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By Alameda County Environmental Health 3:39 pm, Sep 29, 2017



TESORO

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(253) 896-8700

September 29, 2017

Dilan Roe
Land Use and Local Oversight Program Manager
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 Ms. Roe:

Enclosed please find a copy of the *Work Plan for Downgradient Well Installation* for the subject site, dated 29 September 2017. This report is submitted by Arctos Environmental at the request 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 253/896-8700 or Scott Stromberg of Arctos Environmental at 510/525-2180 with questions.

Sincerely,

Kyle Waldron
Environmental Remediation Administrator
Tesoro Companies Inc.

Attachments

CC: Arctos – Scott Stromberg

29 September 2017
Project No. 01LV

Dilan Roe
Land Use and Local Oversight Program Manager
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. RO0434

Dear Ms. Roe:

Arctos Environmental (Arctos), at the request of Tesoro Environmental Resources Company (Tesoro), is submitting this work plan for a proposed shallow and deep well cluster to delineate the downgradient extent of the plume associated with the subject site (Figure 1).

Background and Purpose

In June and July 2017, Arctos conducted field activities to investigate data gaps identified in a draft Remedial Action Plan (RAP) submitted to Alameda County Environmental Health (ACEH) in December 2016, and a meeting with ACEH in February 2017 (Arctos, 2016). In order to investigate the downgradient extent of dissolved-phase impacts, Arctos advanced cone penetration testing and grab groundwater sample boring pairs along a transect in the downgradient area of the plume.

Results of grab groundwater sampling indicated that (1) the lateral extent of the downgradient portion of the plume has been delineated and (2) the downgradient extent of the plume is still not fully delineated based on total petroleum hydrocarbons as gasoline (TPHg) concentrations in grab groundwater samples (Arctos, 2017).

Based on these results, Arctos is proposing to install, develop, and sample a shallow and deep groundwater monitoring well cluster to delineate the downgradient extent of the plume (Figures 2 and 3). This work plan presents the proposed scope of work for well installation activities.

A complete site description and background were included in the draft RAP (Arctos, 2016).

Objectives and Scope of Work

The objectives of the planned activities are to confirm downgradient concentrations and delineate the downgradient extent of the plume. To meet these objectives, Arctos will perform the following scope of work:

- Obtain approval of this work plan from ACEH
- Mobilize for field activities including (1) marking for Underground Service Alert, (2) clearing the proposed locations for subsurface utilities with a private utility locator, (3) obtaining well permits from Zone 7 Water Agency, and (4) updating the site-specific Health and Safety Plan
- Air-knife boring locations to a minimum depth of 5 feet below grade
- Drill two soil borings using hollow stem auger drill rig for the purpose of identifying lithology and constructing monitoring wells:
 - One deep soil boring to collect soil samples at 5-foot intervals starting at approximately 10 feet below grade for visual logging using the Unified Soil Classification System, field headspace measurements using a photoionization detector, and laboratory analysis
 - One shallow soil boring based on the lithology observed in the adjacent deep boring
- Install and develop shallow and deep monitoring wells in the borings:
 - Shallow monitoring well MW-13 to be screened from approximately 25 to 45 feet below grade
 - Deep monitoring well DW-10 to be screened from approximately 55 to 65 feet below grade
- Collect groundwater samples from the new wells for laboratory analysis of TPHg, benzene, toluene, ethylbenzene, xylenes, methyl tert-butyl ether, tert-butyl alcohol, other oxygenates, trichloroethylene, and tetrachloroethylene using U.S. Environmental Protection Agency Method 8260B.
- Survey new wells
- Evaluate field and analytical data and incorporate results into a summary report.

Field Procedures and Reporting

Details of Arctos's field procedures for the proposed field program are described in Attachment A. Well construction diagrams for the proposed shallow and deep groundwater monitoring wells are shown on Figures 4 and 5, respectively. Field personnel may adjust the actual well depths and screen placements as required by the field conditions encountered. Arctos will evaluate the field and analytical data and incorporate the results into a summary report. The report will include the following:

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

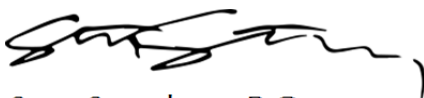
Schedule

Arctos is requesting approval to install the well cluster in November 2017. The final summary report will be submitted within 60 days of receiving final laboratory results.

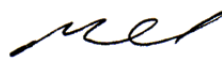
If you have questions or comments, please call Mike Purchase or Scott Stromberg at 510/525-2180.

Very truly yours,

ARCTOS ENVIRONMENTAL



Scott Stromberg, P.G.
Project Geologist



Michael P. Purchase, P.E.
Principal Engineer



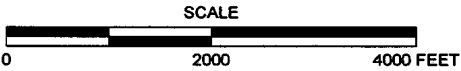
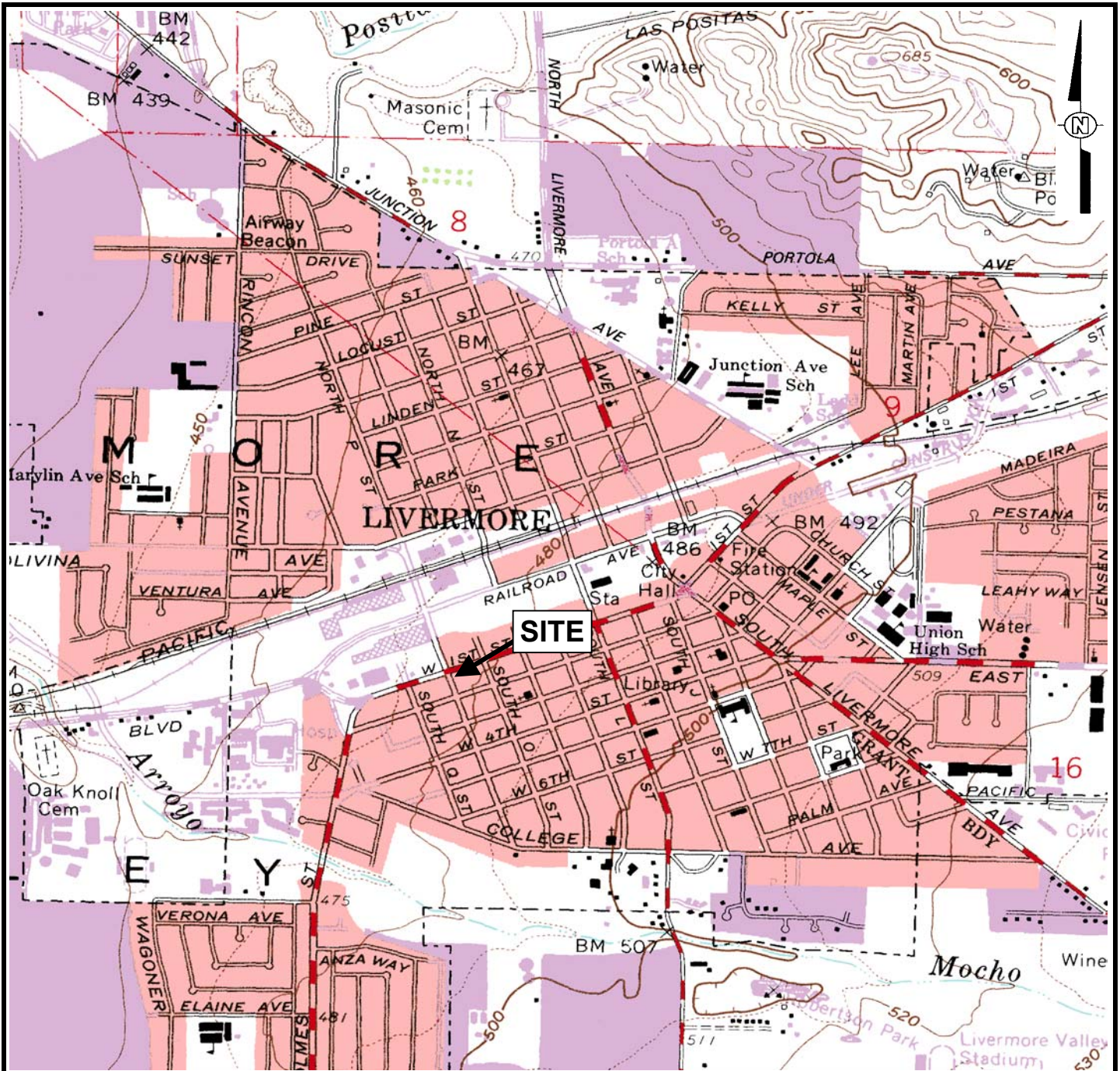
Copy: Kyle Waldron – Tesoro Companies, Inc.
Colleen Winey – Zone 7 Water Agency

Attachments: Figure 1 – Site Location Map
Figure 2 – Site Plan with Proposed Wells
Figure 3 – Cross Section A-A' with Proposed Wells
Figure 4 – Shallow Monitoring Well Construction Diagram
Figure 5 – Deep Monitoring Well Construction Diagram
Attachment A – Quality Assurance/Quality Control (QA/QC) Procedures

References

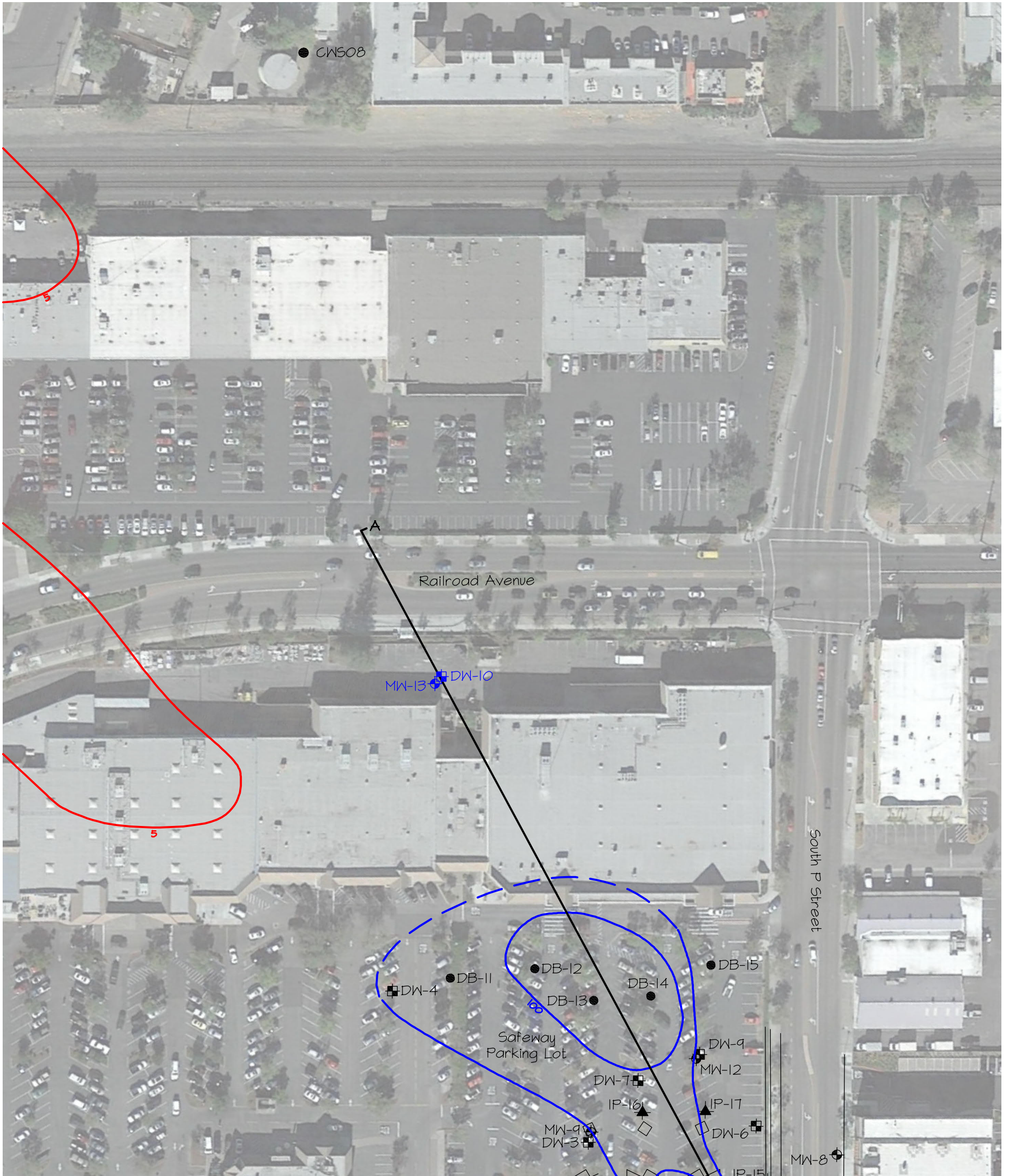
Arctos Environmental, 2016. "Remedial Action Plan, Tesoro Site No. 67076 (Former Beacon 3604), 1619 1st Street, Livermore, California," 4 December.

Arctos Environmental, 2017. "Data Gap Investigation and Plume Stability Evaluation Report, 1619 1st Street, Livermore, California, Tesoro No. 67076 (Former Beacon 3604); ACEH Case RO0434," 29 September.



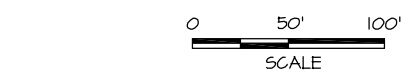
REFERENCE
 7.5 MINUTE USGS TOPOGRAPHIC MAP OF
 LIVERMORE, CALIFORNIA QUADRANGLE
 DATE: 1961, PHOTOREVISED 1980
 SCALE = 1:24,000

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
- DW-1 Deep Groundwater Monitoring Well
- IP-1 Injection Well
- IP-6 Angled Injection Well Screen
- VW-2 Vapor Extraction Well
- TP-1 Monitoring Well/Vapor Extraction Well
- CWS08 California Water Service Municipal Well
- MW-13 Proposed Shallow Groundwater Monitoring Well
- DW-10 Proposed Deep Groundwater Monitoring Well
- 1000 2Q17 Benzene Concentration Contour ($\mu\text{g/L}$), Queried Where Uncertain
- 5 Approximate 2Q16 PCE Concentration Contour ($\mu\text{g/l}$) Associated with LASC/MOSC Site (RWQCB Case OISO216)
- A A' Cross Section Line

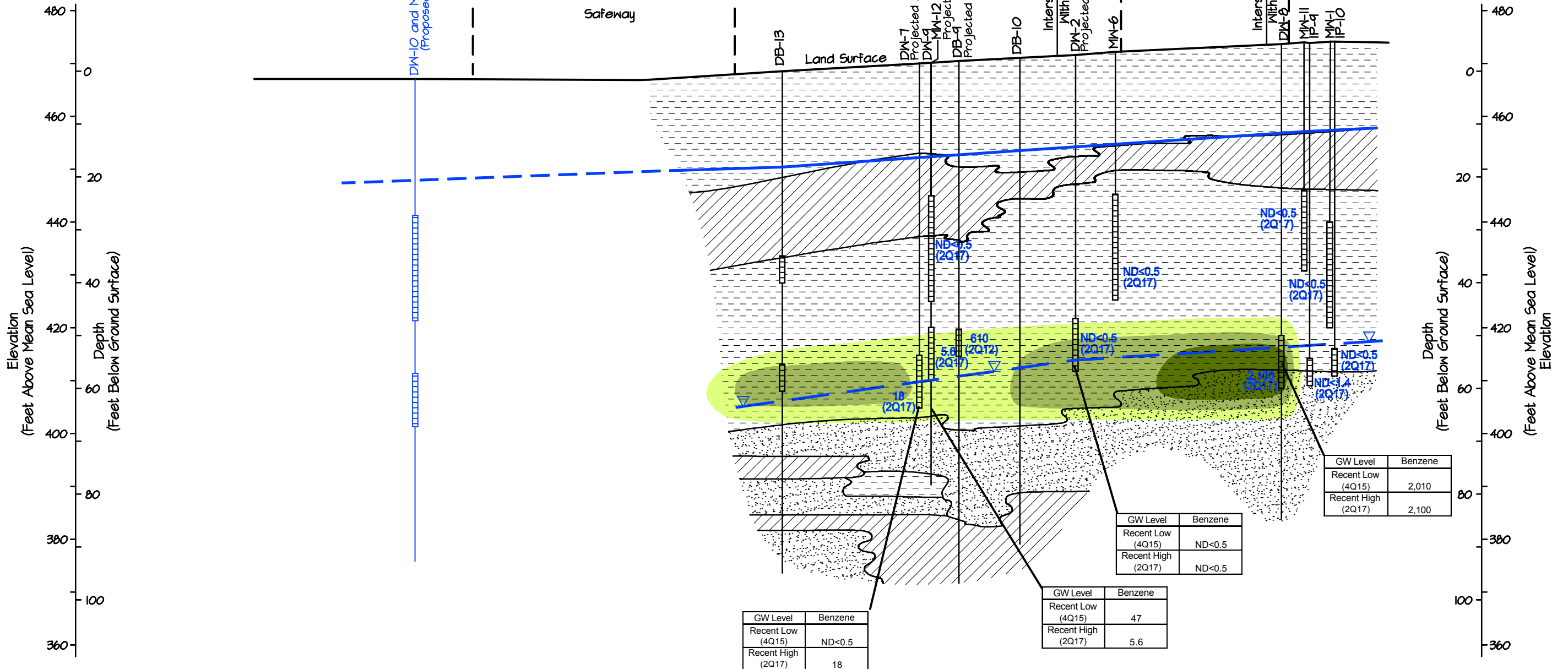


REVISION	REVISIONS			
	NO.	BY	DATE	DESCRIPTION
0	0	MY	9/15/17	Well Installation Work Plan

ARCTOS ENVIRONMENTAL			
TESORO - LIVERMORE			
SITE PLAN WITH PROPOSED WELLS			
PROJECT NO. OILV	DRAWN BY MY	CHECKED BY MP	APPROVED BY JPG
FILE NO. OILV11B3600.DWG		FIGURE 2	

Northwest
A

Southeast
A'



GW Level	Benzene
Recent Low (4Q15)	2,010
Recent High (2Q17)	2,100

GW Level	Benzene
Recent Low (4Q15)	ND<0.5
Recent High (2Q17)	ND<0.5

GW Level	Benzene
Recent Low (4Q15)	47
Recent High (2Q17)	5.6

GW Level	Benzene
Recent Low (4Q15)	ND<0.5
Recent High (2Q17)	18

LEGEND

- MW-1 Well or Boring Identification
- Screened Interval
- Water Level Elevation April 2017 (Historical Maximum Water Level)
- Historical Minimum Water Level Elevation November 2015

SOIL CLASSIFICATION

- Silts and Clays
- Sands and Silty Sands
- Cemented Sands or Silts

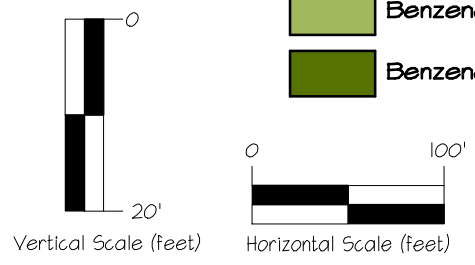
DISSOLVED-PHASE ISOCONCENTRATION CONTOURS

- Benzene > 10 µg/l
- Benzene > 100 µg/l
- Benzene > 1,000 µg/l

DISSOLVED-PHASE CONCENTRATIONS

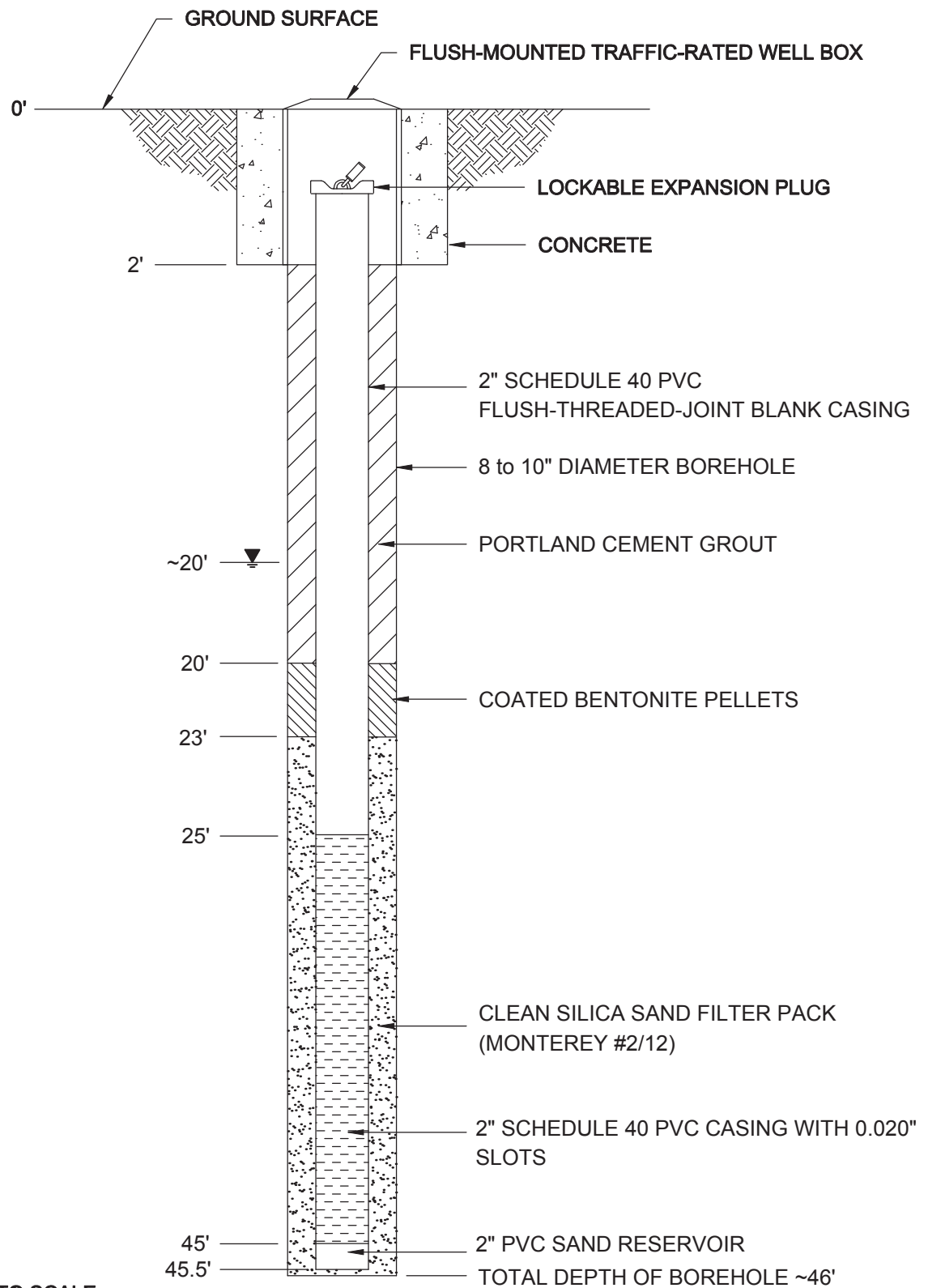
- 260** Benzene Concentration (µg/l)
- (2Q17)** Sample Date
- Benzene Concentration (µg/l) During Recent Period of Low Groundwater Elevation (4Q15) and High Groundwater Elevation (2Q17)

GW Level	Benzene
Recent Low (4Q15)	ND<0.5
Recent High (2Q17)	18



ARCTOS
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TESORO LIVERMORE SITE	PROJECT 01LV-11B
CROSS SECTION A-A' WITH PROPOSED WELLS	XS-AA3q17.dwg
	FIGURE 3

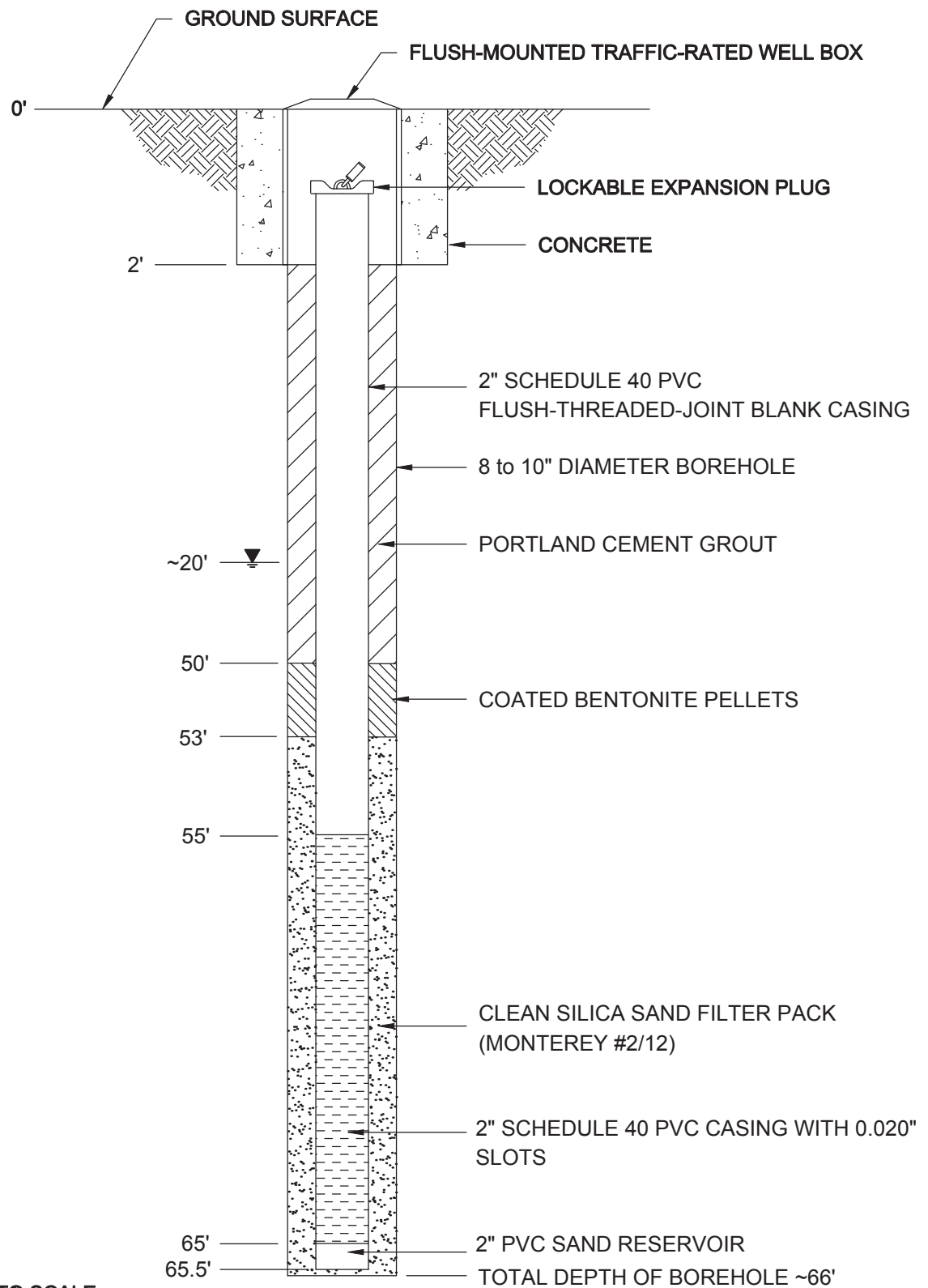


NOTES:

1. DRAWING NOT TO SCALE.
2. ACTUAL WELL CONSTRUCTION MAY VARY BASED ON FIELD INVESTIGATION.

REVISION	REVISIONS			
	NO.	BY	DATE	DESCRIPTION
0	EC	9/15/17		Well Installation Work Plan

ARCTOS ENVIRONMENTAL			
TESORO - LIVERMORE			
SHALLOW MONITORING WELL CONSTRUCTION DIAGRAM			
PROJECT NO. 01LV	DRAWN BY MY	CHECKED BY MP	APPROVED BY JPG
FILE NO. MW-13 Well Const.pdf		FIGURE 4	



- NOTES:**
 1. DRAWING NOT TO SCALE.
 2. ACTUAL WELL CONSTRUCTION MAY VARY BASED ON FIELD INVESTIGATION.

ARCTOS ENVIRONMENTAL			
TESORO - LIVERMORE			
DEEP MONITORING WELL CONSTRUCTION DIAGRAM			
PROJECT NO. 01LV	DRAWN BY MY	CHECKED BY MP	APPROVED BY JPG
FILE NO. DW-10 Well Const.pdf		FIGURE 5	

REVISION	REVISIONS			DESCRIPTION
	NO.	BY	DATE	
0	0	EC	9/15/17	Well Installation Work Plan

ATTACHMENT A

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROCEDURES

ATTACHMENT A

QUALITY ASSURANCE/QUALITY CONTROL (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.

Utility Locating and Permitting

Before initiating drilling activities, Arctos will mark the well location 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.

Hollow-Stem Auger Drilling and Sampling

The soil boring will be advanced with 6- to 12-inch-diameter, hollow-stem, continuous-flight augers. Soil samples will be collected using a split-spoon sampler (California-modified or similar) containing three brass tubes, each approximately 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 30 inches. Samples will be collected for visual logging at various depth intervals with the objectives of observing and describing the locations of lithologic units and obtaining representative samples for physical and/or chemical analysis. Soil samples are typically collected at 5-foot intervals.

After the sampler is retrieved from the auger, it will be placed on a portable field stand near the boring and the tubes will be removed. The ends of one of the tubes will be covered with Teflon sheeting, capped with PVC end caps, and placed in a sealable plastic bag. A portion of the soil from one of the tubes will be extruded and placed in a sealable plastic bag, which will be closed and allowed to equilibrate for approximately 10 minutes. The organic vapor levels in the headspace will be measured using a PID or flame ionization detector.

The same sample will be visually examined and the results of the visual observation and headspace reading will be recorded on the boring logs. Soil samples will be examined for staining or odors. Soils will be classified following the Unified Soil Classification System (USCS). If warranted by PID screening, one of the sealed tubes per sampling run will be placed in a portable ice chest and cooled with ice for delivery to a laboratory for analysis. Standard chain-of-custody procedures will be used during sample handling, transportation, and delivery.

The sealed tubes will be labeled or marked and placed on ice in a cooler. A permanent pen will be used to complete the label or mark directly on the tube. The information recorded will include project identification, sample number (including boring number and sample depth), date, time, and the initials of the person preparing the samples.

The soil samples will be stored on ice in the field and transported in a portable ice chest to the analytical laboratory. The samples will be delivered within 24 to 48 hours after sampling to the laboratory by the sampling crew or a courier.

Monitoring Well Installation

An Arctos registered geologist or registered civil engineer will supervise or direct well construction and installation. 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 (Figure 4). The deep monitoring well will be installed with a casing with total depth of approximately 65.5 feet below grade and screened from 55 to 65 feet below grade as shown on the well construction diagram (Figure 5). 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. Drawings showing the as-built well constructions will be included on the boring/well installation logs.

An approximately 3-foot-thick layer of bentonite will be placed above the filter pack to provide an annular seals. 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 annuli to near ground surface will be filled with cement. A locking cap and traffic-rated cover will be installed at the surface of each well.

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. The individual in the analytical laboratory who accepts responsibility for samples will sign and date 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.

Additional decontamination procedures are presented below:

1. Personnel will dress in suitable personal protective equipment (PPE) to reduce personal exposure.
2. Equipment that may be damaged by water (such as the battery portion of water level indicator or the pH and conductivity meters) will be carefully wiped clean using a sponge and dried with new paper towels. Care will be taken to prevent damage to the equipment.
3. When conducting a groundwater sampling event, evacuation and sampling equipment will be decontaminated before sampling operations, between each well, and at the end of the sampling event. If dedicated equipment is used, it will be rinsed with deionized water.
4. Detergent waters and rinse waters will be replaced periodically depending on level of contamination. Used detergent and rinse waters will be contained in 55-gallon drums approved by the Department of Transportation (DOT) or holding tanks for storage.

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 health and safety plan 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 containerized in labeled 55-gallon DOT drums or holding tanks and stored in a secured area at the site. At the completion of field investigation activities or a groundwater sampling event, samples from the 55-gallon drums or holding tanks will be collected and analyzed in accordance with the work or sampling plans. Once the analytical results are obtained, 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.

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 the well purge and sample log.

Analytical QA/QC Procedures

Laboratory analytical QA/QC procedures will 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 will 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 included 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.