KeySpan Corporation
Environmental Asset Management
175 East Old County Road
Hicksville, NY 11801

March 4, 2004

Mr. Edward Hampston, P.E.
Project Manager
NYSDEC
Division of Environmental Remediation
625 Broadway - 12th Floor
Albany, NY 12233-7013

Re: Glenwood Landing Former Gas Plant Site
VCA #R1-0001-01-01- Bench Scale Treatability Study Work Plan

Dear Mr. Hampston,

Attached for your review is the Bench Scale Treatability Study Work Plan for the Glenwood Landing Former Gas Plant Site. The work plan provides details for the Bench Scale Treatability Study that was recommended in the Phase 1 groundwater report. The work is associated with KeySpan's Voluntary Cleanup Plan for the Glenwood Landing site.

The field work is scheduled for March 23 to 25, 2004. During this timeframe, we also plan to collect the Area 1B soil samples and Shelby tube samples that you requested. In addition, the storm sewer Manhole #2 will be checked for sediment accumulation and tested as necessary per our recent comment response letter.

If you have any questions, or require additional information, please call me at 516-545-2578.

Sincerely,

Patrick J. Van Rossem
Environmental Asset Management

Attachment

Cc: G. Anders Carlson, NYSDOH
K. Frantzen, VHB
L. Liebs
B. McClellan, PS&S
J. Reilly
D. Riccobono
M. Wawrowski, VHB

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Vanasse Hangen Brustlin, Inc.

March 2, 2004

Ref: 06392.31

Mr. Patrick Van Rossem
Senior Environmental Engineer
KeySpan Corporation
One MetroTech Center
Brooklyn, NY 11201-3850

Re: Former Glenwood Landing Gas Plant Site – Area 1A
Groundwater Remediation Work Plan
Bench Scale Treatability Study Work Plan Addendum

Dear Mr. Van Rossem:

This correspondence serves as an addendum to the existing *Groundwater Remediation Work Plan* (the work plan), dated January 2003, for the former Glenwood Landing Gas Plant site (the site).

1.0 Introduction

This letter work plan describes the details for performing a bench scale treatability study as recommended in the Phase I groundwater report dated October 2003. The work described herein is consistent with the work plan. This work is associated with a phased groundwater program designed to address chlorinated volatile organic constituents (CVOCs) in Area-1A of the site.

1.1 Site Location and Background

The site is located on approximately 800-feet of waterfront on the east shore of Hempstead Harbor. The site is bounded on the south by an ExxonMobil major oil storage facility, to the west by Hempstead Harbor, and on the north and east by the North Shore Country Club. Refer to Figure 1, which is a Site Location Map

For the purposes of the environmental work performed to date, the site has been divided into three discrete areas, which consist of Area 1, Area 2, and Area 3. The site is bisected by Shore Road. Area 1 includes the entire site west of Shore Road and has been subdivided into Area 1A and Area 1B. Areas 2 and 3 are located to the east of Shore Road. Area 1A is an undeveloped 3.7-acre parcel of land that is bound by Shore Road to the east; Hempstead Harbor to the west; a marina to the south; and Area 1B to the north. This area formerly contained a propane storage tank field, which was part of KeySpan's gas storage system. Area-1B is a greenspace and tidal wetland.

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The site was initially developed as a modern liquid petroleum (LP) gas cracking plant in 1949. Subsequent development included a natural gas regulating station (compressor station), laboratory, and propane storage field. These facilities have since been decommissioned and/or demolished to make way for the redevelopment of the property (Areas 2 and 3) as a 79-megawatt electric power generation facility.

1.2 Purpose

The purpose of this bench study is to determine the efficacy of In-Situ Chemical Oxidation (ISCO) as a remedial alternative for reducing concentrations of CVOCs at the site, and define the next step in the remedial process. VHB proposes to test LIQUOX® sodium permanganate 40%, manufactured by Carus Chemical Company, Peru, IL.

1.3 Objectives

The bench test is anticipated to achieve the following:

- Determine natural oxidant demand (NOD);
- Evaluate the effectiveness of sodium permanganate for site specific conditions;
- Determine potential optimum dosages;
- Develop estimates of permanganate demand and kinetics;
- Develop cost estimates for pilot and/or full-scale programs; and,
- Define the next phase of the program.

2.0 Project Management Plan

This section specifies the personnel and subcontractors that will be utilized to execute the proposed bench scale treatability study. A conceptual project schedule is also provided.

2.1 Project Staffing

In addition to KeySpan and PS&S, P.C. personnel, the following VHB staff is proposed for the project:

- Kurt Frantzen, Ph.D.—Principal-in-charge
- Matthew Wawrowski, PE—Project Manager
- Chris Poole, PG, CPG—Field Team Leader
- John Schafer, PG—Field Geologist

The following outside technical staff are proposed for the project:

- Richard Watts, Ph.D., Professor, Department of Civil & Environmental Engineering, Washington State University, Pullman, WA—Bench Testing & Project Technical Support

2.2 Project Subcontractors

The following subcontractors are proposed for the project:

- H2M LABS, Inc. (H2M), Melville, NY—NYSDOH CLP Services (under KeySpan's contract)
- Zebra Environmental, Inc. (Zebra), Lynbrook, NY—Geoprobe® Services

2.3 Project Schedule

Fieldwork will start within two weeks after notice-to-proceed. The sample collection fieldwork will take three days. Samples will be shipped via overnight courier to Washington State University for testing. Bench testing will be complete within 28-days following receipt of the sample media at the laboratory. A draft report will be complete within 60 days following the conclusion of fieldwork (see below).

3.0 Bench Scale Treatability Study Scope of Work

Table 1 is a matrix detailing the location and rationale for sampling and the bench testing and confirmatory laboratory analytical procedures.

3.1 Sample Collection Locations

Saturated soil and groundwater samples will be collected at four locations designated GLBT-01 to -04 (Figure 2). The proposed locations were chosen to obtain samples from areas of both higher and lower dissolved CVOC concentrations. Two samples in both the shallow and deep portions of the on-site aquifer are proposed because higher dissolved CVOC concentrations have generally been detected in the deeper subsurface at the site. This will provide representative physicochemical and geophysical data on conditions that may be encountered during full-scale implementation. Even though lower dissolved CVOC concentrations would conceptually be remediated under the optimal conditions identified during bench testing (see below), the injection program will need to account for possible deleterious effects of high concentration sodium permanganate injection in areas of low concentrations.

3.2 Sample Collection & Management Procedures

The following procedures will be utilized during the collection and management of samples to be used for bench testing.

3.2.1 Saturated Soil Sampling & Baseline Analysis

As discussed above, a total of four discrete saturated soil samples will be collected using a Geoprobe® and a four-foot long, closed-piston Macro-Core® sampler. A total soil volume of one pound will be required for each soil sample. Therefore, since the soil samples will be collected under saturated conditions, sample liners with integrated core-catchers will be used to ensure the recovery of an intact soil column and prevent sample wash-out. Upon retraction to the surface, a soil sample will be collected from the ends of each sample liner for analysis of volatile organic constituents (VOCs) by EPA Method 8260 and Target Analyte List (TAL) metals at H2M. This analysis will be performed to establish a baseline prior to bench testing. Following sample collection, any excess liner material will be removed from each sample and the ends capped for shipping. All soil sampling tools will be decontaminated between soil borings and sample intervals using a deionized water and Liquinox® wash.

3.2.2 Groundwater Sampling & Baseline Analysis

As discussed above, a total of four discrete groundwater samples will be collected using a Geoprobe® and the four-foot long Screen Point 15 or 16 groundwater sampling system. A total water volume of two liters will be required for each groundwater sample for bench testing. In addition, a sample will be collected at each location for analysis of VOCs by EPA Method 8260 and TAL metals at H2M. As with the soil samples, this analysis will be performed to establish a baseline prior to bench testing. To minimize turbidity during groundwater sample collection, all samples will be collected following low flow (minimal drawdown) groundwater sampling procedures. Specifically, a peristaltic pump will be used to collect the groundwater samples at each of the four locations. The sample tubing will be set at the mid-screen level of the sampler and the discharge tubing from the peristaltic pump will be connected to an integrated flow cell and water quality meter for real-time parameter monitoring. Parameters to be monitored during sampling will include: turbidity, pH, temperature, specific conductance, salinity, and dissolved oxygen. Flow will be limited to less than 1 liter per minute at each location during sampling. Once parameter stabilization has been reached, the flow cell will be disconnected and groundwater samples will be collected directly into the required sample bottles. All groundwater sampling tools will be decontaminated between sample locations and intervals using a deionized water and Liquinox® wash.

3.2.3 Sample Custody & Management

Immediately upon collection, each soil and groundwater sample will be properly labeled and identified. A chain-of-custody form will be filled out and signed by the person performing the soil and groundwater sampling discussed above. The

original of the form will travel with the samples and will be signed and dated each time the samples are relinquished to another party, until they reach the laboratory or analysis is completed. The field team leader will retain a copy for the project file.

Prior to packaging the samples for shipment, all sample containers will be checked for proper identification and compared to the field logbook and chain of custody for accuracy. The samples will then be wrapped with a cushioning material and placed in a cooler with a sufficient amount of bagged ice in order to keep the samples at 4°C until arrival at the laboratory. All necessary documentation required to accompany the samples during shipment will be placed in a sealed plastic bag and taped to the underside of the cooler lid. The cooler will then be sealed and custody seals will be placed in such a manner that opening of the cooler prior to arrival at the laboratory can be detected. All samples will be shipped to ensure laboratory receipt within 48 hours of sample collection in accordance with NYSDEC requirements. The laboratory will be notified prior to the shipment of the samples.

3.3 Bench Testing & Laboratory Analytical Procedures

The collected saturated soil samples will be used for testing and groundwater will be added to the soil if it is not completely saturated or rehydration is required. Natural Oxidant Demand (NOD) measurements will be conducted on the samples after purging with N_2 to remove VOCs. Additionally, un-purged samples will serve as controls for testing. NOD is determined by the difference in permanganate concentrations between the purged and un-purged samples using visible spectrophotometry. Samples will be amended with five different concentrations (*e.g.*, 2,500, 5,000, 10,000, 15,000, and 20,000 milligrams per liter (mg/L)) of sodium permanganate and aliquots collected over time for NOD measurements. Aliquots will first be passed through a 0.22 mm filter prior to spectrophotometric analysis of permanganate.

The most effective concentration for the treatment of VOCs will be performed in 40 mL volatile organic analysis (VOA) vials containing 30 grams of subsurface solids saturated with groundwater. Aliquots will be collected over time, extracted in hexane, dried with anhydrous sodium sulfate, and analyzed for VOCs by gas chromatography/electron capture detection and also tested for manganese (Mn) and sodium (Na). When the optimum conditions for VOC treatment are obtained, the specific reaction will be repeated and split samples analyzed. One set will be analyzed for VOCs, Mn and Na at Washington State University. The other set will be analyzed for VOCs by EPA Method 8260 and TAL metals at H2M.

4.0 Report

A letter report is anticipated to contain, at a minimum, the following information:

- Introduction;
- Field and laboratory procedures;
- Deviations from work plan;
- Bench testing and laboratory analytical results;
- Conclusions regarding the efficacy of ISCO as a remedial alternative at the site; and,
- Recommendations based on the results, byproduct assessment, and economic viability.

We look forward to discussing your comments regarding this work plan addendum and proceeding with the project.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Matthew Wawrowski, PE
Senior Project Engineer

Attachments

CP/MW/pc
CC: K. Frantzen (VHB)
E. Kitt (VHB)
C. Poole (VHB)

Figures

\\ctmiddat\projects\06392\graphics\figures\glenwood\figure1-1.pdf

BASE MAP SOURCE:

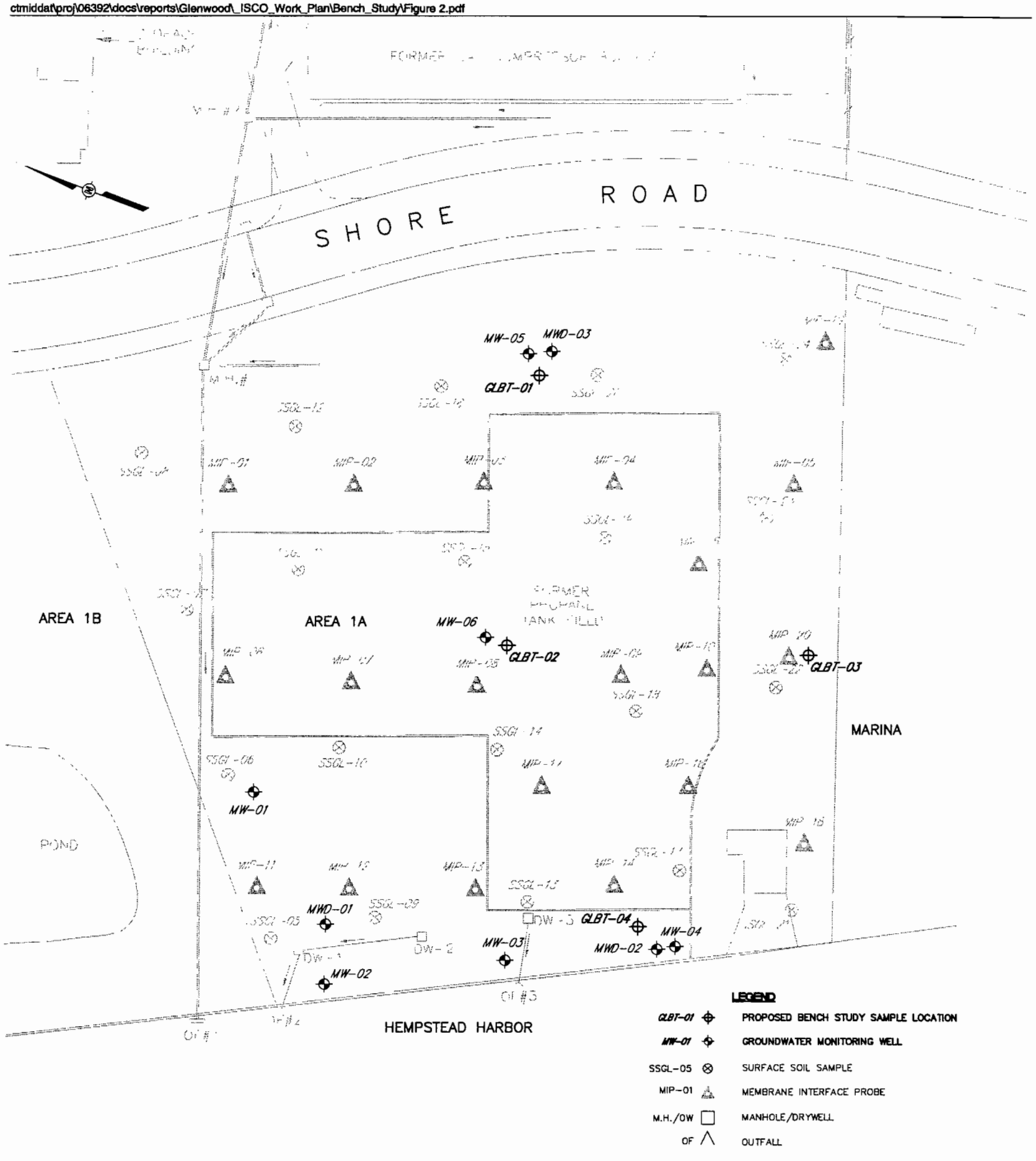
U.S.G.S. QUAD MAP
SEA CLIFF, N.Y. QUADRANGLE - 1979

N

0 0.25 0.5 0.75 1 Miles

Vanasse Hangen Brustlin, Inc.

Figure 1
Site Location Map
Glenwood Landing Gas Plant Site
Glenwood Landing, New York



MAP REFERENCE
1. BASE MAP SOURCE: DRAWINGS AND AERIAL PHOTOGRAPHS BY LONG ISLAND LIGHTING COMPANY AS MODIFIED BY ITS CORPORATION.

2. ALL ELEVATIONS ARE BASED ON A PLANT DATUM.

0 40 80 Feet

Vanasse Hangen Brustlin, Inc.

Sample Location Map
Former Glenwood Landing
Gas Plant Site - Area 1A
Glenwood Landing, New York

Figure 2
February 2004

Table

Table 1
Bench Scale Treatability Study Sample Matrix

Bench Sample Designation	Proposed Sample Location	Proposed Sample Depth (feet)	Sample Rationale	Sample Designation (Depth) (feet)	Chemical Data[1]				Bench Test Parameters				Laboratory Parameters		
					Soil	Groundwater			Sample Volume	Sample Containers	Bench Study Analyses	Number Test Trials	Baseline & Confirmatory Analyses	Number Samples[2]	QA/QC Samples
					Total CVOCs (mg/kg)	Total CVOCs (ug/L)	BOD (ug/L)	COD (ug/L)							
GLBT-01	Proximal to well MW-05	10-14	Upgradient location near Shore Rd. where concentrations of CVOCs are low. Representative of ubiquitous nature of CVOCs at site.	MW-05	--	4	ND (640)	49,000	Water - 2 Liters	Water - Unpreserved Amber Liters	Water - VOCs, NOD, and Total & Dissolved Mn & Na	3	Water - VOCs (8260) & TAL Metals	2	--
									Soil - 1 Pound	Soil - Geoprobe® Macro-Core® Liners	Soil - VOCs, NOD, Mn & Na		Soil - VOCs (8260) & TAL Metals	1	--
GLBT-02	Proximal to well MW-06	10-14	Proximity to center of former propane tank field and detection of highest dissolved CVOC concentrations in shallow GW at this well during March 2003.	MW-06	--	344	ND (640)	33,000	Water - 2 Liters	Water - Unpreserved Amber Liters	Water - VOCs, NOD, and Total & Dissolved Mn & Na	3	Water - VOCs (8260) & TAL Metals	2	--
									Soil - 1 Pound	Soil - Geoprobe® Macro-Core® Liners	Soil - VOCs, NOD, Mn & Na		Soil - VOCs (8260) & TAL Metals	1	--
GLBT-03	Proximal to boring MIP-20	56-60	Highest dissolved CVOC concentrations detected in deep subsurface in Area 1A.	MIP-20 (56-60)	0.014	2,167	--	--	Water - 2 Liters	Water - Unpreserved Amber Liters	Water - VOCs, NOD, and Total & Dissolved Mn & Na	3	Water - VOCs (8260) & TAL Metals	2	2
									Soil - 1 Pound	Soil - Geoprobe® Macro-Core® Liners	Soil - VOCs, NOD, Mn & Na		Soil - VOCs (8260) & TAL Metals	1	1
GLBT-04	Between well MWD-02 and boring MIP-14	56-60	Deep subsurface adjacent to bulkhead. Area adjacent to Hempstead Harbor with higher concentrations.	MWD-02	--	861	ND (640)	43,000	Water - 2 Liters	Water - Unpreserved Amber Liters	Water - VOCs, NOD, and Total & Dissolved Mn & Na	3	Water - VOCs (8260) & TAL Metals	2	--
				MIP-14 (56-60)	0.01	305	--	--	Soil - 1 Pound	Soil - Geoprobe® Macro-Core® Liners	Soil - VOCs, NOD, Mn & Na		Soil - VOCs (8260) & TAL Metals	1	--

NOTES:

(1) Sample results from *Phase I - Geophysical Investigation & Supplemental Environmental Sampling*, May 2003.

(2) Assumes samples will be submitted for baseline and confirmatory laboratory analyses pre- and post-bench testing, respectively.

-- = Not Applicable

CVOCs = Chlorinated Volatile Organic Constituents

VOCs = Volatile Organic Constituents

TAL = Target Analyte List

BOD = Biological Oxygen Demand

COD = Chemical Oxygen Demand

NOD = Natural Oxidant Demand