October 11, 2013

Ms. Barbara Cook, P.E.
Acting Assistant Deputy Director, Cleanup Program
Site Mitigation Branch
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, California

Attention: Lynn Nakashima
Sent via: email

Subject: Response to Department of Toxic Substances Control Comments Regarding the "Draft Monitoring Well Installation Work Plan, Area 1, University of California Richmond Field Station"

Dear Ms. Cook:

Terraphase Engineering Inc. (Terraphase) has prepared this letter on behalf of Zeneca Inc., to respond to the comments provided by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in its September 18, 2013 letter regarding the September 13, 2013 Terraphase document, "Draft Monitoring Well Installation Work Plan, Area 1, University of California Richmond Field Station" ("the Work Plan"). The DTSC comments are provided below followed by the response to each comment.

Response to DTSC September 18, 2013 Comment Letter

DTSC Comment #1

"The Work Plan identifies the area around the BAPB as 'Area 1'. Include additional text explaining how the boundaries for Area 1 were determined and why the delineated Area 1 is relevant to this investigation"

Response

The Work Plan refers to Area 1 in order to provide the reader a general reference as to where the work at the University of California Richmond Field Station (UCRFS) is taking place. Previous Remedial Area 1 (Area 1) was an area designated for phased remediation during the 2001-2004 remedial activities conducted under the Regional Water Quality Control Board (RWQCB) Order for the UCRFS (See Figure 3 of the Remedial Action Plan Phase 2 Subunits 2A and 2B Marsh, Meade Street Operable Unit, dated April 15, 2003 and prepared by the URS Corporation). The boundaries of Area 1 presented in the Draft Work Plan were referenced from Figure 4-1 of the May 28, 2013, "Final Site Characterization Report,

Proposed Richmond Bay Campus, Research, Education, and Support Area and Groundwater within the Richmond Field Station Site", prepared by Tetra Tech Inc. on behalf of the University of California, Berkeley.

The previous groundwater investigation was performed in Area 1 and the additional groundwater monitoring proposed in the Work Plan generally will be conducted in Area 1. Therefore, the Draft Work Plan references Area 1 when describing the location of the work. However, upon further review of the Area 1 boundaries described in the previous RWQCB Order, some of the groundwater investigation will be conducted in a location known as Area 4. Therefore, the references to Area 1 have been removed from the Work Plan to avoid confusion. The Work Plan has been modified to identify that the work is taking place in the vicinity of the UCRFS portion of the BAPB.

DTSC Comment #2

"Page 3 describes the target screen interval for the proposed wells to be 5 to 15 feet below ground surface based on the construction of the existing wells in the area. In order to avoid placement of the screen interval at or below the BAPB material (such as what may have occurred at well MW-35), language should be inserted into the text discussing how to avoid this potential problem."

Response

To address this comment, the text within the, "Monitoring Well Installations" section of the work plan has been amended to include the discussion in bold italics below:

"*The monitoring wells will be installed at the approximate locations illustrated on Figure 1 using hollow stem auger (HSA) technology by a California-licensed drilling contractor under the supervision of a Terraphase California Professional Geologist.* ***The screen interval for each monitoring well will be constructed at a depth interval that will allow for the assessment of shallow groundwater above the bottom of the BAPB. The purpose of each monitoring well is discussed below:***

- *MW-42: To assess groundwater upgradient of the BAPB and assess the performance of the BAPB.*
- *MW-43: To assess groundwater downgradient of the BAPB and assess the performance of the BAPB.*
- *MW-44: To assess groundwater upgradient of the BAPB.*
- *MW-45: To assess groundwater downgradient and to the west of the BAPB.*
- *MW-46: To assess groundwater downgradient of the BAPB."*

Terraphase will use the lithology information obtained during the previous investigation in conjunction with the lithology recorded at each proposed monitoring well location to properly position the well screen. If well screens are required to be shortened or modified as compared to the specifications provided in the Work Plan, the modifications will be identified and described in the well installation report. No further changes to the Work Plan are required at this time.

DTSC Comment #3

"Investigation Derived Waste, Page 5: Indicate in the Work Plan who is responsible for disposal of the investigation derived waste"

Response

To address this comment, the text within the, "Investigation Derived Waste" section of the work plan has been amended to include the discussion in bold italics below:

*"Investigation-derived waste **(IDW)** water and soil generated during this investigation will be temporarily staged at the RFS in 55-gallon drums or an appropriate non-reactive plastic tank, and will be handled and disposed of in accordance with state and federal requirements as well as the requirements of the RFS. **Terraphase will coordinate the disposal of the IDW with UC."***

DTSC Comment #4

"*Table 1 indicates that the new monitoring wells will be samples semiannually. The wells should be sampled quarterly for the first year to develop a larger data set in order to more confidently determine if there are seasonal variations in water levels or water quality at these locations"*

Response

In accordance with this comment, Table 1 has been modified to identify that the monitoring wells will be sampled on a quarterly schedule.

DTSC Comment #5

"The Report documenting the groundwater investigation within and in the BAPB included a conclusion that well MW-35 should not be used to assess formation water as groundwater with little or no residence time within the BAPB may be entering the screen interval during well sampling. An evaluation to determine the usability of the monitoring well for purposes other than sampling should be conducted. If it is anticipated that the well will not be used in the future, the Work Plan should include plan to properly decommission the well"

Response

The objective of the additional groundwater monitoring is to develop a groundwater data set that can be assessed to evaluate if additional groundwater remediation is warranted and, if necessary, assess what remedial technologies are feasible. Therefore, MW-35 will not be decommissioned during these field activities. This well has the potential to be retrofitted and therefore provide access to the BAPB to assess amendments if necessary.

If you have any questions with regard to the response to the DTSC comments discussed in this letter, please do not hesitate to give me a call at (510) 326-1473.

Sincerely,

For Terraphase Engineering Inc.

Andrew Romolo, P.G. (8110)
Vice President and Principal Geologist

Attachments:
Monitoring Well Installation Work Plan, Vicinity of the Biologically Active Permeable Barrier, University of California Richmond Field Station

cc:
Mr. Bill Marsh, Esq., Edgcomb Law Group
Lynn Nakashima, DTSC
Chuck Elmendorf, Zeneca Inc.
Karl Hans, UC
Anthony O. Garvin, Esq.,
Jenifer Beatty, Arcadis-US

September 13, 2013 (REV: October 11, 2013)

Ms. Barbara Cook, P.E.
Assistant Deputy Director
Brownfields and Environmental Restoration Program
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, California

Attention: Lynn Nakashima
Sent via: email

Subject: Monitoring Well Installation Work Plan, Vicinity of the Biologically Active Permeable Barrier, University of California Richmond Field Station.

Dear Ms. Cook:

Terraphase Engineering Inc. (Terraphase) has prepared this Work Plan on behalf of Zeneca Inc. (Zeneca), to describe the procedures for installing monitoring wells in the vicinity of the Biologically Active Permeable Barrier (BAPB) at the University of California (UC) Richmond Field Station (RFS; Figure 1). This Work Plan has been prepared to address the comments provided by the Department of Toxic Substances Control (DTSC) in a May 20, 2013 letter ("the May 20th Letter") regarding the Terraphase December 18, 2012, "Draft Groundwater Investigation Within and In the Vicinity of the BAPB at the University of California Richmond Field Station" (UC BAPB Investigation Report). The work will take place near the portion of the biologically active permeable barrier (BAPB) that extends onto the RFS property from the Campus Bay property located to the east of the RFS (Figure 1). The monitoring wells to be installed will be used to assess and monitor groundwater quality in the vicinity of the BAPB at the RFS property.

Background and Objective

The UC BAPB Investigation Report concluded that the portion of the BAPB located at the UCRFS was performing in accordance with its intended design. In the May 20th Letter, the DTSC concurred with this conclusion. However, based on the shallow groundwater data collected upgradient of the BAPB, the DTSC required that groundwater remedial alternatives be assessed. In a June 11, 2013 meeting between representatives for Zeneca, UC, and the DTSC, previous remedial activities in the vicinity of the BAPB were discussed. As discussed in that meeting, to further assess the effectiveness of the previous remedial activities in the vicinity of the BAPB, additional groundwater monitoring would be required. The additional groundwater monitoring data will be evaluated to assess if additional remedial activities are warranted in this area and, if so, what remedial alternatives are applicable. Therefore, as discussed in the June 11, 2013 meeting, Zeneca will install and sample additional monitoring wells in the vicinity of

the BAPB at the UCRFS. The data collected at the monitoring wells will be assessed in conjunction with additional data to be collected by UC west of the BAPB to evaluate if additional groundwater remedial activities are warranted for this area of the RFS. If determined to be warranted, the combined data set will be used to assess the applicability of remedial alternatives. This Work Plan has been prepared to provide the procedures and methodologies for installing and sampling the additional monitoring wells.

Scope of Work

The field activities discussed in this Work Plan will be conducted in accordance with the procedures and methodologies set forth in the following documents previously approved by the DTSC for activities completed at the Campus Bay property:

- "Lot 3 Field Sampling and Analysis Plan, Campus Bay Site, Former Zeneca, Inc., Richmond Facility, Richmond, California," dated November 2, 2005 ("the Lot 3 FSAP");
- "Revised Quality Assurance Project Plan Approval, Former Zeneca Property, Campus Bay Site," dated July 18, 2005.

The scope of work is discussed below.

Pre-Field Activities

Terraphase will update the project Health and Safety Plan (HASP) in accordance with the activities described in this Work Plan. The HASP will establish the site-specific health and safety protocols for Terraphase staff to implement this Work Plan. Prior to implementing field activities, Underground Service Alert (USA) will be notified at least 48 hours in advance of mobilization to the field. A private utility locator will also be contracted to identify underground utilities at each monitoring well location. In addition, Terraphase will coordinate with RFS representatives to review the proposed monitoring well locations relative to site construction as-built drawings to support the effort in identifying subsurface utilities in the area of work. Terraphase will also obtain the applicable county and state permits required for the work.

Monitoring Well Installations

The monitoring wells will be installed at the approximate locations illustrated on Figure 1 using hollow stem auger (HSA) technology by a California-licensed drilling contractor under the supervision of a Terraphase California Professional Geologist. The screen interval for each monitoring well will be constructed at a depth interval that will allow for the assessment of shallow groundwater above the bottom of the BAPB. The purpose of each monitoring well is discussed below:

- MW-42: To assess groundwater upgradient of the BAPB and assess the performance of the BAPB.
- MW-43: To assess groundwater downgradient of the BAPB and assess the performance of the BAPB.
- MW-44: To assess groundwater upgradient of the BAPB.
- MW-45: To assess groundwater downgradient and to the west of the BAPB.
- MW-46: To assess groundwater downgradient of the BAPB.

The HSA method consists of a drill rig that rotates tubular steel augers (4.25-inch inner diameter, 8-inch outer diameter) into the subsurface. The augers have a hollow axis with steel flights spirally welded on the outside. A hollow drill bit is attached to the first HSA that is advanced into the ground. A continuous core barrel sampler will be inserted into and slightly ahead of the hole of this bit. As the augers are rotated into the ground, the soil and sediments encountered in the middle of the boring are forced into the continuous core barrel sampler. The sediments encountered on the outer edges of the bit and lead auger are cut and conveyed to the ground surface via the outer flights of the auger. The continuous core barrel, which is connected to the steel drill rods or cable extending up to the ground surface, is extracted from the bit and lead auger whenever a new section of auger is added (typically every 5 feet). This drilling method allows soil sampling and completion of the monitoring well to be conducted inside the augers while the augers allow the boring to remain open.

During drilling, a 5-foot-long continuous core barrel will be used to collect a continuous soil core, as feasible, at each proposed monitoring well location. The soil core will be examined and the lithology will be logged by a Terraphase field geologist using the USCS. The lithology will be recorded onto the soil boring/monitoring well construction logs. Soil samples will be screened in the field using a PID and the measurements will be recorded onto the soil boring/monitoring well construction logs. The soil boring logs/monitoring well construction logs will be prepared under the direction of a Terraphase California Professional Geologist.

The monitoring wells will be installed so that the screen interval is approximately 2 feet above and 8 feet below the static water level measured in the borehole. The target screen interval for the new wells is anticipated to be approximately 5 to 15 feet (ft) below ground surface (bgs) based on the construction of existing groundwater monitoring wells in the area. After the desired depth of the boreholes is reached, the augers will then be slowly removed from the borehole as the monitoring well casing, sand, bentonite, and/or grout are added from the bottom up. A threaded schedule 40 PVC groundwater monitoring well will then be constructed within the HSA. The monitoring wells will be constructed to provide a low turbidity groundwater sample when following low-flow purging procedures, and to accurately reflect the potentiometric surface at the monitoring well location.

Approximately 10 feet of well screen will be installed in each well. As the augers are being removed, the annular space between the well screen and the formation will be filled with sand to a depth of approximately 1 foot above the screened interval. If the top of the screen interval is shallower than 5 feet bgs, the sand will be placed ½ foot above the screened interval to accommodate more space for the surface seal. The top of screen interval will not be installed shallower than 4 feet bgs. These construction details are consistent with the construction details of existing monitoring wells at the Site, and have been sufficient to yield a low turbidity groundwater sample. The well screen will be positioned within the boring to screen across the groundwater surface. A California Professional Geologist from Terraphase will approve the final placement of the screened interval. The grain size of the sand pack and the slot size of the well screen will be appropriately sized based on the type of soil encountered in the formation. The information will be provided in the monitoring well logs.

Approximately 1 foot of bentonite chips will be placed above the sand pack and hydrated to form a coherent seal. It is anticipated that fine-grained forms of bentonite, such as granules or powder, will be

used since it is anticipated for the bentonite seal to be installed above the water table. If the bentonite seal is below the water table, chips and pellets will be used. Due to the shallow nature of the monitoring wells, the bentonite seal will be dropped down the annulus from the surface. A tamping device will be used to prevent bridging of the bentonite material. The bentonite seal will be placed in two lifts of approximately 6-inches each. Each lift will be hydrated with potable water in such a way as to prevent the displacement of the bentonite material. The bentonite seal will be allowed to hydrate in accordance with the manufacturer's recommendations. The remaining annular space above the bentonite will be filled with cement grout. A locking well cap will be placed on top of the well casing, and the well will be completed above grade, approximately 3 feet above the ground surface.

The newly installed monitoring wells will be developed to remove sediment from around the screen and to enhance hydraulic communication with the surrounding formation. The grout installed within the annular seal for the monitoring wells will be allowed to cure for a minimum of 72 hours before initiating well development activities. The wells will be developed using a combination of surging and pumping techniques. Observations of indicator parameters, including pH, temperature, specific conductance, quantity, and clarity, will be recorded onto water-quality data sheets after each well volume is purged. In the event that a well recovers slowly, the well will be purged dry and then allowed to recover to approximately 80 percent of its static water level before being purged dry again. The wells will be developed until a minimum of 6 to 10 well casing volumes are removed, relatively sediment-free water is produced, or indicator parameters stabilize in accordance with the following criteria:

Parameter	**pH**	**Conductivity**	**ORP**	**Turbidity**	**DO**
Stabilization Criterion	±0.1 units	±3%	±10 mV	±10%	±10%

Notes:
DO = dissolved oxygen
mV = millivolts
ORP = oxidation reduction potential

Previous well development activities at the Site suggest that indicator parameters will stabilize after approximately 10 well volumes are evacuated from the monitoring well. Groundwater samples will be collected at a minimum of 24 to 48 hours after well development is complete and the water-quality parameters have stabilized during purging.

The elevation, northing, and easting of each newly installed monitoring well will be surveyed by a California-licensed surveyor following installation. Elevations of groundwater monitoring wells will be surveyed to the nearest 0.01 foot relative to the 1929 National Geodetic Vertical Datum. These data will allow for the measurement of groundwater elevations and the assessment of groundwater flow direction.

A minimum of 48 hours following development, groundwater samples will be collected from the newly installed temporary monitoring wells using the low flow sampling techniques currently used for the Campus Bay groundwater monitoring program and described in the associated groundwater monitoring reports and the Lot 3 FSAP. Depth to groundwater will be measured in each well and water-quality parameters (pH, conductivity, ORP, DO, and temperature) will also be monitored during purging. The

groundwater samples will be labeled, logged on chain-of-custody forms, and placed in an ice-chilled cooler for transport to C&T for the analysis prescribed by the sample matrix provided in Table 1.

Investigation-Derived Waste

Investigation-derived waste (IDW) water and soil generated during this investigation will be temporarily staged at the RFS in 55-gallon drums or an appropriate non-reactive plastic tank, and will be handled and disposed of in accordance with state and federal requirements as well as the requirements of the RFS. Terraphase will coordinate the disposal of the IDW with UC. The location of the drum storage will be coordinated with RFS representatives prior to implementation of the work. The drums will be properly labeled; drum labels will include the following information:

- Description of waste (i.e., water or soil),
- Location at the RFS from where the waste originated,
- Date generated,
- Contact information, and
- Project name.

When implementing the activities described in this work plan, measures will be taken to minimize disruption of the restored marsh area. The well installation activities will be completed using track mounted limited access drilling equipment. Routes to the monitoring well locations will be selected to minimize the disruption to the existing vegetation. In addition, the weather forecast will be taken into account when scheduling the work. If feasible, work will not be scheduled to take place during forecasted rain events or immediately after rain events.

Upon completion of the monitoring well installation activities, Terraphase will prepare a letter report describing the well installation activities. The report will also include the analytical data for the first groundwater samples collected from the wells. The report will be submitted to the DTSC for review and comment. If you have any questions with regard to the procedures described in this Work Plan, please do not hesitate to give me a call at (510) 326-1473.

Sincerely,

For Terraphase Engineering Inc.

Andrew Romolo, P.G. (8110)
Vice President and Principal Geologist

Attachments:
Figure 1: Site Plan With Proposed Monitoring Well Locations
Table 1: Sample Matrix

cc:
Mr. Bill Marsh, Esq., Edgcomb Law Group

Lynn Nakashima, DTSC
Chuck Elmendorf, Zeneca Inc.
Karl Hans, University of California
Anthony O. Garvin, Esq.
Jenifer Beatty, Arcadis-US

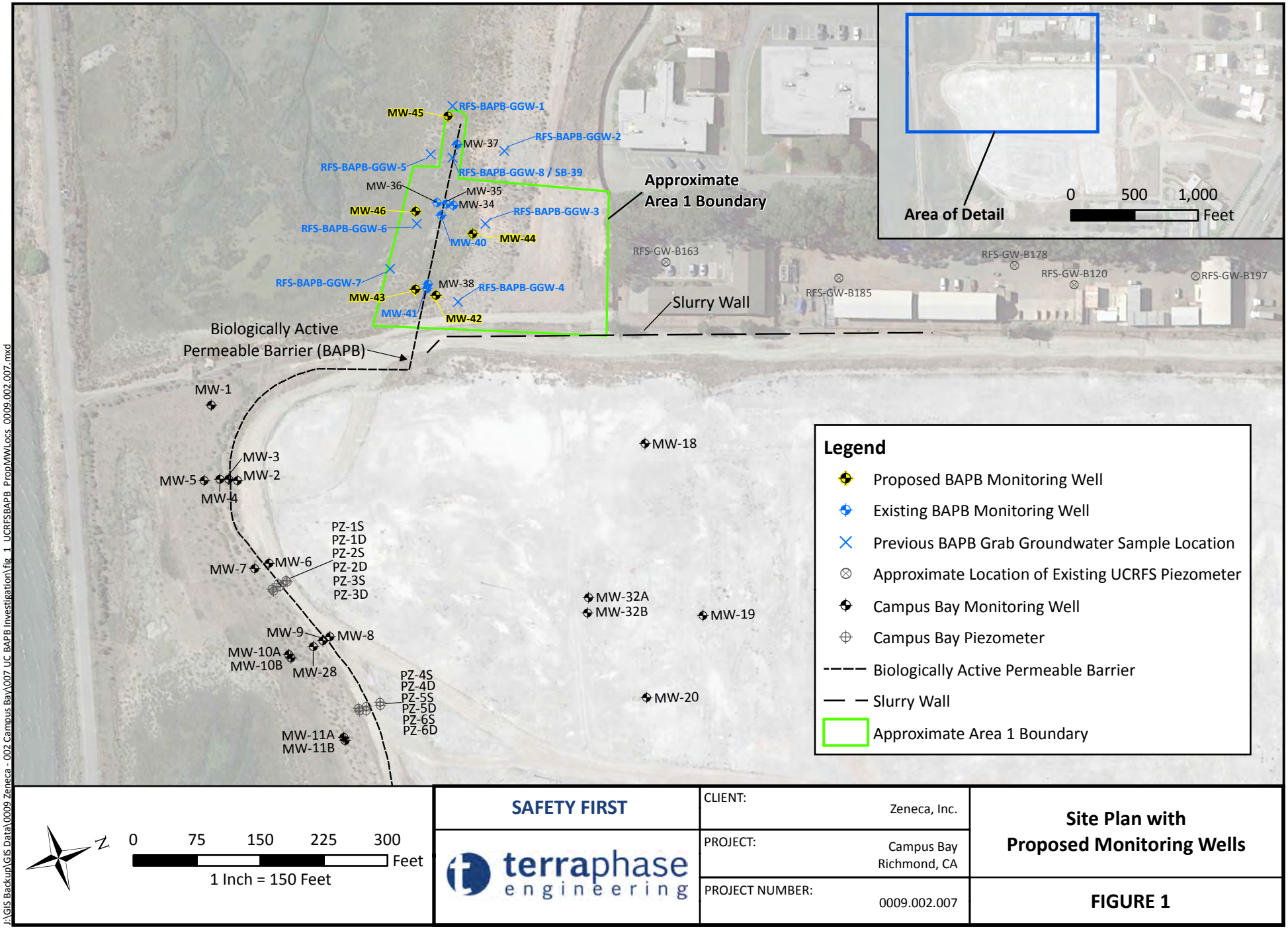
Tables

Table 1
UCRFS Groundwtaer Sample Matrix
Groundwater Monitoring Well Installation Work Plan
Richmond, California

								General Minerals						
					Field Filter	Field Filter	Field Filter							
Well	Schedule	Water Levels	Physical Parameters (DO, ORP, pH, SC, Temp, Turb.)	VOCs [EPA Test Method 8260]	Title 22 Metals [EPA Test Method 6010, EPA Test Method 7470A for mercury; Duplicates anlayzed using EPA Test Method 6020]	Ferrous Iron [Standard Method 3500 FeB]	Dissolved Sulfide [Standard Method 4500S2-D; Lab bottles to contain sodium hydroxide]	Alkalinity [Standard Method 2320B]	Chloride [EPA Test Method 300.0]	Sulfate [EPA Test Method 300.0]	TDS [Standard Method 2540C]	TSS [Standard Method 2540D]	TOC [Standard Method 5310C]	
Groundwater monitoring wells														
MW-42	Semiannually	X	X	X	X	X	X	X	X	X	X	X	X	
MW-43	Semiannually	X	X	X	X	X	X	X	X	X	X	X	X	
MW-44	Semiannually	X	X	X	X	X	X							
MW-45	Semiannually	X	X	X	X	X	X							
MW-46	Semiannually	X	X	X	X	X	X							

Abbreviations:
DO = Dissolved oxygen
TDS = Total dissolved solids
TOC = Total organic carbon
TSS = Totoal suspended solids
VOCs = Volatile organic compounds
MW = Monitoring well

Figures



J:\GIS Backup\GIS Data\0009 Zeneca - 002 Campus Bay\007 UC BAPB Investigation\Fig_1_UCRFSBAPB_PropMWLocs_0009.002.007.mxd

SAFETY FIRST

terraphase engineering

CLIENT:	Zeneca, Inc.
PROJECT:	Campus Bay Richmond, CA
PROJECT NUMBER:	0009.002.007

Site Plan with Proposed Monitoring Wells

FIGURE 1