TESORO

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April 2, 2012

Mr. Jerry Wickham
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: **Work Plan for Downgradient Well Installation**
1619 1st Street, Livermore, California
Tesoro No. 67076 (Former Beacon 3604); ACEH Case No. RO0434

Dear Mr. Wickham:

Enclosed please find a copy of the work plan for downgradient well installation at the subject site located at 1619 1st Street in Livermore, California. This report is submitted by Arctos Environmental on behalf of Tesoro Environmental Resources Company.

Based on my inquiry of the person or persons directly responsible for gathering the information contained in this report, I believe the information was prepared by qualified personnel who properly gathered and evaluated the information, and that the information submitted is, to the best of my knowledge and belief, true, correct, and complete. Please feel free to call me at 253/896-8708 or Matthew Nelson of Arctos Environmental at 562/988-2755 with questions.

Sincerely,

Jeffrey M. Baker, P.E.
Supervisor, Environmental
Compliance & Remediation
Tesoro Companies, Inc.

Attachments

CC: Arctos – Matthew Nelson

ARCTOS

Arctos Environmental
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6 April 2012
Project No. 01LV

Jerry Wickham
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Subject: Work Plan for Downgradient Well Installation
1619 1st Street, Livermore, California
Tesoro No. 67076 (Former Beacon 3604); ACEH Case No. RO0000434

Dear Mr. Wickham:

Arctos Environmental (Arctos), on behalf of Tesoro Environmental Resources Company (Tesoro), is submitting this work plan for a proposed dual-nested well cluster to monitor groundwater downgradient of the subject site (Figure 1).

Executive Summary

Concentrations of total petroleum hydrocarbons as gasoline (TPHg), benzene, and methyl tert-butyl ether (MTBE) have remained stable at offsite shallow well MW-6 and offsite deep wells DW-2 and DW-6 since the second quarter 2010. Arctos is proposing to install a dual-nested well cluster to monitor downgradient migration of petroleum hydrocarbon-impacted groundwater in the deep and shallow intervals (Figure 2).

Site Background

The site description and background are included in Arctos's "In Situ Chemical Oxidation Pilot Test Report" dated 16 March 2012 (Arctos, 2012).

Objective and Scope of Work

The objective of the planned activities is to monitor downgradient migration of petroleum hydrocarbons in groundwater. To meet this objective, Arctos will perform the following scope of work:

1. Mobilize for well installation including (1) marking for Underground Service Alert, (2) obtaining well permits from Zone 7 Water Agency, and (3) updating the site-specific Health and Safety Plan.

2. Drill a soil boring and collect soil samples 5 feet below grade and at 5-foot intervals for visual logging using the Unified Soil Classification System and field headspace measurements using a photoionization detector.

3. Install and develop proposed deep monitoring well DW-9, screened between 50 and 60 feet below grade, and proposed shallow monitoring well MW-12, screened between 25 and 45 feet below grade (Figure 3).

4. Collect groundwater samples from the new wells for laboratory analysis.

5. Submit the water samples and selected soil samples to a State-certified laboratory for analysis of TPHg, benzene, toluene, ethylbenzene, xylenes, MTBE, tert-butyl alcohol, other oxygenates, lead scavengers, methanol, and ethanol analyses using U.S. Environmental Protection Agency Method 8260B.

6. Survey the new wells.

7. Evaluate the field analytical data and incorporate the results into the next quarterly status report.

Details of Arctos's field procedures for the proposed field program are described in Attachment A. A well construction diagram for the proposed groundwater monitoring wells is shown on Figure 3. Field personnel may adjust the actual well depth and screen placement as required by the field conditions encountered. Arctos will evaluate the field and analytical data and incorporate the results into the next quarterly status report. The report will include the following:

- Field activities and sampling procedures including boring/well construction log, development log, sampling log, and a figure showing the well location
- Laboratory analytical results presented in tables.

Schedule

Arctos is requesting approval to install the dual-nested well during the second quarter 2012.

If you have any questions or comments, please call Scott Stromberg at 510/924-1458 or Matthew Nelson at 562/988-2755.

Very truly yours,

ARCTOS ENVIRONMENTAL

Scott Stromberg
Senior Staff Geologist

Matthew Nelson, P.E.
Project Engineer

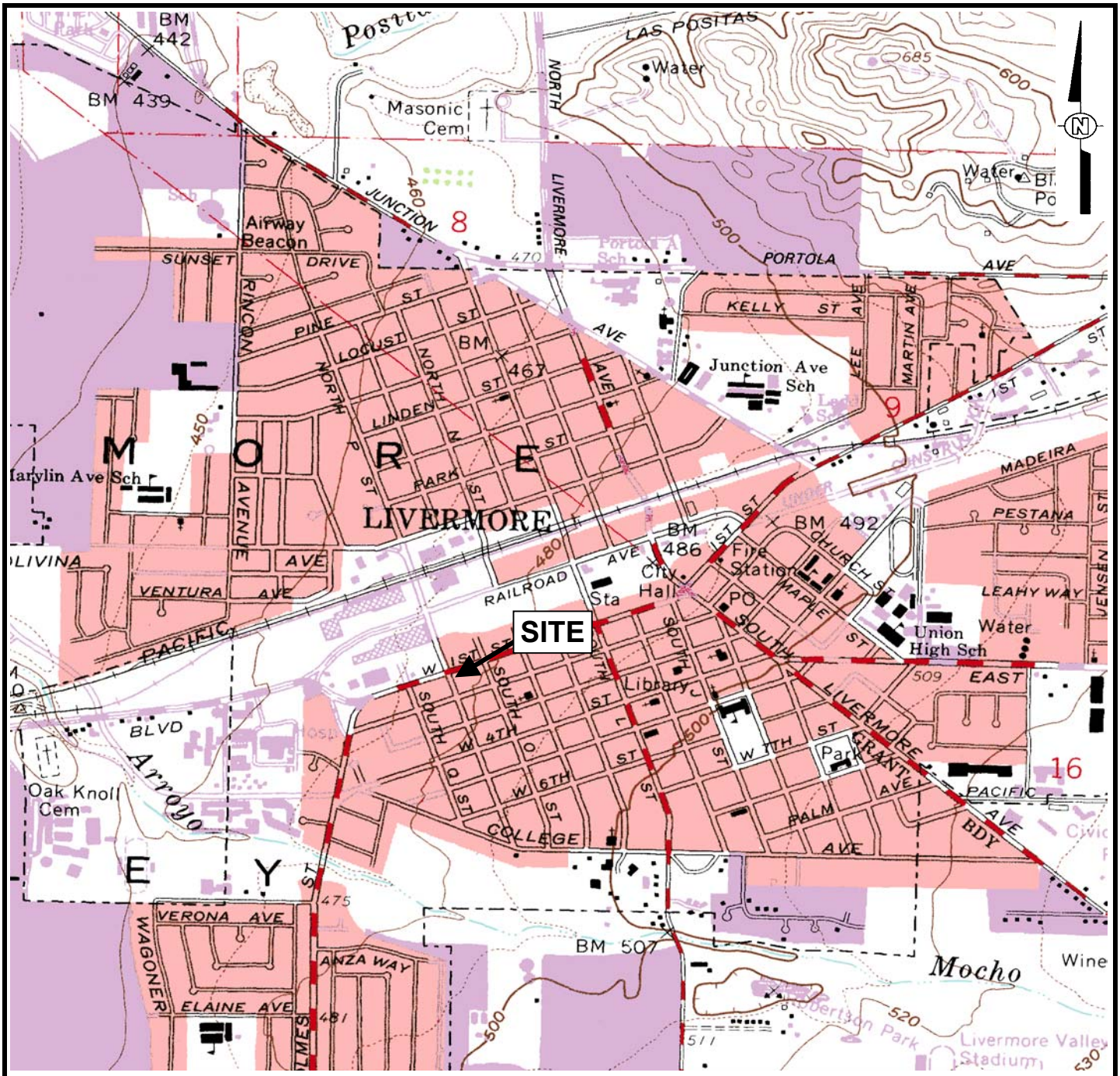
REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. NELSON
NO. C74689
Exp. 12/31/13
CIVIL
STATE OF CALIFORNIA

Copy: Jeffrey M. Baker, P.E. – Tesoro Companies, Inc.
Tom Foley – Gallagher and Miersch, Inc.
Colleen Winey – Zone 7 Water Agency

Attachments: Figure 1 – Site Location Map
Figure 2 – Site Plan with TPHg Concentration Contours
Figure 3 – Dual-Nested Well Construction Diagram
Attachment A – Well Installation Quality Assurance/Quality Control (QA/QC) Procedures

References

Arctos Environmental, 2012. "In Situ Chemical Oxidation Pilot Test Report, 1619 1st Street, Livermore, California, Tesoro Station No. 67076, Former Beacon Station No. 3604, ACEH Case No. RO0434," 16 March.



REFERENCE

7.5 MINUTE USGS TOPOGRAPHIC MAP OF
LIVERMORE, CALIFORNIA QUADRANGLE
DATE: 1961, PHOTOREVISED 1980
SCALE = 1:24,000

ARCTOS ENVIRONMENTAL			
TESORO - LIVERMORE			
SITE LOCATION MAP			
PROJECT NO. 01LV	DRAWN BY MP	CHECKED BY MP	APPROVED BY JG
FILE NO. Site Map.xls		**FIGURE 1**	

Legend

MW-7 ⊕	Groundwater Monitoring Well with 3 and 4 August 2011 and 10, 11 and 25 October 2011 Total Petroleum Hydrocarbons as Gasoline (TPHg) Results in µg/L
DW-1 ✥	Deep Groundwater Monitoring Well with 3 and 4 August 2011 and 10, 11 and 25 October 2011 TPHg Results in µg/L
IP-1 ✦	Injection Well
IP-6 △	Angled Injection Well Screen Location
DW-9/MW-12 ●	Proposed Dual-Nested Groundwater Monitoring Well
VW-2 ⊞	Vapor Extraction Well with 3 and 4 August 2011 and 10, 11 and 25 October 2011 TPHg Results in µg/L
TP-2 ⊗	Monitoring Well/Vapor Extraction Well with 3 and 4 August 2011 and 10, 11 and 25 October 2011 TPHg Results in µg/L
1,000	TPHg Concentration Contour (µg/L), Queried Where Uncertain
ND	Not Detected
NS	Not Sampled
(130/1,500)	Previous Quarter/Current Quarter TPHg Results in µg/L

0 30' 60'
SCALE

REVISION	NO.	BY	DATE	DESCRIPTION
0	0	MY	3/15/12	Well Installation Work Plan

ARCTOS ENVIRONMENTAL

TESORO - LIVERMORE

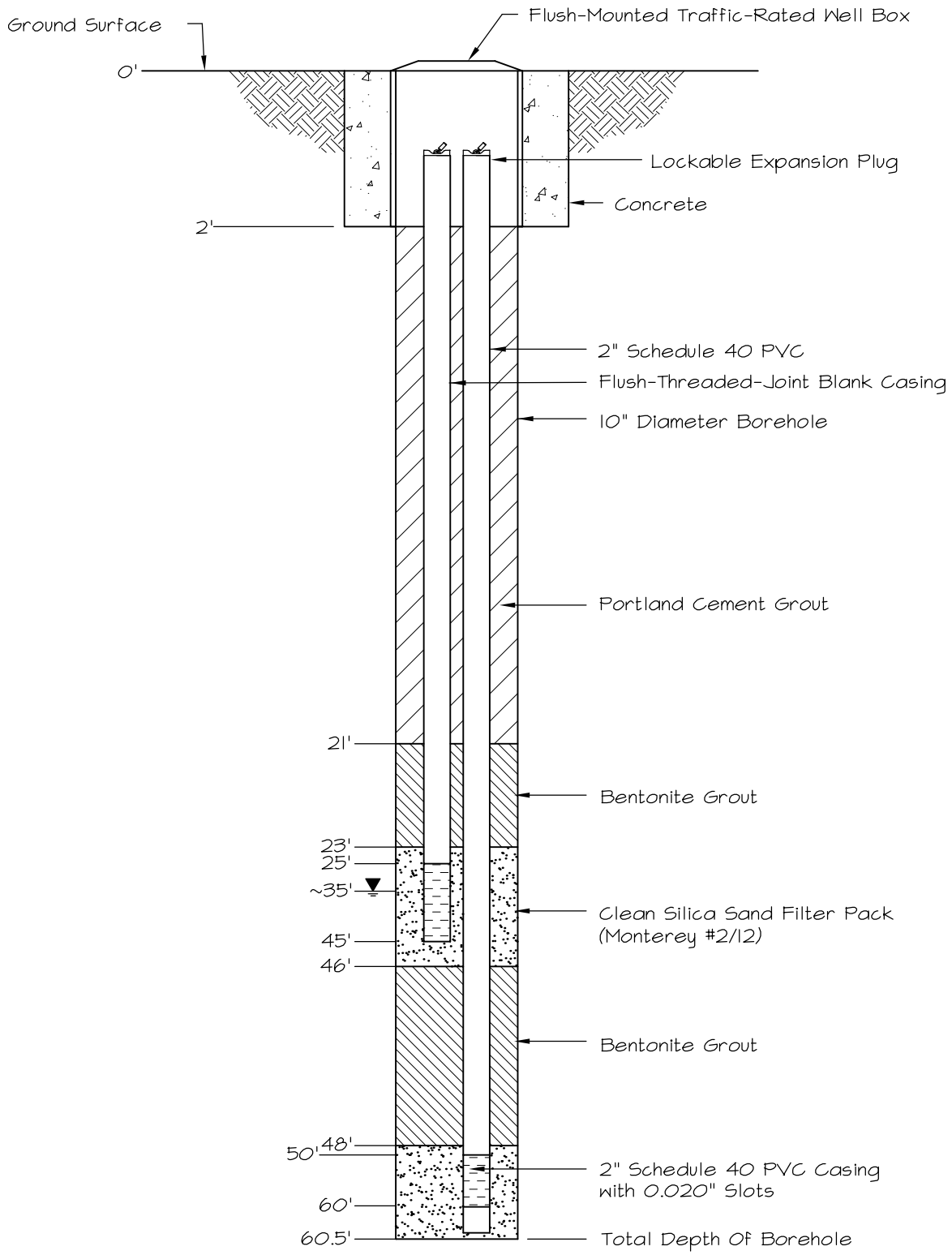
SITE PLAN WITH
TPHg CONCENTRATION CONTOURS

PROJECT NO.	DRAWN BY	CHECKED BY	APPROVED BY
01LV	MY	MN	MP

FILE NO. 01LV11B-20800.DWG

FIGURE 2

3/8/2012 6:56PM 01LV11B-20800.dwg



Notes:

1. Drawing not to scale.

2. Actual well construction may vary based on field investigation.

REVISION	NO.	BY	DATE	DESCRIPTION
0	0	MY	3/1/12	Well Installation Work Plan

ARCTOS ENVIRONMENTAL

TESORO - LIVERMORE

DUAL-NESTED MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NO.	DRAWN BY	CHECKED BY	APPROVED BY
01LV	MY	SS	MP

FILE NO. 01LV11B-20900.DWG

FIGURE 3

9/28/2005 4:48 PM 02HAB30700.dwg

ATTACHMENT A

WELL INSTALLATION QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES

ATTACHMENT A
WELL INSTALLATION QA/QC PROCEDURES

Health and Safety

Arctos will modify the site-specific Health and Safety Plan (HSP) for the field program outlined in this work plan. The HSP presents procedures for personnel and equipment safety, medical surveillance, personal protection, air-quality monitoring, exposure control, emergency response procedures, and general work practices.

Before beginning work at the site, a site safety meeting will be conducted. Field personnel will review the HSP and sign the accompanying acknowledgment form. Field personnel will be required to comply with the HSP throughout performance of site assessment activities.

Based on the site history and potential chemicals of concern, field activities will be initiated in Level D personal protective equipment (PPE). During field activities, the breathing zone of field personnel will be monitored using a field photoionization detector (PID). If breathing zone PID readings indicate elevated levels of organic vapors, PPE will be upgraded accordingly. Breathing zone readings will be recorded on the boring log.

The following sections provide a description of Arctos's proposed drilling, soil sampling, and well installation program.

Drilling and Soil Sampling Procedures

Before initiating drilling activities, Arctos will mark the well locations and contact Underground Service Alert to clear the area of subsurface lines and utilities. Arctos will also obtain boring and well permits from Zone 7 Water Agency.

The soil boring for the installation of the monitoring well will be drilled with 10-inch-diameter hollow-stem continuous-flight augers. Soil samples will be collected with a split-spoon sampler containing three brass tubes, each 2 inches in diameter and 6 inches in length. The sampler will be driven to the sampling depth by dropping a 140-pound hammer approximately 36 inches. Samples will be collected at 5 feet below grade and 5-foot intervals thereafter.

Immediately after the sampler is retrieved from the auger, it will be placed on a portable field stand near the boring and the brass tubes removed. The ends of one of the tubes will be covered with Teflon liners and capped with polyvinyl chloride (PVC) end caps. The sealed tubes will be labeled or marked, placed in a resealable plastic, and placed on ice in a cooler until delivery to the analytical laboratory. The information on the label or marked on the brass tube will include project identification, sample number, sample depth, date, time, and initials of the person preparing the samples.

A portion of the soil from one of the tubes will be extruded and placed in a sealable plastic bag, which will then be closed and allowed to equilibrate for approximately 10 minutes. The organic vapor levels in the headspace will be measured using a field PID. The same sample will be visually examined and the results of the visual observation and headspace reading will be recorded on the boring or well construction log. The soil type will be classified using the Unified Soil Classification System as described in American Society for Testing and Materials Standards D2487 and D2488.

Monitoring Well Installation

An Arctos registered geologist or registered civil engineer will supervise or direct well construction and installation. The deep monitoring well will be installed with a casing with total depth of approximately 60.5 feet below grade and screened from 50 to 60 feet below grade as shown on the well construction diagram (Figure 3). The shallow monitoring well will be installed with a casing with total depth of approximately 45.5 feet below grade and screened from 25 to 45 feet below grade as shown on the well construction diagram. Field personnel may adjust actual well depth and screen placement as required by the field conditions encountered.

The wells will be constructed using new 2-inch-diameter, flush-threaded, Schedule 40 PVC casings. As indicated by site lithology and previous well constructions, a 0.020-inch slot size and 2/12 Lonestar sand filter pack will be used in the new wells. The annular space around the wells will be filled with filter pack to about 2 feet above the top of the screens. A drawing showing the as-built well construction will be included on the boring/well installation log.

An approximately 2-foot-thick layer of bentonite will be placed between the filter packs surrounding the well screens to provide an annular seal between the shallow and deep screen intervals. An approximately 2-foot-thick layer of bentonite will be placed above the shallow well screen filter pack to provide an annular seal. The wells will be surged before placing the annular seal to allow for filter pack settlement. After placement, the seals will be hydrated with potable water. The remainder of the annulus to near ground surface will be filled with cement. Locking caps and traffic-rated covers will be installed at the surface.

The wells will be developed at least 72 hours after installation by surging and bailing to remove fines from the filter packs and well screens to reduce sediment in the groundwater. Development will be considered complete when at least 5 to 10 casing volumes are removed or until the pH, temperature, and specific conductivity measurements of the evacuated groundwater stabilize to within 10 percent of the previous readings.

Groundwater Sampling Procedures

Groundwater samples will be collected from the new wells at least 48 hours after development. The depth to groundwater will be measured to the nearest 1/100 foot before sampling using an electric water-level sounder. Approximately three casing volumes will be purged from the wells before sampling. Throughout purging and just before sampling the wells, the pH, specific conductivity, and temperature of the purged groundwater will be measured and recorded. These measurements will be made to confirm that the wells are purged sufficiently. Groundwater samples will be collected after the measurements stabilize to within 10 percent of the previous readings.

Sampling will be performed using a 1-inch-diameter disposable polyethylene bailer suspended from a nylon line. The bailer will be equipped with a bottom-release device. Samples will be collected from just below the water surface after the water level has recovered to at least 80 percent of the pre-purge level.

Water samples will be transferred from the bailer to new 40-milliliter glass bottles with Teflon-lined caps provided by the analytical laboratory. The bottles will be filled so that no air bubbles (i.e., headspace) will be present in the vial. A field (equipment) blank will be collected after decontamination of the sampling equipment. A field blank will not be collected if the well is sampled using disposable bailers.

Monitoring Well Surveying

A licensed surveyor will survey the elevation and location of the new wells following the requirements of State Assembly Bill 2886. The location will be measured to the nearest 1/10 foot and the elevations to the nearest 1/100 foot relative to mean sea level.

General Field QA/QC Procedures

Chain-of-Custody Records

Chain-of-custody records will be completed before samples are packaged for shipment. One copy of these records will be placed in the project file. A second copy will accompany samples during transportation to the laboratory. An individual in the analytical laboratory will accept responsibility for samples by signing and dating the chain-of-custody record.

Equipment Decontamination Procedures

Field equipment will be decontaminated between sampling events using the following procedures:

1. Rinse with water using a brush to remove soil and mud.

2. Wash with non-phosphate detergent and water using a brush.

3. Rinse with deionized or distilled water.

4. Rinse again with deionized or distilled water.

5. Air dry.

Personal Decontamination Procedures
At a minimum, field personnel will follow the following decontamination procedures:

1. Wear appropriate gloves.

2. Wash hands thoroughly with soap and water.

3. Avoid unnecessary contact with groundwater.

The site HSP will be reviewed for site-specific personal decontamination procedures.

Wastewater and Solid Waste Storage and Disposal
Small volumes of used wash and rinse solutions will be collected during field work and transported to a central decontamination area. This wastewater will be stored in a holding tank. The Project Manager will determine the appropriate disposal method for this wastewater.

Solid wastes such as used personal protective equipment, paper towels, trash bags, and any other solid debris will be collected for disposal. If the sampled groundwater is not a hazardous waste, the solid wastes will be disposed with the onsite trash.

Field Investigation Documentation Procedures
Field personnel will follow documentation procedures developed for site investigation work. The procedures serve to (1) provide a record of the activities performed in the field and (2) permit identification of samples and tracking of their status in the field, during shipment, and at the laboratory. All documentation will be recorded with waterproof ink. Groundwater sampling activities will be documented on daily field reports and on well purge and sample logs.

Health and Safety
Arctos will use a site-specific HSP with procedures that will be followed by field personnel for equipment safety, medical surveillance, personal protection, air quality monitoring, exposure control, emergency response, and general work practices during field activities. Before beginning work at the site, a site safety meeting will be conducted. Field personnel will review the HSP and sign the accompanying acknowledgment form before initiating field activities. Field personnel are required to comply with the HSP throughout performance of site assessment activities.

Analytical QA/QC Procedures

Laboratory analytical QA/QC procedures include (1) preparing and analyzing laboratory samples to assess the performance of the analytical laboratory and (2) conducting data validation in accordance with the protocols described below. QC samples prepared by the laboratory include method blanks, matrix spike and matrix spike duplicates, and laboratory control samples.

The laboratory results will be reviewed in general accordance with EPA guidelines for data validation. The data validation process includes reviewing laboratory results for the following parameters:

- ☐ Completeness of the data package
- ☐ Compliance with EPA-required holding times
- ☐ Agreement of dilution factors with reported detection limits
- ☐ Presence or absence of analytes in the method blanks
- ☐ Agreement of duplicate samples
- ☐ Percent recovery and relative percent difference results for matrix spike and matrix spike duplicate analyses
- ☐ Percent recovery results for laboratory control samples.