site must log in and out with the Recordkeeper.		
(5) ONSITE CONTROL (Prevailing wind directions, exclusion zones, etc.) (attach additional sheet if necessary) Work zone will be established around each monitoring well or soil disturbance. As necessary, exclusion, contaminant reduction, and support zones will be identified. Traffic cones will be utilized in traffic areas. Air monitoring will dictate size and direction of work zone (See Section 7). A Job Safety Analysis (JSA) Form will be prepared daily by the SSO to discuss and document the safety issues for the work being performed that day. The JSA Form will be reviewed and signed by all Cornerstone personnel working on site. The JSA Form is presented as Attachment 2-1.		

SECTION 3: PHYSICAL HAZARDS INFORMATION					
(1) IDENTIFY POTENTIAL PHYSICAL HAZARDS TO WORKERS					
	Confined Space		Steep/uneven terrain	X	Surface Water
X	Heavy Equipment	X	Heat Stress	X	Drum Handling
X	Moving Parts	X	Extreme Cold	X	Noise
	Heavy Lifting		Ionizing Radiation		Non-Ionizing Radiation
	Electrical		Traffic		Elevated Work
X	Overhead Hazards		Marine/Open Water Navigation		Surface
	Underground Utilities	X	Biological Hazards		Trenching
					Sewage
(2) SAFETY EQUIPMENT REQUIRED					
	Explosimeter		Barrier Tape		Lights
	Fall Protection Equipment		Traffic Cones		Lights – emergency
	Confined Space Equipment		A-B-C Fire Extinguisher	X	Communications – On Site
	Ladder		Tick Repellant		Communications – Off Site
X	First Aid Kit		Snake Bite Kit		Lockout/Tagout
	Eye Wash	X	Floatation Device (USCG)		
	Emergency Shower		Emergency Air Horn		
Other: _____ A personal data (hand-held) RAM meter for dust monitoring <u> X </u> Other - PID _____ A TSI air velocity meter for logging wind speed _____ A wind sock for wind direction					
Comment: See Attachment 3-1 for Physical Hazard Analysis.					

SECTION 4: CHEMICAL HAZARDS INFORMATION

(1) IDENTIFIED CHEMICAL HAZARDS

Known or suspected hazardous/toxic materials (attach historical information, physical description, map of contamination, tabulated data and MSDS sheets, if available). Materials brought to the site for the investigation (decontamination solvents, gases, etc.) are addressed in Section 6.

Table 4-1 presents site contaminants of concern (COCs) and their exposure limits.

Media	Substances Involved	Characteristics	Estimated Concentrations	PEL

(2) DESCRIBE POTENTIAL FOR CONTACT WITH EACH MEDIA TYPE FOR EACH OF THE TASKS LISTED IN SECTION 2.3

The potential routes of exposure to the chemicals found in the soils or sediment include: 1) inhalation of vapors from the work activities; 2) direct dermal (skin) contact or absorption of contaminants; and 3) ingestion by hand-to-mouth transfer of contaminants.

For inhalation, prevention of exposure is accomplished by appropriate vapor control measures and/or through the appropriate use of air-purifying or air-supplying respirators. See Section 7 for specific procedures.

For direct dermal contact or absorption, prevention of exposure is accomplished by the proper selection of protective clothing. Section 5 presents PPE requirements for this project.

For ingestion, prevention is accomplished through good hygiene practices, frequent hand washing, and enforcement of rules regarding eating, drinking and smoking.

Use of appropriate PPE and environmental monitoring will minimize or prevent overexposure to chemical hazards. Accidental overexposure to the organic chemicals listed in Table 4-1 can result in mild to severe reactions and appropriate emergency procedures should be implemented as presented in Section 13. Immediate medical attention is warranted if any worker exhibits dizziness, shortness of breath or other sudden health issue.

SECTION 5: PROTECTIVE EQUIPMENT LIST									
TASK	RESPIRATORS & CARTRIDGE		USE	CLOTHING		GLOVES	BOOTS	OTHER	
Sediment & Surface Water sampling				C, long sleeves		T	W	S, L	
Soil Sampling - Geoprobe	Full Face APR/O		UP – See Section 7	C, long sleeves		T	S	S, H, N, V	
Soil Sampling – Hand auger	Full Face APR/O		UP – See Section 7	C, long sleeves		T	S	S, V	
RESPIRATORS		APR CARTRIDGES		USE		CLOTHING		GLOVES	
APR = Air Purifying Respirator		O = Organic Vapor		Cont = Continuous		T = Tyvek		B = Butyl	
B = SCBA		G = Organic vapor/acid gas		UP = Upgrade		P = PE Tyvek		L = Latex	
E = Escape		A = Asbestos				S = Saranex		N = Neo	
AL = Airline		P = Particulate				C = Cover- alls		T = Nitrile	
		C = Combination organic vapor & particulate				FRC = fire retardant clothing		V = Viton	
								W – Waders or rubber boots	
		OTH = Other						CN = Cotton	
								P = PVC	
								PA = Polyvinyl	
								SS = Silver shield	

SECTION 6: HAZARD COMMUNICATION PROGRAM
If chemicals are introduced to the site by Cornerstone (e.g., decontamination liquids, preservatives, etc.), attach Safety Data Sheets (SDSs). The Site Safety Officer will review this information with field personnel prior to the start of the project. The Comprehensive List of Chemicals for this site is: None

SECTION 7: ENVIRONMENTAL MONITORING

(1) The following environmental monitoring instruments shall be used on site at the specified intervals.

Photoionization Detectors (PIDs). PIDs will be used during all soil sampling activities.
See Attachment 7-1 for details of Environmental Monitoring Procedures.

(2) Monitoring equipment is to be calibrated according to manufacturers' instructions. Record calibration data and air concentrations in the Health and Safety on-site log book.

(3) Recommended Action Levels for Upgrade or Downgrade of Respiratory Protection or Site Shutdown and Evacuation. Consideration should be given to the potential for release of highly toxic compounds from the waste or from reaction by-products. Levels are for persistent (> 10 min) breathing zone measurements.

See Attachment 7-1 for details.

SECTION 8: HEALTH AND SAFETY TRAINING AND MEDICAL MONITORING PROGRAM

The project staff is included in the Health and Safety training and medical monitoring programs. A current list, including training dates will be provided when staff has been determined.

HAZWOPER TRAINING

Name	MEDICAL (Date)	INITIAL – 40 Hr (Date)	REFRESHER – 8 Hr (Date)	SUPV (Date)	CPR/FA/ BBP (Dates)	FIT TEST (Make/Size/ Type/Date)
Robert Laufenberg	8/12/2013	9/1/1990	03/04/2013	11/11/2008		08/15/2012
Daniel Wheeler	6/27/2013	03/18/2011	03/14/2013			03/23/2012

SECTION 9: PERSONAL MONITORING

The following personal monitoring will be in effect on site: **None**

Personal exposure sampling:

Medical monitoring:

A copy of personal monitoring results (if collected) is to be sent to Corporate Health and Safety.

SECTION 10: CONFINED SPACE ENTRY

(1) WILL CONFINED SPACE ENTRY TAKE PLACE? Yes _____ No **X**

If yes, attach **Confined Space Entry Program** available from the Health and Safety Coordinator.

SECTION 11: COMMUNICATIONS PROCEDURES

The following standard hand signals will be used in case of failure of radio communications or other circumstances where voice communication may not be possible:

Hand gripping throat	Out of air, can't breathe
Grip partner's wrist or both hands around wrist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	OK, I am all right, I understand
Thumbs down	No, negative

SECTION 12: DECONTAMINATION PROCEDURES

Personnel and equipment leaving the Exclusion Zone shall be decontaminated. The Site Safety Officer is responsible for monitoring adherence with the decontamination plan described below: Attach sketch of decontamination area as appropriate.

(1) See Attachment 12-1 for details

(2) _____

(3) _____

Other _____

The following decontamination equipment is required:

Distilled water, Alconox, bucket, tarp, brushes,

SECTION 13: EMERGENCY PROCEDURES

(1) The following standard emergency procedures will be used by onsite personnel. The Site Safety Officer shall be notified of any onsite emergencies and be responsible for checking that the appropriate procedures are followed. See Section 14 for additional emergency information.

Personnel Injury in the Exclusion Zone: Upon notification of an injury in the Exclusion Zone, the designated emergency signal – Honk vehicle horn 3 times, shall be sounded. Site personnel shall assemble at an upwind location to be designated by the Site Safety officer. The Site Safety Officer and Field Team Leader should evaluate the nature of the injury, and the affected person should be decontaminated to the extent possible prior to movement to the Support Zone. The SSO shall call 911, if applicable, or the designated emergency number for the site as instructed by Site Manager. No persons shall enter/reenter the Exclusion Zone until the cause of the injury or symptoms are determined.

Personal Protective Equipment Failure: If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and others within the Exclusion Zone shall immediately leave the Exclusion Zone. Reentry shall not be permitted until the equipment has been repaired or replaced. If PPE failure results in a chemical overexposure to the worker, then appropriate emergency procedures will be implemented as above.

Fire/Explosion: Upon notification of a fire or explosion on site, site personnel shall assemble at the site's front gate or location designated by the Site Safety officer or Site Manager. The SSO (or others in a life threatening situation) shall call 911 or the designated emergency number for the site and personnel moved to a safe distance from the involved area. If others make the emergency call, the SSO shall be notified immediately thereafter.

Other Equipment Failure: If any other equipment on site fails to operate properly, the Field Team Leader and Site Safety Officer shall be notified and then determine the effect of this failure on continuing operations on site. If the failure affects the safety of

personnel or prevents completion of the Work Plan tasks, personnel shall leave the Exclusion Zone until the situation is evaluated and appropriate actions taken.

The following emergency escape routes are designated for use in those situations where egress from the Exclusion Zone can not occur through the decontamination line (attach map, if available):

N/A – in case of emergency can
proceed through Exclusions Zone

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

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

(3) Accident/Incident Reports – The following information will be conveyed by the SSO to the Project Manager immediately and followed up as soon as possible with a written **Incident Report and Statement of Injury (Attachment 13-1)**

A brief description of the emergency

The location, time and date of the event/accident/injury

The number of persons injured and the severity of the injuries

The name(s), company and positions of the injured person(s)

The name and location of the medical facility where the injured person(s) were taken

The name of the person reporting the event/accident/injury.

The employee's supervisor will complete the **Supervisor's Accident Investigation Report (Attachment 13-2)**.

SECTION 14. EMERGENCY INFORMATION

TO BE POSTED IN SITE-TRAILER/OFFICE AND/OR IN FIELD VEHICLES

(1) LOCAL RESOURCES - **NOTE – IMT SECURITY MUST BE CONTACTED FOR ALL ON-SITE EMERGENCIES**

Ambulance (name): _____ Phone: **911**

Hospital (name): **Orange Regional Medical Center** Phone: **911 or (845) 333-1000**

Police (local or state): **Harriman Village Police Dept** Phone: **911 or (845) 782-6644**

Fire Dept. (name): Harriman Fire Dept Phone: **911 or (845) 294-7711**

HAZ MAT Responder: _____ Phone: _____

Nearest phone: Personal cell phone

On-Site CPR/FA(s): _____

The hospital is 5 minutes from the site.

(2) DIRECTIONS TO NEAREST HOSPITAL – ATTACH MAP: **See Attachment 14-1**

DIRECTIONS TO NEAREST POLICE STATION: **See Attachment 14-2**

(3)	CORPORATE RESOURCES								
(4)	WHOM TO NOTIFY IN CASE OF ACCIDENT: <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">Corporate H&S Officer:</td> <td>Michael Schumaci (845) 695-0212 or (914) 548-8144 (cell)</td> </tr> <tr> <td>Overall PM:</td> <td>Gary DiPippo (845) 695-0251 or (973) 809-2581 (cell)</td> </tr> <tr> <td>Project Manager:</td> <td>Tim Roeper (845) 216-9630 (cell)</td> </tr> <tr> <td>Insperty (formerly Administaff):</td> <td>Injury Hotline: 1-866-863-5622 (Supervisor / Project Manager must notify; Cornerstone's Client No. <u>1871000</u> must be provided at time of call)</td> </tr> </table>	Corporate H&S Officer:	Michael Schumaci (845) 695-0212 or (914) 548-8144 (cell)	Overall PM:	Gary DiPippo (845) 695-0251 or (973) 809-2581 (cell)	Project Manager:	Tim Roeper (845) 216-9630 (cell)	Insperty (formerly Administaff):	Injury Hotline: 1-866-863-5622 (Supervisor / Project Manager must notify; Cornerstone's Client No. <u>1871000</u> must be provided at time of call)
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SECTION 15: SAFE WORK PRACTICES	
THE FOLLOWING PRACTICES MUST BE FOLLOWED BY PERSONNEL ON SITE 1. Smoking, eating, chewing gum or tobacco, or drinking are forbidden except in clean or designated areas. 2. Ignition of flammable liquids within or through improvised heating devices (e.g., barrels) is forbidden. 3. Contact with samples, excavated materials, or other contaminated materials must be minimized. 4. Use of contact lenses is prohibited at all times. 5. If drilling equipment is involved, know where the 'kill switch' is. 6. All electrical equipment used in outside locations, wet areas or near water must be plugged into ground fault circuit interrupter (GFCI) protected outlets. 7. Good housekeeping practices are to be maintained. 8. Where the eyes or body may be exposed to corrosive or acidic materials or other irritants, suitable facilities for quick drenching or flushing with water shall be available for immediate use. 9. In the event of extreme or hazardous weather-related working conditions (i.e., thunderstorm, limited visibility, extreme cold or heat) field tasks will be suspended at the discretion of the SSO until conditions improve or appropriate protection from the elements is provided. Site Specific Safe Work Practices:	

SECTION 16: EMPLOYEE ACKNOWLEDGEMENTS

PLAN REVIEWED BY:

DATE:

Corporate Health & Safety: **Michael Schumaci**

Project Manager: **Gary DiPippo**

Sampling Team Leader:

I acknowledge that I have read the information on this Site Specific Health and Safety Plan and all attachments. I understand the site hazards as described and agree to comply with the contents of this Plan.

EMPLOYEE (print name)

SIGNATURE

DATE

TABLES

Table 4-1 Site Contaminants of Concern

	OSHA PEL
Chemical	Exposure Limits (ppm)
Volatile Organics	
Benzene	1
Toluene	200
Ethylbenzene	100
Xylenes	100
Pyridine	5
Alpha-Picoline	N/A
Metals/Inorganics	
Mercury	0.1 mg/m ³ C*
Ammonia	25

* Ceiling value for elemental mercury, inorganic compounds and aryl compounds

ATTACHMENTS

Attachment 2-1
Job Safety Analysis
CORNERSTONE ENVIRONMENTAL GROUP, LLC

JOB SAFETY ANALYSIS

Date/Time: _____ **Weather:** _____
JSA prepared by: _____ **Job Location:** _____
Site Supervisor: _____ **Site Name:** _____

1. Are there other work activities being conducted in the area: _____

If yes, what type of work: _____

2. List all of the required PPE: _____

3. Describe the scope of work being performed: _____

4. Describe all Potential Hazards: _____

5. Describe ways to minimize exposure to the hazard: _____

Cornerstone Personnel on site		
Print Name	Sign Below	Date

Safe Meeting Location

Safe Meeting Point: _____

Evacuation Route: _____

ATTACHMENT 3-1

PHYSICAL HAZARD ANALYSIS

The following are potential hazards that may be encountered at the site during the work and the appropriate procedure for each.

SEVERE WEATHER

If severe weather occurs that may affect the safety of site workers, the Site Safety Officer or designee will stop affected field operations. The Site Safety Officer or designee will give the approval to resume operations when weather conditions improve.

Work will be suspended during any weather conditions that are sufficiently extreme to potentially affect the adequacy of the Health and Safety Plan or the integrity of equipment, such as heavy rains, heavy snow fall, electrical storms, or extreme heat or cold. The Site Safety Officer is responsible for determining when to suspend work.

HEAT STRESS

Field personnel will be cognizant of weather conditions and monitor weather reports so that they can dress appropriately. Field personnel should bring supplies of non-caffeinated fluids such as water to the job site daily.

During hot weather, workers will monitor each other's actions, speech, and appearance for signs and symptoms of heat-related illnesses including heat exhaustion and heat stroke. Physical signs and symptoms of heat exhaustion include headache, nausea, vertigo, weakness, thirst, and giddiness. Heat exhaustion may progress to heat stroke if a worker is unable to cool and re-hydrate their body. Heat stroke is a medical emergency that requires immediate medical attention. The primary signs and symptoms of heat stroke are confusion, irrational behavior, loss of consciousness, convulsions, lack of sweating (usually), hot, dry skin, and an abnormally high body temperature. Workers should be aware of the key differences between the signs and symptoms of heat stroke and those of heat exhaustion, such as the lack of sweating, the color of the skin (red), and the rise in body temperature.

COLD STRESS

Factors affecting the potential development of cold weather related symptoms include ambient air temperature, wind speed, ambient humidity, perspiration, contact with

surface water or metal, clothing, age, and general health conditions. High humidity conditions and cold temperatures also have the effect of rapidly removing heat from the body.

Cold temperature clothing will be provided to personnel required to work in temperatures below 40°F. This clothing may include insulated coveralls, gloves, boots, wind breakers, and hard hat liners. Outer and inner garments will be selected that allows perspiration to be drawn away from the skin.

Work rate should not be so high as to cause heavy sweating when the wind chill index falls below 10°F. If heavy work must be done, arrangements should be made to provide a heated warming shelter for rest periods. Work should also be arranged to minimize sitting or standing still for long periods of time.

Hypothermia is a general term describing the lowering (cooling) of the body core temperature. Initially, blood flow is restricted to the skin, hands, and feet and conserved for the body core and brain. Stages of hypothermia include shivering (a response that generates heat), apathy, decreased muscle function, decreased level of consciousness, a glassy stare, possible freezing of the extremities, and decreased vital signs with slow pulse and slow respiration rate.

Severe hypothermia results in a rapid decline in the body core temperature and is an acute emergency requiring immediate medical attention. Keep the patient as warm and dry as possible until professional medical attention is available.

Frostbite is the effect of freezing a body part such as the ears, cheeks, nose, fingers, or toes. Symptoms are first noticed as local tingling and redness, followed by paleness and numbness. Initial stages are described as frostnip or incipient frostbite, and characterized by sudden blanching or a whitening of the skin. Superficial frostbite is where the skin has a waxy or white appearance and is firm to the touch, but the tissue beneath is resilient. Deep frostbite, is where the tissues are cold, pale, and solid; this is an extremely serious condition that requires immediate medical attention.

First Aid Treatment of frostbite is to gradually warm up the affected body part. If numbness and/or pain does not subside and if deep frostbite is evident, medical attention should be obtained as soon as possible.

Prevention of frostbite can be accomplished through the replacement of wet clothing with dry clothing, drinking of warm fluids at locations away from the work zones, and frequent warm-up breaks.

SLIP, TRIP AND FALL HAZARDS

As in any work area, it is expected that the ground may be uneven, the surface may be uneven, debris may be present, work may be performed on poly sheeting, and wet or muddy areas may exist. Therefore, the potential for slipping, tripping and falling is present. Severe slip or trip hazards will be identified prior to commencement of project activities and demarcated by flags or caution tape.

TRAFFIC AND SITE ACTIVITIES

Work may take place along site access roads and active work areas by other individuals. Daily safety meetings will note where activities are taking place.

Field personnel should be constantly aware of their surroundings and follow the guidelines below:

- Wear appropriate protective equipment even outside of contaminated areas (e.g., safety boots, safety vests)
- Keep a safe distance from heavy equipment operations and truck traffic, and preferably within the line of sight of the operator
- Be aware of equipment backup alarms
- Be alert to overhead hazards
- If working around heavy equipment or operations be alert to noise levels and check with the SSO if noise levels do not permit normal verbal communication. Be aware that hearing protection may prevent hearing other activities around you.
- If working above grade observe all fall protection requirements and devices.

EQUIPMENT

Work will involve supervising the use of Geoprobe soil sampling equipment. The following activities should be followed to minimize hazards associated with operating equipment:

- Approved ear muffs and ear plugs will be used to reduce noise levels below the OSHA action level of 85 dBA. If you have difficulty in maintaining normal conversation levels, the site noise level likely exceeds the safe OSHA limit, and

hearing protection must be worn. These situations could include, but are not limited to, Geoprobe operations and hand tool use.

- Ground fault interrupters will be used when equipment is operated in or around wet conditions.
- Appropriate eye protection will be worn to prevent dust and soil particles from getting into the eyes. At a minimum, safety glasses with side shields are required.
- Gloves and other PPE should be worn, as specified in Section 5, to prevent contact with contaminated soil or sediment.
- Back strain can be prevented by employing proper lifting techniques (i.e., lifting with legs), and utilizing moving equipment and/or assistance from others when possible.

WATER HAZARDS

Sediment and surface water samples will be collected from in and around the Ramapo River. While this section of river is relatively shallow, the following procedures should be followed:

- Appropriate field equipment and PPE must be worn at all times, as identified in Section 5.
- Workers should evaluate stream bed and bank conditions (e.g. stream speed, stream bed material, depth and indications of deeper areas) prior to entering river.
- Rising water levels can happen quickly. Work in and around the river should be halted if there has been significant rainfall within the past 24 hours or during the course of the work day.

ATTACHMENT 7-1

ENVIRONMENTAL MONITORING

AIR MONITORING AND ENGINEERING CONTROLS DURING HAND AUGERING AND GEOPROBE SOIL SAMPLING ACTIVITIES

This attachment presents air monitoring and engineering controls to be instituted during soil sampling activities. Based on the tasks to be performed and the contaminants previously detected in the site soils, an air monitoring and engineering control program has been developed to control potential exposure to organic vapors and monitor both the worker breathing zone and Exclusion Area whenever exposure to hazardous organic vapors may occur. This air monitoring program was designed to be consistent with known or expected exposure to the hazardous substances listed in Table 4-1 and the properties of those substances. Mercury and ammonia do not represent an inhalation hazard based on the activities to be performed.

In order to monitor and control potential exposure to hazardous organic vapors, a procedure has been developed that will be implemented when potential exposure to vapors from contaminated soil is possible. In addition to use of a Photoionization Detector (PID), Draeger tubes will be used to detect for the presence of benzene. Benzene is listed in Table 4-1 with an OSHA PEL of 1 ppm, which is the detection limit of the PID.

Air monitoring will be initiated upon mobilizing. Prior to activities for which exposure is possible, background readings will be taken with the PID and recorded.

Following completion of the background readings, the work area exposure activities may begin (e.g., Geoprobe drilling or hand-augering of soil). PID readings will then be taken in the breathing zone within the work area and compared to background. If the results are consistent with background, then the work may proceed. If PID measurements are detected above background in the breathing zone, Draeger tube measurements for benzene will be collected prior to further work, in the breathing zone adjacent to the work. Provided PID readings remain less than 10 ppm and Draeger tube(s) do not indicate the presence of benzene, the work may continue. Should the PID measure sustained background readings above 10 ppm, or Draeger tubes detect the presence of benzene in the breathing zone, then work will not be initiated until a ventilation fan can be brought to the location, or field personnel don a Full-face APR with an OV cartridge. If the use of an APR is selected, then all field personnel in the work zone must use one, and be authorized and certified to wear an APR. If ventilation is utilized, then the air monitoring procedure will be repeated with a ventilation fan blowing across the work zone.

Should Draeger tubes indicate that benzene is present below 50 ppm, or PID readings consistently range between 10 and 25 ppm above background in the breathing zone, activities will continue with Level C respiratory protection as specified in Section 5 of the SSHASP. PID readings above 25 ppm will require Level B respiratory protection and appropriately trained personnel will be utilized.

If work was initiated without respiratory protection being required (i.e., PID less than 10 ppm and, if utilized, no benzene detected with Draeger tubes), then the breathing zone will continue to be monitored with the PID. Should at any time during the work PID readings show sustained readings above background in the breathing zone, then a second set of Draeger tube readings will be taken. If at any time a Draeger tube indicates the presence of benzene, then activities will resume following use of a ventilation fan or respiratory protection as described above.

A second PID will be utilized if necessary to take readings downwind of the work area at a distance of approximately 10 feet to establish an Exclusion Zone. Respiratory requirements established for the breathing zone will be required throughout the Exclusion Zone. If the downwind readings are above background at 10 feet, PID monitoring will be conducted at approximately 25 feet. If the downwind readings are above background at 25 feet, then additional ventilation may be used or the SSO may discuss other options with the Project Manager. Traffic cones will be used to mark out the Exclusion Zone.

As stated above, Level C respiratory protection will be utilized when PID readings are between 10 ppm and 25 ppm above background, or any required Draeger tube monitoring indicates that benzene is present. If Level C respiratory protection is required, activities will be conducted under the direction of the SSO. The ventilation fan may be utilized if necessary to maintain PID readings below 25 ppm in the breathing zone, and both PID and Draeger tube measurements will continue to be collected to monitor the level of respiratory protection required. Decisions to reduce the level of respiratory protection will be made by the SSO. Cornerstone employees who may be required to use a respirator will follow Cornerstone's Corporate Respirator Protection Program requirements and OSHA 29 CFR 1910.134, and will have been fit tested within the past 12 months.

If Level B respiratory protection is required based on the above monitoring protocol, an outside firm will be contracted to provide the Level B equipment and support services. Additionally, a ventilation fan would be utilized to direct vapors away from work area and assist in setting Exclusion Zone limits. PID and Draeger tube measurements will continue to be collected to monitor the appropriate respiratory protection required. Decisions regarding use of respiratory protection will be made by the designated SSO, in coordination with the Project Health and Safety Coordinator, as well as the Project Manager and Site Representative as data are collected.

ATTACHMENT 12-1

DECONTAMINATION/CLEAN-UP PROCEDURES

Personnel and equipment that have been exposed to groundwater or potentially contaminated soil or waste shall be decontaminated according to the following procedures.

PERSONNEL DECONTAMINATION

Appropriate decontamination equipment will be available to personnel to properly decontaminate outer PPE. Disposable PPE will be removed on site and collected for proper off-site disposal. Reusable PPE will be removed on-site and decontaminated prior to leaving the site.

Portable wash-up materials, apparatus and/or facility may be provided. Personnel working at the site must wash their hands and face prior to eating, drinking or smoking and practice good personal hygiene. Potable water will be available at the site. Personal decontamination should be done at the designated decontamination location.

EQUIPMENT DECONTAMINATION

Equipment decontamination will take place at the location specified by the Site Representative (as needed).

Instruments will be decontaminated whenever they have come into contact with contaminated soil. Dust or dirt will be removed daily or more frequently as needed. Instrument decontamination will occur in the same area for personnel decontamination and will consist of the removal of liquids or dust from the surface of the instruments.

DECONTAMINATION PROCEDURES

A plastic tarp will be placed on the ground in the designated decontamination area, with a drum placed adjacent to the area for liquid decontamination fluids. Two tubs will be utilized for cleaning and rinsing of contaminated equipment or reusable PPE. The tub used for cleaning will contain water mixed with any commercially available low phosphate cleaning agent such as Alconox. The rinsing tub will contain tap water. Spent wash and rinse water will be emptied into the drum designated for liquids.

If field decontamination of heavily contaminated equipment is necessary prior to maintenance or storage, the following procedure will be utilized:

- Laboratory grade glassware detergent plus tap water wash,
- Generous tap water rinse,
- Distilled and deionized (ASTM Type II) water rinse,
- Acetone (pesticide grade) rinse,
- Total air dry or pure nitrogen blow out,
- Distilled and deionized (ASTM Type II) water rinse.

ATTACHMENT 13-1

Incident Report and Statement of Injury

What happened? Discuss HOW and WHY the accident happened:

Has anything like this ever happened to you before? If yes, when?

Were there damages to any equipment or property? If yes, explain.

Was anyone injured? If a Cornerstone employee was injured, have a Supervisor complete the Supervisor's Accident investigation Report.

Were there any witnesses? If yes, who?

What, if anything, can be done to prevent a recurrence?

Employee's Name: _____

Title: _____

Supervisor's Name: _____

Date of Occurrence: _____

Attachment 13-2
Supervisor's Accident Investigation Report



SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

Instructions

- Client supervisor completes and submits this form within 24 hours of an employee accident (whether or not an injury occurs).
- Return this completed form to the following:
ATTN: WORKERS' COMPENSATION
INSPERITY
19001 CRESCENT SPRINGS DR
KINGWOOD TX 77339
Fax: 800-430-4738
- If you have questions, contact Insperity Workers' Compensation toll-free at 800-242-8893, ext. 4244.
- **Note:** If an injury occurs, a First Report of Injury must be filed, within 24 hours, with Specialty Risk Services (SRS). Call SRS at 866-863-5622 for further instructions and information.

SUPERVISOR INFORMATION

Name		Client Company	
Date of Accident	Date of This Report	Time of Accident ☐ a.m. ☐ p.m.	

EMPLOYEE INFORMATION

Name		Employee Social Security Number (last four digits only)	
Accident Location – Street Address		City	State ZIP Code
Employee Reported Injury To (Identify by Name)		Date and Time Accident Reported Date ☐ a.m. ☐ p.m.	
Does Employee Speak English? If "No," Identify Spoken Language ☐ Yes ☐ No		Job Duties (At Time of Accident)	
Was Employee Performing Regular Job Duties? ☐ Yes ☐ No If "No," Identify Regular Job Duties →		Regular Job Duties	

ACCIDENT INFORMATION

Describe Accident	
Did Accident Result in Injury? ☐ Yes ☐ No	If "Yes," Describe Injury (Pain, Cut, Fracture, Etc.)
If Injured, Identify Area(s) of Body Affected	Identify Cause(s) of Accident (Slip, Fall or Object/Substance)
After Accident, Did Employee Leave Work? ☐ Yes ☐ No	If "Yes," Specify Date and Time Date ☐ a.m. ☐ p.m.
Describe Unsafe Acts and/or Conditions	
Describe Safety Equipment Provided and Used	
Describe Corrective Actions Taken	
Did the Accident Cause Property Damage? ☐ Yes ☐ No	If "Yes," Please Describe Extent of Damage

SUPERVISOR'S ACCIDENT
INVESTIGATION REPORT

MEDICAL ATTENTION OR TREATMENT INFORMATION

Describe First Aid/Medical Treatment (If Transported to Hospital or Clinic, Provide Name, Address and Phone Number of Facility)
If First Aid or Medical Treatment Not Provided, Please Explain Why
Additional Comments

WITNESS INFORMATION

Name	Relationship (Co-worker, Etc.)	Work Phone	Home Phone

PERSON COMPLETING THIS FORM

Signature -----	Print Name	
	Print Title	Date Signed

Attachment 13-3
Supervisor's Injury Report

**TELECLAIM WORKERS' COMPENSATION
LOSS REPORT****E-Mail Address: reportclaim@SRScconnect.com****Fax Number: 866-879-4777**

Account # 42720	Client Number (Location Code)	Filing State
---------------------------	-------------------------------	--------------

Mandatory For Minnesota Employees Only: Print this copy of the [Minnesota Workers' Compensation System Employee Information Sheet](#).

Client Company Name		
Location Address		
City	State	ZIP Code
Preparer's Name	Title	Phone Number

INJURED EMPLOYEE INFORMATION

Date of Injury	Name		Social Security Number	
Current Mailing Address				
City		State		ZIP Code
Home Phone	Date of Birth	☐ Male ☐ Female	Marital Status (If Married, Spouse's Name)	
Number of Dependents	Number Under Age 18	Employee's Language		

INJURED EMPLOYEE'S WORK INFORMATION

Employee's Regular Occupation		Department	
Department at Time of Injury (CA, TX Only)		Was Employee Performing Regular Job Duties at Time of Incident? ☐ Yes ☐ No	
Is Employee Partner, Officer or Owner? ☐ Partner ☐ Officer ☐ Owner	Hire State	Does Employee Receive ADA Accommodations? ☐ Yes ☐ No	
Employment Status		Job End Date (If Employee is Seasonal or Temp)	Date in Current Job

ACCIDENT / INCIDENT INFORMATION

Does Employee Have Group Health ☐ Yes ☐ No	Time of Accident a.m. p.m.		Date / Time Reported to Employer Date Time	
Reported to Whom		Supervisor's Name		
Shift Begin / End Time From To		Date Employee Received Claim Form? (CA Only)		
Incident Address			Employer's Premises? ☐ Yes ☐ No	
City		State	County	ZIP Code
Description of Accident / Incident (Include what the Employee was doing, Work Process, Cause, Injury and Body Part)				
Questionable? (If Yes, Contact Name) ☐ Yes ☐ No		Name		Phone Number
Is Employee Permanently Disabled Because of Incident? ☐ Yes ☐ No	Signs of Drug / Alcohol Use? ☐ Yes ☐ No		Fatality? (If Yes, Date) ☐ Yes ☐ No Date	



ACCIDENT / INCIDENT INFORMATION (CONTINUED)

Number of Days Expected to Miss	Last Date / Time Worked Date Time	First Day Off	Was Employee's Salary Continued? ☐ Yes ☐ No
Actual OR Expected Return to Work Date		Is There a Previous Claim / Injury? (If Yes, Claim Status and Body Part Affected) ☐ Yes ☐ No	
Safety Equipment Provided? ☐ Yes ☐ No	Was it Used? ☐ Yes ☐ No	Unsafe Act? (If Yes, Describe) ☐ Yes ☐ No	
Machine Part Involved? (If Yes, Describe) ☐ Yes ☐ No			
Machine Part Defective? (If Yes, Describe) ☐ Yes ☐ No			
Third Party Responsible for Incident? (If Yes, Name) ☐ Yes ☐ No		Name	Phone Number
Address			
City		State	ZIP Code
Witness? (If Yes, Name) ☐ Yes ☐ No		Name	Phone Number
Address			
City		State	ZIP Code
Name of Contact Regarding Additional Loss Information			Phone Number
Address			
City		State	ZIP Code
First Aid Given on Site? ☐ Yes ☐ No		Medical Treatment Received (Describe)	
Name of Physician / Health Care Provider			Phone Number
Address			
City		State	ZIP Code
Hospitalized? (If Yes, Date) ☐ Yes ☐ No Date		Name of Hospital	Hospital Phone Number
Address			
City		State	ZIP Code
Treated Outpatient? ☐ Yes ☐ No		Emergency Treatment, Ambulance Services? ☐ Yes ☐ No	
Comments			



Trip to:

Orange Regional Medical Center 707 East Main Street

Middletown, NY 10940

(845) 333-1000

18.70 miles / 21 minutes

Notes

Attachment 14-1

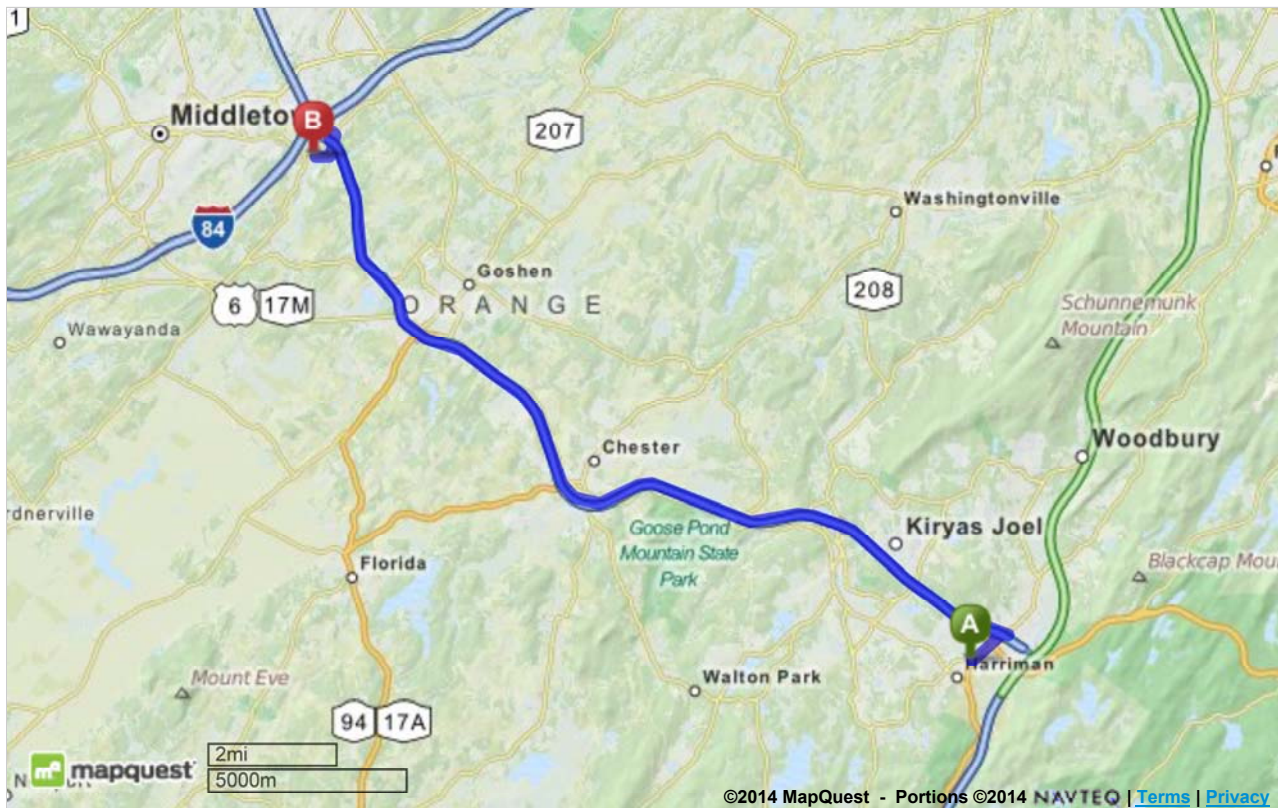
	2156 RT-17, Harriman, NY 10926	Download Free App
	1. Start out going northeast on RT-17 toward Commerce Dr S. Map	0.7 Mi <i>0.7 Mi Total</i>
 	2. Merge onto RT-17 W toward US-6 W / Monroe. Map	17.1 Mi <i>17.8 Mi Total</i>
	3. Take the Crystal Run Crossing exit, EXIT 122. Map	0.2 Mi <i>18.0 Mi Total</i>
	4. Turn right onto Crystal Run Xing. Map	0.06 Mi <i>18.0 Mi Total</i>
	5. Turn right onto Crystal Run Rd. Map <i>Wendy's is on the corner</i>	0.3 Mi <i>18.3 Mi Total</i>
	6. Stay straight to go onto E Main St. Map	0.4 Mi <i>18.7 Mi Total</i>
	7. 707 EAST MAIN STREET. Map <i>Your destination is 0.1 miles past Midway Rd</i> <i>If you reach Golf links Rd you've gone about 0.1 miles too far</i>	
	Orange Regional Medical Center 707 East Main Street, Middletown, NY 10940 (845) 333-1000	

Total Travel Estimate: **18.70 miles - about 21 minutes**

FREE NAVIGATION APP

SELECT: ☐ IPHONE ☐ ANDROID

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Trip to:

Harriman Village Police Dept 1 Maple Ave

Harriman, NY 10926

(845) 782-6644

0.42 miles / 1 minute

Notes

Attachment 14-2. Route to Police Department

	2156 RT-17, Harriman, NY 10926	Download Free App
	1. Start out going southwest on RT-17 toward Meadow Ave. Map	0.09 Mi <i>0.09 Mi Total</i>
	2. Take the 2nd right onto Grove St. Map <i>Grove St is just past Meadow Ave</i> <i>If you reach Averill Ave you've gone about 0.1 miles too far</i>	0.3 Mi <i>0.4 Mi Total</i>
	3. Turn left onto Maple Ave. Map <i>Maple Ave is 0.2 miles past Surrey Ln</i> <i>Harriman Village Police Dept is on the left</i> <i>If you reach N Main St you've gone a little too far</i>	0.03 Mi <i>0.4 Mi Total</i>
	4. 1 MAPLE AVE is on the left. Map <i>If you reach Surrey Ln you've gone about 0.2 miles too far</i>	
	Harriman Village Police Dept 1 Maple Ave, Harriman, NY 10926 (845) 782-6644	

Total Travel Estimate: **0.42 miles - about 1 minute**

FREE NAVIGATION APP

SELECT: ☐ IPHONE ☐ ANDROID

Enter your mobile number



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APPENDIX D

PROJECT PERSONNEL RESUMES

PROFESSIONAL QUALIFICATIONS

Mr. DiPippo has thirty-seven years of professional experience in design, construction, and operation of remediation including brownfields, solid waste, and hazardous waste management facilities, water and wastewater treatment facilities, hydraulic and hydrologic analyses, and site planning. Remediation related work has included in-situ groundwater treatment (e.g., reductive dechlorination, chromium reduction), groundwater extraction and treatment, caps and cutoff walls, soil vapor extraction, and air sparging. Solid and hazardous waste experience has included design of landfills, including leachate collection and treatment facilities, gas venting systems, final cover, drainage controls, and stability analysis. Other work has included design and layout of water and wastewater pumping systems, clarifiers, filters, storage facilities, piping networks, hydrologic and hydraulic analyses for flood studies and hydraulic structures, and review of site development projects. Work has spanned feasibility studies through detailed engineering designs and construction services. Construction services have included management of field personnel, assessment of QA/QC data, and preparation of final certification reports. Also provided expert witness services for various environmental projects and in support of negotiations with regulatory agencies.

Mr. DiPippo has been involved in office, department, and project management. He has supervised multi-disciplinary project teams of engineers and hydrogeologists. He also represents clients at hearings and meetings with regulatory agencies, and lends assistance to clients with development of strategic approaches to projects.

EDUCATION

Master of Science, Environmental Engineering, Drexel University, 1973
Bachelor of Science, Civil Engineering, New Jersey Institute of Technology (formerly Newark College of Engineering), 1972

REGISTRATION/CERTIFICATIONS

Licensed Professional Engineer in New Jersey and New York

EXPERIENCE AND BACKGROUND

2009 - Present

*Manager, Hydrogeology & Remediation, Cornerstone Environmental Group, LLC,
Middletown, New York*

2003 - 2009

Principal, HydroQual, Inc., Mahwah, New Jersey

1998 - 2003

Office Manager, Brown & Caldwell, Allendale, New Jersey

1987 - 1998

Vice President, Eckenfelder, Inc., Allendale, New Jersey

1978 - 1987

Group Director, Wehran Engineering, Middletown, New York

1976 - 1978

Engineer, McPhee, Smith, Rosenstien, Montvale, New Jersey

1973- 1976

Engineer, Haves & Emerson, Ltd., Saddlebrook, New Jersey

Remediation/Brownfields

- Fraternity Meadows, LLC, Gas Control System Design: Project Manager for preparation of a gas control and monitoring system design for a residential building over a former ash landfill. The landfill also had a fraction of putrescible waste, and testing indicated the presence of both combustible gas and trace organics. A sub-slab depressurization system was designed to control the potential for vapor intrusion into the building. In addition, a unique gas monitoring system was designed beneath the entire building footprint, using the protective geotextile for the vapor barrier, as the monitoring layer. Testing was performed to confirm the applicability of the geotextile for this monitoring. The testing confirmed its suitability and the system provides a comprehensive but unobtrusive monitoring approach for a residential development.
- Tantalo Waste Disposal Site, Seneca Falls, NY: Project Manager for remediation of a former landfill which was placed on the New York State Registry of Inactive Hazardous Waste Sites. Work has included the assessment, design, and construction of a closure plan for the site (i.e., geocomposite cap, leachate collection system, gas control system, drainage facilities) and a monitored natural attenuation groundwater remedy that includes addition of electron donor materials to address a plume of VOCs in bedrock groundwater. The groundwater remedy was selected after implementing a well-planned process of educating the NYSDEC (both central and regional office personnel) on enhanced monitored natural attenuation.
- New York City Economic Development Corporation, Staten Island Railroad Reactivation Project, Staten Island, NY: Project Manager for remediation work along a portion of the Staten Island RR slated for reactivation. The New York City Economic Development Corporation was undertaking the reactivation of a line in the Staten Island Railroad, a portion of which was adjacent to the former GATX petroleum facility. The GATX facility was the subject of a site remediation program. However, the work stopped at the railroad right of way, leaving residual petroleum contamination. Critical to the project was a culvert crossing that contained contaminated sediments and free product. The work involved a site investigation, design, and implementation of the remediation. The contaminated materials were excavated, classified, and properly disposed of off site, the culvert was subsequently filled, and the rail line restored for reactivation.

- LCP Chemicals, Inc. Superfund Site, Linden, NJ: Project Manager for a feasibility study for this former chlor-alkalai manufacturing facility. The principal contaminant at the site is mercury. The feasibility study efforts involved understanding the speciation of the mercury present at the site, evaluating treatment methods for mercury contaminated soil (with emphasis on soil washing and solidification and stabilization), developing treatment efficiency estimates, calculating potential vapor emissions, evaluating disposal options for elemental mercury, and developing various remedy cost estimates.
- Study Area 7, Sediments Remedy, Jersey City, NJ.: Project Manager for the selection and design of a sediments remedy in the Hackensack River. The remedy is being performed under a Court Order and includes multiple areas of thin layer capping and dredging. Work includes a feasibility study and detailed engineering design. Design aspects have included evaluation of river bottom shear stress and cap armoring, wave action protection, and propeller wash considerations.
- New York City Dept. of Sanitation, Brooklyn Navy Yard Facility, Brooklyn, NY: Project Manager for this 13-acre parcel within the former Brooklyn Navy Yard. Work has involved a remedial investigation (RI) and feasibility study (FS) performed for the DSNY, and at which Brownfield redevelopment is underway. Work has included an RI report of investigation of groundwater, soils, sediments, and soil gas. The feasibility study was prepared in full recognition of the presence of urban fill with concentrations of various constituents above cleanup criteria. A Brownfield redevelopment plan for a portion of the site is also concurrently underway. As a result, a separate IRM was submitted to the NYSDEC to facilitate site redevelopment, and this IRM has been integrated with the overall approach for the site as developed in the feasibility study. The FS focused on effective and rapid remedial measures consistent with the planned redevelopment for the site and the site characterization (primarily historic fill).
- University Avenue Site, Gloucester City, NJ: Project Manager responsible for a hydrogeologic investigation and feasibility study for an asbestos containing materials site in a residential area of New Jersey. The project involved defining the extent of asbestos containing material, performing a risk assessment upon which to base the selection of remedial alternatives, and preparing a feasibility study to evaluate practicable remedial alternatives. Of note was the need to evaluate, as a part of the feasibility study, mechanisms to either control or restore use of residential properties to limit the potential for future exposure to asbestos containing materials. Following completion of the FS, final design drawings and specifications were prepared and the work was implemented, including restoration of use and facilities at the various residential properties.
- Main Street Site, South Bound Brook, NJ: Project Manager for a site capping program for an industrial facility being handled under ISRA. While site investigation and remediation programs were underway, this facility maintained active commercial operations, unrelated to the prior use as an asphalt shingle manufacturing facility. The site capping program integrated the continued use of buildings and upgrades to

pavement for capping of largely historic fill.

- Superfund Sites: Project Manager and Project Director for work at numerous Superfund sites including work plans, remedial investigations, feasibility studies, remedial design, construction assistance, operation and maintenance, public participation, and agency negotiations. Sites have included Nascolite Corporation, D'Imperio Property, Sharkey Farms, Boarhead Farms, Diamond Alkali, GEMS Landfill, Myers Farm, Chemsol, Atlantic Resource Corporation, and Cornell Dubilier Electronics.

Solid/Hazardous Waste

- Seneca Meadows, Inc. Sanitary Landfill, Seneca Falls, NY: Project Manager and Project Director for preparation of a 6NYCRR Part 360 permit application for this landfill expansion. Specific services included hydrogeologic site characterization and preparation of an engineering design/permit documents for the landfill expansion including various grading plans (subgrade, baseliner, primary collection system), liner system layouts and details, leachate collection and storage system, landfill design details, operational plans including site access roads, and retrofit systems (e.g., existing leachate system modifications). Also responsible for various supporting documents including an engineering design report, an operations and maintenance plan, an environmental monitoring plan, a CQA/CQC plan, a contingency plan, and a closure/post-closure care plan (including cost estimates). Also assisted with the development of a plan for the relocation of Salcman Road, the main access road for the landfill, and worked with others on the project for the design of a new entrance off of State Highway Route 414 and a new bridge on Route 414 to accommodate relocation of a stream that was part of the overall landfill expansion plan. A unique aspect of this project is the relocation of approximately three miles of Black Brook, a Class C stream feeding the Montezuma National Wildlife Refuge. The relocation project involved HEC-RAS modeling, stream hydraulic design, hydraulic design integration with wetlands enhancement, and natural channel design. Also responsible for preparation of a Stormwater Pollution Prevention Plan for implementation of stream relocation and wetland mitigation work.
- Modern Landfill, Inc. Sanitary Landfill, Lewiston, NY: Project Director of an expansion design for this landfill in upstate New York. The project involved a lateral expansion design and permit application package under the New York state Part 360 regulations. The project included a full design and permitting package including engineering drawings, engineering reports, an environmental impact statement, and permit applications. The design efforts included such items as leachate generation using the HELP model, gas generation modeling, stability analyses, operational plans, contingency plans, operation and maintenance plans, and design of an overfill liner (i.e., liner above existing solid waste). The permit was acquired in approximately 18 months.
- Broome County Sanitary Landfill, Nanticoke, NY: Project Manager responsible for a county landfill project in mid-New York State. Work commenced with the design of

a landfill expansion and acquisition of permits to operate and construct under the State's 6 NYCRR Part 360 regulations. Work continued with the preparation of construction bid documents, construction observation, and construction certification for each stage of the landfill expansion. The existing landfill on the same property was the subject of a separate remedial investigation/feasibility study. Activities in this regard included evaluation of groundwater flow patterns, extent of contamination, sources of leachate generation, and alternative remediation technologies such as capping, cut-off, and groundwater pumping (upgradient and/or downgradient).

- Secure Landfills No. 4 and 5, CECOS International: Project Manager responsible for two secure landfill designs in the Buffalo-Niagara Falls region of New York. Project responsibilities included coordination with regulatory agencies and the client, review of design data including capping and lining, leachate control, gas venting, structural considerations, and site drainage. Also participated in the review of hydrogeologic data to evaluate site suitability and design requirements.

PROFESSIONAL AFFILIATIONS

Water Environment Federation
National Ground Water Association
New York State Society of Professional Engineers
ASTM Committee D35 - Geosynthetics

PUBLICATIONS AND PRESENTATIONS

“The Carbon Footprint of In-Situ Groundwater Remediation v. Conventional Pump and Treat,” presented at the New York Federation of Solid Waste Management Associations, Lake George NY, May 4, 2011.

“Vapor Intrusion Management for Residential Development at a Former Landfill,” presented at the New York Federation of Solid Waste Management Associations, Lake George, NY, May 5, 2008.

“Comparable Structural Fill, A Cost-Effective Alternative to Natural Resources,” presented at the New York Federation of Solid Waste Management Associations, Lake George, NY, May 8, 2007.

“Use of Alternative Grading Materials in Landfill Closure,” presented at the New York Federation of Solid Waste Management Associations, Lake George, NY, May 5, 2003.

“Recent Advances and Design Considerations in Capping Systems,” G. DiPippo and M. Monteleone, Technical Papers for the Fourteenth Annual Environmental Management and Technology Conference International, Advanstar Expositions, Atlantic City, NJ, June 1996.

“Intragradient Cutoff Walls in Waste Disposal Site Remediation,” R.D. Mutch, Jr. and G. DiPippo, Proceedings of the Third Annual Hazardous Materials Management Conference/Central Tower Conference Management Company, Glen Ellyn, Illinois, March 1990.

*Gary J. DiPippo, P.E.
Client Manager II*

“Environmental Cleanup of the Monroe Township Landfill,” R.D. Mutch, Jr., G. DiPippo, and J. Hearty, Proceedings of the ASCE National Conference in Environmental Engineering, Atlanta, GA, July 1981.

PROFESSIONAL QUALIFICATIONS

Mr. Timothy Roeper has over 27 years of professional experience in the supervision and interpretation of hydrogeologic investigations, including the evaluation of lithologic and stratigraphic data, monitoring well placement and installation, aquifer testing, water quality sampling, statistically based monitoring plans, and the preparation of detailed hydrogeologic reports. His responsibilities include the determination of the number and location of monitoring well sampling points, soils sampling locations, analytical requirements and collection procedures as well as the managerial aspects of coordinating individuals with various technical expertise, budgeting, scheduling and tracking the project. Further responsibilities include interaction and negotiation with various regulatory agencies, litigation assistance, expert testimony and overall responsibility for data compilation and presentation of technical reports.

EDUCATION

Master of Science, Geology, Kent State University, 1988
Bachelor of Science, Geology, State University of New York, 1982

REGISTRATION/CERTIFICATIONS

Licensed Professional Geologist: State of Indiana

EXPERIENCE AND BACKGROUND

2009 - Present

Client Manager, Cornerstone Environmental Group, LLC, Middletown, New York

2003 - 2009

Associate Hydrogeologist, HydroQual, Inc, Mahwah, New Jersey

1987 - 2003

Sr. Project Hydrogeologist, Brown and Caldwell, Allendale, New Jersey

1985 - 1987

Research Assisstant, Kent State University, Kent, Ohio

1982-1985

Staff Geologist, Wehran Engineering, Middletown, New York

Solid Waste Management

- Seneca Meadows Inc., Seneca Falls, NY: *Project Manager* responsible for the development and implementation of an aquifer test work plan to demonstrate the ability to capture an existing bedrock groundwater plume under a proposed expansion area as part of a 1.9(g) demonstration. Developed and implemented a work plan to demonstrate that the plume originating from the adjacent Superfund site was being naturally retarded

and that biodegradation was a potentially viable remedial alternative. A Site Investigation Work Plan, resulting Site Investigation Report, 1.9(g) Demonstration Report, and Environmental Monitoring Plan (EMP) were prepared to support expansion of the existing Part 360 Solid Waste Landfill. On-going technical support is provided relative to groundwater quality and hydrogeology as needed.

- Albion Solid Waste Facility, Waste Management of New York: *Project Manager* responsible for a comprehensive hydrogeologic investigation in accordance with NYSDEC Part 360 regulations. The investigation focused on a fractured bedrock hydrogeologic environment and included the use of various surface and borehole geophysical techniques, aquifer testing, groundwater flow modeling, environmental isotope analysis, packer testing, and conventional and angle boreholes. Key issues included the presence of two existing landfills and the potential presence of a fault system. The NYSDEC concluded the site to be located in a "complex" geologic setting and thus required an investigation that was "above and beyond" the intent of the regulations. The complex groundwater geochemistry required development of a statistically based environmental monitoring program. The resulting report was well received by the NYSDEC and they fully supported the results of the investigation during the issues conference and adjudicatory hearings for which both written and verbal testimony was provided.
- High Acres Landfill & Recycling Center, Waste Management of New York: *Project Manager* responsible for the investigation of an existing sanitary landfill facility and proposed expansion area. The investigation included the use of Pneumatic piezometers, packer testing and downhole geophysical logging resulting in a successful expansion application. .

Hazardous Waste Site Remediation

- Former GAF Facility, Linden, NJ: *Project Manager* responsible for a multi-disciplinary investigation and design of a 8,600 foot long, circumferential Waterloo Barrier® containment wall and shallow groundwater collection trench. Developed and implemented a Remedial Action Work Plan from pre-design through construction that also included the installation of bedrock extraction wells, importation of fill to raise the site above the 100 year flood plain, an investigation into the contents of a "drum landfill", interim grading and drainage plans, permitting and conceptual re-development as a Brownfield site. On-going technical support is provided relative to remedial effectiveness monitoring
- Manufacturing Facility, Arkema Inc., Calvert City, KY: *Project Manager* responsible for review and integration of various data collected over years of investigation to develop a site-wide conceptual site model to explain the observed VOC distribution (principally CFC's). Designed and implemented a groundwater collection and treatment system, and associated effectiveness monitoring program.
- Former Rowe International Facility, Whippany, NJ: *Project Manager* responsible for investigation of persistent levels of TCE in groundwater at a site that was slated for

residential redevelopment. Short term Soil Vapor Extraction (SVE) tests and subsequent pilot tests were implemented to collect design data for a full scale SVE and air/ozone sparging system that would allow residential redevelopment of the site without restrictions.

- Bound Brook Superfund Site, Wyeth, Bound Brook, NJ: *Project Manager* responsible for characterization of the site wide hydrogeology, including interrelationship between overburden and bedrock water-bearing zones, and surface water. Included the use of acoustical borehole geophysical logging, packer testing and installation of the FLUTE multi-port sampling system in new and existing boreholes to collect discrete water quality and potentiometric surface data. Completed aquifer testing to quantify the influence of bedrock extraction wells on overburden groundwater and define the associated zone of capture in both the overburden and bedrock water-bearing zones.
- Myers Property Superfund Site, Elf Atochem, Pittstown, NJ: *Project Manager* responsible for defining the vertical and horizontal extent of a suspected DNAPL source and associated dissolved contaminant plume in fractured bedrock. Field screening methods were successful in delineating the plume without the need to install numerous monitoring wells. Subsequent work included aquifer testing, acoustical borehole geophysical logging and groundwater modeling to design a groundwater recovery, treatment and re-injection system. Monitoring continues to demonstrate successful capture and treatment. The monitoring program also includes coordination and interaction with nearby residents as part of a semi-annual residential well sampling program.
- Chemsol Superfund Site, de maximis inc., NJ: *Project Manager* responsible for the delineation of a VOC plume in bedrock and subsequent design and implementation of a bedrock groundwater extraction and monitoring plan to achieve and demonstrate capture. Also implemented multi-well aquifer tests, soil sampling programs for delineation of soils containing elevated VOC, PCB and lead concentrations, and installation of multi-port wells in a residential neighborhood to depths in excess of 450 feet into bedrock.
- New Lyme Landfill, New Lyme Defense Group/Swidler & Berlin, OH: *Project Manager* -Responsibilities included working with PRPs and regulatory agencies to conduct a Five Year Review Investigation related to the effectiveness of an existing groundwater extraction system. The investigation resulted in a ROD amendment that called for the abandonment of the groundwater extraction wells and wastewater treatment plant in favor of monitored natural attenuation. The ROD amendment is estimated to save the PRPs over \$500,000 per year in O&M costs.
- Kodak Park, Eastman Kodak, Rochester, NY: *Project Manager* responsible for a 2.5 million dollar hydrogeologic investigation at Kodak Park in Rochester, New York. Responsibilities included the development of a work plan, standard operating procedures, formal bid packages, construction specifications, and reports. Directly responsible for coordinating the activities of six drill rigs with that of an active tank upgrade program in addition to detailed budget tracking and project management. Technical specifications for

the project included quadruple-cased wells, five-foot packer testing utilizing the Lugeon method, downhole geophysics, and stainless steel well casings. Drilling and well construction activities were ongoing for approximately 10 months and were conducted under a strict health and safety plan.

- Former Sterling Drug, Trenton, NJ: *Project Manager* responsible for developing a groundwater extraction system pumping strategy and off-site investigation to delineate a benzene plume in low permeability bedrock. The investigation is on-going and includes the installation of wells to depths of 350 feet.
- Army Corps of Engineers, Former Atlas Missile Site, Cheyenne, WY: *Hydrogeology Task Manager* responsible for integrating data collected from various investigations into a site conceptual model (CSM) and reaching consensus on the CSM with various stake holders. Developed and implemented a work plan for matrix diffusion testing on-site and conceptual design and field investigation for an off-site groundwater extraction system. Work included the use of sonic drilling methods, aquifer testing and analysis and groundwater flow modeling.

Resource Conservation and Recovery Act

- DYNO Nobel Site, Hercules/DYNO Nobel, Port Ewen, NY: *Project Manager* responsible for a RCRA Facility Investigation (RFI) of an active primary explosives plant. Investigative activities included working with the analytical laboratory to speciate total mercury concentrations and the use of explosives specialists to identify and excavate soils containing primary explosives at sufficient concentrations to pose an explosive hazard.

Vapor Intrusion

- Former Rowe International Facility, Whippany, New Jersey: *Project Manager* responsible for indoor air sampling at homes adjacent to this former facility. Despite the presence of VOCs in indoor air that were similar to those found at the Site, successfully demonstrated to NJDEP that the VOCs in indoor air were not site related
- Chemsol Superfund Site, de maximis inc., NJ: *Project Manager* responsible for assessing the vapor intrusion pathway and preparation of a report concluding the pathway was incomplete. The report and conclusions were independently reviewed by Dr. Paul Johnson, co-author of the Johnson and Ettinger Model (J&E Model) who concurred with the conclusions. The report was submitted to USEPA and no further work is required.
- Tantalum Superfund Site, Waterloo, NY: *Task Manager* responsible for a vapor intrusion investigation related to a bedrock groundwater plume. Collected shallow groundwater, soil gas, sub-slab and indoor air samples and used the J&E Model to simulate site conditions. Modified the model calculations based on input from Dr. Paul Johnson (co-author of the J&E model) to demonstrate incomplete pathway.
- University Square Office Building, Reckson Associates, West Windsor, NJ: *Project Manager* responsible for a vapor intrusion investigation at a new office building

Timothy R. Roeper, P.G.
Client Manager - Hydrogeology

constructed at a Brownfield site. In order to avoid puncturing the slab, the proposed sampling approach deviated from that called for in the NJ Vapor Intrusion Guidance and thus required special approval from NJDEP. The proposed approach was approved without comment and the results were all well below applicable screening criteria.

PROFESSIONAL AFFILIATIONS

Professional Association of Groundwater Scientists and Engineers

National Water Well Association

PROFESSIONAL QUALIFICATIONS

Dr. Medley's responsibilities have included ecological evaluations, air quality permitting and compliance for County, State and private facilities, renewable energy and grant applications, greenhouse gas inventory reports, and consulting for biomass and solar energy projects. She helps facilities comply with State and Federal air pollution requirements and represents their interests for all NJDEP and EPA permits or enforcement issues.

EDUCATION

City University of New York, New York, NY -Ph.D.: Biology, Ecology and Environmental Biology Subprogram

New Jersey Institute of Technology, Newark, NJ -MS: Environmental Science

University of Delaware, Newark, DE -BS: Environmental Science

Additional Training

Qualified Air Compliance Auditor

OSHA Certified

REPRESENTATIVE EXPERIENCE AND BACKGROUND

34 Woodridge Lane, Sea Cliff, NY: Work included preparation of a Fish and Wildlife Resource Impact Analysis, in accordance with NYSDEC DER-10 guidance. Efforts included assessing terrestrial, aquatic, and fish & wildlife resources, observations regarding potential ecological stressors, assessments of habitat value, analysis of compounds of potential ecological concern (COPECs) and definition of ecological receptors and exposure pathways.

Monmouth County Reclamation Center, Tinton Falls, NJ: Work included updating the permit to reflect new equipment operation and installation or removal at the facility, in addition to monitoring and record keeping. BSG prepared and submitted all reports required by the NJDEP and/or EPA, including the Annual Emission Statement, semi-annual Deviation Reports, and semi-annual NSPS Reports.

Monmouth County Landfill, Howell, NJ: Work included updating the permit to reflect new equipment operation and installation or removal at the facility, in addition to monitoring and record keeping. BSG prepared and submitted all reports required by the NJDEP and/or EPA, including the Annual Emission Statement, semi-annual Deviation Reports, and semi-annual NSPS Reports.

Lakewood Landfill, Lakewood, NJ: Submitted the Initial Title V Operating Permit application for the facility and is responsible for the ongoing permit compliance, including landfill gas testing three times a year and Deviation and Annual Compliance reporting.

Woodbine Developmental Center, Woodbine, NJ: Prepared a Title V Operating Permit Modification application to increase the allowable sulfur and particulate emissions for the existing boilers consuming landfill gas from the Cape May County Landfill.

Neptune Sewerage Authority, Neptune, NJ: Prepared an Air Quality Pre-Construction Permit application for multiple boilers and backup flares that consume digester gas. In addition, assisted the facility in the installation of flow meters and other compliance-related issues of the permit.

Other Experience:

- Landfill Disruption Permits and Reports
- Class “C” Recycling Center Approvals
- Beach Management Plans
- Wetlands Mitigation Evaluation Reports

PROFESSIONAL QUALIFICATIONS

Ms. Leslie Sparrow has over 25 years of professional experience in overseeing extensive site investigations and remedial activities for complex sites with soil and groundwater contamination, for closed sites as well as active industrial properties, including ISRA and Superfund sites. At Cornerstone, she continues to manage all phases of remedial investigations and works with the project team in implementing the remedial design and site remediation activities.

Ms. Sparrow has also managed projects involving the preparation of environmental assessment and impact statements for redevelopment projects within the City of New York. Ms. Sparrow has evaluated projects related to the placement of new facilities, relocation of existing activities, redevelopment projects, and mineral exploration. She has been directly involved in the construction of over 300 monitoring and piezometer wells, collection and classification of soil samples, and collection of groundwater samples. As Project Engineer, she developed a process design for dual groundwater pumping and soil vapor extraction system to remediate groundwater and soils in a chlorobenzene spill area. She determined the extent of the spill area and developed a work plan for the excavation and thermal treatment of the contaminated soils. She also managed the operation of the groundwater pumping and treatment system and air injection system during its four years of operation.

Ms. Sparrow also coordinated OSHA Hazwoper training and administers a Respirator Protection Program. She has prepared and reviewed HASPs for all levels of activities including hazardous waste sites, industrial facilities, confined space entry, and marine sediment and water sampling.

EDUCATION

Master of Engineering, Environmental Engineering, Manhattan College, 1991
Bachelor of Science, Geological Engineering, Colorado School of Mines, 1982

REGISTRATION/CERTIFICATIONS

Licensed Professional Geologist, State of Illinois.
American Institute of Professional Geologists-Certified Professional Geologist
NJDEP Underground Storage Tank Certification Licensed Subsurface Evaluator

EXPERIENCE AND BACKGROUND

2009- Present
Senior Project Manager, Cornerstone Environmental Group, LLC, Middletown, New York
1998 - 2009
Project Manager, HydroQual, Inc., Mahwah, New Jersey

1991 – 1998

Project Engineer, HydroQual, Inc., Mahwah, New Jersey

1985 – 1991

Engineer II, HydroQual, Inc., Mahwah, New Jersey

1984 - 1985

Geophysical Processing Manager, Crestal Processing Services, Aurora, Colorado

1982 – 1984

Field Geologist, U.S. Geological Survey, Lakewood, Colorado

Remediation

- Remedial Investigation for Confidential Industrial Client, NJ: Project Manager for a large, multi-task site remedial investigation project for an active chemical bulk storage facility. Ms. Sparrow is managing an investigation to delineate chlorinated solvent contamination in groundwater and soils beneath the site. Results of investigation will ultimately support development of a remedial system or systems to mitigate contaminated groundwater that may be impacting the adjacent marine waterbody and/or other sensitive receptors.
- Site Investigation and Remediation at Former Smelter and Refinery Site, NJ: As Project Geologist, Ms. Sparrow assisted in the site investigation of a 160 acre former smelter and refinery. Supervised the drilling and construction of over 200 monitoring and piezometer wells and 150 soil borings, as well as collected and classified all soil samples. Analyzed geology and soil concentration data. Assisted in monitoring well sampling programs, well pump tests, preparation of well construction reports, work plans, remedial investigation reports, and feasibility studies. Observed construction of large-scale passive neutralization trenches for treatment of metals in groundwater. Project Engineer for a pilot study to evaluate soil vapor extraction as a remedial alternative. Determined extents of an organic chemical spill and supervised the excavation of 7,000 tons of contaminated soil. Analyzed contaminant plume characteristics and developed a work plan for a groundwater treatment system. Project Manager for a groundwater pumping and treatment system and air injection system which operated for four years.
- Remedial Investigation at a Food Packaging Facility, NJ: As a Project Manager, developed an investigation for delineation of contaminants in soils and groundwater due to historical site operations. Managed implementation of field activities and coordinated with team in the analysis of soil and groundwater data and determination of remedial alternatives.
- Sampling and Analysis Plan for the Acquisition of Five Year Dredging Permits at Department of Sanitation Facilities, NY: As a Project Engineer, assisted in the preparation of a sampling and analysis protocol, which incorporated literature dredging information and sampling data into calculations for determining the resuspension rate of sediments based on the dredging method. Utilized a mixing zone model to analyze the

plume of dissolved constituents away from dredging activities. Planned and supervised the marine sediment sampling at nine facilities. Prepared the final report and addressed comments by the NYSDEC.

- Phase II Environmental Site Assessment, NYCDEP: As an Engineer, supervised drilling and construction of monitoring wells at a former Phelps Dodge smelter. Collected soil samples for laboratory analysis and classified soil samples using unified soil classification system. Field screened soil samples for volatile organics and field decontaminated sampling equipment.
- Remedial Investigation at Chemical Repackaging Warehouse Facility, NJ: As a Project Engineer, supervised drilling and construction of monitoring wells and soil borings to investigate the movement and extent of organic compounds following a chemical spill. Assisted in analysis of soil and groundwater data and determination of remedial alternatives.

Consulting

- On-Call Environmental Consulting Services, Pharmaceutical Company, NY: Project Manager for project to provide on-call consulting services for a large pharmaceutical company for miscellaneous environmental issues that might arise at the site. Provided assistance in the development of a technical strategy for the closure/post closure of former landfills and previously identified Solid Waste Management Units (SWMUs) under their RCRA Corrective Action Program. In addition, provided technical assistance on environmental issues related to the previously identified SWMUs, building sub-slab sampling, excavation sampling, spill area sampling, contaminated soil delineation and excavation, and long term monitoring well sampling.
- Comprehensive City-Wide Floatables Control Abatement Plan, NY: Project Manager for a large, multi-year, multi-task project with the New York City Department of Environmental Protection to develop a Comprehensive Plan to abate floatables and settleable solids impacts from combined sewer overflows (CSOs). Managed projects to determine estimated volume of CSOs from DEP's WPCPs, determined near-field impacts due to CSOs, developed and evaluated alternatives for CSO control, and determined estimates of percent capture of both wet weather flow and floatables material. Provided overall project management for the final three years of the contract.

Closure

- Closure Activities for Former Site Storage Facilities, NJ: Engineer for a soil sampling program around former drum storage areas at this New Jersey Superfund Site. Conducted fieldwork and prepared analytical report under RCRA closure plan requirements. Supervised underground storage tank removal and sampling of tank and excavated soils.

PROFESSIONAL AFFILIATIONS

American Institute of Professional Geologists
New Jersey Society of Women Environmental Professionals

PUBLICATIONS AND PRESENTATIONS

"Partitioning of Metals to Sediment Organic Carbon." Mahony, J.D., D.M. Di Toro, A.M. Gonzalez, M. Curto, M. Dilg, L.D. De Rosa and L.A. Sparrow. Submitted to Environ. Toxicol. Chem., 1996.

"Investigation and Remediation of a Chlorobenzene Spill - A Case Study." Eugene J. Donovan, Jr. and Leslie A. Sparrow. Proceedings of the 27th Mid-Atlantic Industrial and Hazardous Waste Conference. Lehigh University, July 1995.