

February 25, 2011

EM009359.0058.00002

Ms. Barbara Cook, P.E.
Acting Assistant Deputy Director, Cleanup Program
Site Mitigation Branch
c/o Lynn Nakashima
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, California 94710

Subject: Response to Department of Toxic Substances Control's Comments on the "Third Addendum to the Treatability and Pilot Study Work Plan for Localized Occurrences of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California"

Dear Ms. Cook:

ARCADIS U.S. Inc., (ARCADIS) has prepared this letter on behalf of Cherokee Simeon Venture I, LLC, Zeneca Inc., and Bayer CropScience Inc., collectively referred to as "the Respondents,"¹ for the Campus Bay Site, located in Richmond California, previously referred to as the Zeneca property ("the Site"). This letter addresses the comments from the Department of Toxic Substances Control (DTSC) in a February 15, 2011 letter ("the DTSC Comment Letter") regarding the February 7, 2011 "Third Addendum to the Treatability and Pilot Study Work Plan for Localized Occurrences of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California" ("the Third Work Plan Addendum"). The DTSC's comments are provided below followed by the response to each comment.

Responses to DTSC Comment Letter

DTSC COMMENT #1:

Insure that injection is not conducted as a single application across the entire 10 foot-long intervals and specify the shorter intervals to be used.

¹ Respondents to the California Environmental Protection Agency, Department of Toxic Substances Control Site Investigation Order, Docket No. 04/05-006 and Site Investigation and Remediation Order, Docket No. IS/E-RAO 06/07-005 ("the DTSC Order"). The Regents of the University of California is also a respondent to the DTSC Order.

RESPONSE:

The substrate will be injected using a five-foot long injection tool allowing the substrate to be injected into two distinct intervals. The injections will first occur in the 16 to 21 foot below ground surface (bgs) interval, and then the tooling will be pulled up to allow the substrate to be injected into the 11 to 25 foot bgs zone. If the pressures or flow rates indicate that a change is necessary, the injection contractor will have the tooling available to inject at the one- or two-foot injection intervals starting from the bottom of the proposed injection interval and moving up. This is the same method that was used to inject the substrate at the “MW-19”, “MW-21”, and “Lot 3 Sub Area” pilot study areas.

DTSC COMMENT #2:

Recalculate and confirm the theoretical feasibility of injecting 1,000 gallons of solution at each location.

RESPONSE:

One objective of this pilot study is to evaluate the correlation of injecting substrate into injection wells versus injection points at the same location. During the injections in this area in 2009, 1,000 gallons of solution was injected into each injection well on the Campus Bay and University of California Richmond Field Station properties. In order to make a direct correlation between the injection points and wells, an attempt will be made to inject 1,000 gallons of solution into each injection point. If the real-time conditions observed in the field suggest that the volume is too great (e.g., continuously rising pressures, flow rates of less than 1.0 gallons per minute, significant surfacing of injection solution), then a modification will be made to the injection volume. The modification would likely consist of reducing water in the substrate/water mixture to create a more concentrated injection solution.

DTSC COMMENT #3:

Explain measures to be implemented to reduce the likelihood of the unintentional surfacing of injected solution. Additionally, the Work Plan should include a planned response for injectate surfacing including changes to injection methods and cleanup of spilled solution.

RESPONSE:

To address this comment, Section 3.1 of the Third Work Plan Addendum has been revised to include measures that will be implemented to reduce the likelihood of surfacing as well as a response plan if the surfacing of injected solution is observed. Section 3.1 now includes the following language:

“To reduce the risk of unintentional surfacing of injected solution, the injection pressures will be limited to approximately 50 pounds per square inch and the flow rate will be limited to 10 gpm. This will decrease the chance of creating hydraulic fractures that can lead to surfacing.

Should surfacing of the injection solution be observed, the injections will be immediately stopped to alleviate the pressures in the subsurface. A barrier will be placed around any storm drain inlets to prevent the injection solution from entering the storm drains. An industrial “wet-dry vacuum” will be on hand to capture any material that is surfacing. This captured material will be stored in a 55-gallon drum for future characterization and disposal.”

DTSC COMMENT #4:

Add piezometer RFS-GW-B473 as a second down gradient performance monitoring well.

RESPONSE:

The Tetra Tech piezometer RFS-GW-B473 will be added to the baseline and performance monitoring sampling schedule. Section 4.1 of the Third Work Plan Addendum has been revised to reflect this change.

DTSC COMMENT #5:

Baseline and performance monitoring should include analysis of both filtered (dissolved) and unfiltered (total) metals.

RESPONSE:

Unfiltered (total) metals samples will be collected in addition to the filtered (dissolved) metals samples in the baseline and performance monitoring events. Section 4.2 of the Third Work Plan Addendum has been revised to reflect the additional sample collection.

DTSC COMMENT #6:

Amend Table 1, Groundwater Performance Monitoring Analytical Results, MW-25 Area (3DMe™ Injections) to include pH and ORP results and insure that the reporting for the upcoming pilot test includes these parameters in the data tables.

RESPONSE:

Table 1 has been amended to include the pH and ORP results. The pH and ORP values will be reported with the baseline and performance monitoring data collected as part of the upcoming pilot study. The amended Table 1 is included in the attached Revised Third Work Plan Addendum.

If you have any questions with regard to the response to comments discussed in this letter, please feel free to contact the undersigned at (510) 652-4500.

Sincerely,

ARCADIS-U.S., Inc.



Ron Goloubow, P.G. (8655)
Principal Geologist



Daren Roth
Senior Geologist

Attachment 1: Revised Third Work Plan Addendum

cc: Mr. Mark Vest, DTSC
Lynn Nakashima, DTSC
Mr. Doug Mosteller, representative for Cherokee Simeon Venture I, LLC
Mr. Bill Marsh, Esq.
Mr. Nicholas Targ, Esq.
Mr. Anthony O. Garvin, Esq.
Mr. Karl Hans, UC

**Revised Third Addendum to the
Treatability and Pilot Study Work Plan
for Localized Occurrences of Volatile Organic
Compounds in Groundwater,
Lots 1 and 2, Former Zeneca Facility
Campus Bay Project,
Richmond, California**

**February 25, 2011
EM009359.0058**

Prepared for
Cherokee Simeon Venture I, LLC,
Zeneca Inc., and
Bayer CropScience Inc.

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CERTIFICATION

All hydrogeologic and geologic information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by an ARCADIS U.S., Inc., California Professional Geologist.



February 25, 2011

Ronald Goloubow, P.G.
Principal Geologist
California Professional Geologist (8655)

Date

1.0 INTRODUCTION

ARCADIS U.S., Inc. (ARCADIS) has prepared this Revised Third Addendum to the Treatability and Pilot Study Work Plan (“Third Work Plan Addendum”) for localized occurrences of volatile organic compounds (VOCs) detected in shallow groundwater at Lots 1 and 2 of the former Zeneca Facility, located at 1391 South 49th Street in Richmond, California (“the Site”; Figure 1). The Site is subject to the California Department of Toxic Substances Control (DTSC) Site Investigation and Remediation Order, Docket No. IS/E-RAO 06/07-005, dated September 15, 2006 (“the DTSC Order”). ARCADIS has prepared this Third Work Plan Addendum for submittal to the DTSC on behalf of Cherokee Simeon Venture I, LLC, Zeneca Inc., and Bayer CropScience Inc., collectively known as “the Respondents”¹ to the DTSC Order.

1.1 Background

On behalf of the Respondents, in 2006, 2007, and 2009, ARCADIS pilot-tested remedial alternatives for VOCs detected in Upper Horizon groundwater in select areas of Lot 1 and Lot 2 of the Site. The previous pilot test activities were completed in accordance with the following documents prepared by LFR Inc. (now fully incorporated into ARCADIS) and approved by the DTSC:

- “Treatability and Pilot Study Work Plan for Localized Occurrences of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California,” dated September 6, 2006 (“Pilot Study Work Plan”)
- “Addendum to the Treatability and Pilot Study Work Plan for Localized Occurrences of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California,” dated October 10, 2006 (“First Work Plan Addendum”)
- “Second Addendum to the Treatability and Pilot Study Work Plan for Localized Occurrences of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California,” dated July 14, 2009 (“Second Work Plan Addendum”)

The analytical results of the groundwater samples collected as part of the performance monitoring as described in the Pilot Study Work Plan and First Work Plan Addendum were assessed and reported to the DTSC in ARCADIS’ “Revised Pilot Study Summary Report for Treatment of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California,” dated October 10, 2008.

¹ The Regents of the University of California is also a respondent to the DTSC Order.

The final round of groundwater monitoring outlined in the Second Work Plan Addendum was completed in the fourth quarter of 2010. Table 1 contains the analytical data collected from the samples collected from the temporary groundwater monitoring wells and piezometers located in the MW-25 Area. As indicated, the results of the previous pilot tests indicate that successful reductive dechlorination of VOCs occurred in several pilot test areas. However, additional pilot testing is proposed herein to further evaluate remediation technology options, including alternative substrate and delivery methods.

1.2 Objectives

The objectives of the activities described in this Third Work Plan Addendum are to evaluate the following:

- A substrate alternatives not addressed in the Pilot Study Work Plan, First Work Plan Addendum, and Second Work Plan Addendum
- Alternative substrate delivery methods
- Develop cost-benefit information between different injection methods and substrates for incorporation into the Site Feasibility Study / Remedial Action Plan (FS/RAP)

To accomplish these objectives, additional pilot testing activities will be completed in the MW-25 Area at Lot 1 discussed below. The explanation for additional pilot testing is presented in Section 3.

2.0 GENERAL APPROACH

The additional pilot test activities are summarized below. The field activities described herein will be completed in accordance with the procedures described in the Pilot Test Work Plan, the First Work Plan Addendum, the Second Work Plan Addendum and the following documents previously approved by the DTSC:

- “Revised Health and Safety Plan, Environmental and Associated Activities, Campus Bay Site, Former Zeneca, Inc., Richmond Facility, Richmond, California,” dated July 18, 2005
- “Revised Quality Assurance Project Plan Approval, Former Zeneca Property, Campus Bay Site,” dated July 18, 2005
- “Revised Quarterly Monitoring, Well Installation/Repair, and Lot 1/Lot 2 Field Sampling and Analysis Plan, Campus Bay Site, Former Zeneca, Inc., Richmond Facility, Richmond, California,” dated September 19, 2005 (“Lots 1 and 2 FSAP”)

2.1 MW-25 Area Shallow Groundwater

Previous pilot study activities for the shallow groundwater in Area MW-25 (Figure 2) took place in 2009 after site investigations identified tetrachloroethene (PCE) and trichloroethene (TCE) in groundwater at this location. Enhanced Reductive Dechlorination (ERD) was selected as a potential remedial approach at this location, and a pilot-scale injection program was conducted using 3-D Microemulsion (3DMe)[™] as a carbon substrate. In November and December 2009, approximately 54,000 gallons of 3DMe[™] solution, containing approximately 12,300 pounds of 3DMe[™], were injected into 58 injection wells screened from approximately 21 feet below ground surface (bgs) to 11 feet bgs. The injection wells were installed along lines perpendicular to the interpreted direction of groundwater flow to distribute the carbon substrate along a treatment zone through which affected groundwater will pass as it migrates. There were five rows of injection wells spaced approximately 60 feet from each other (see Figure 2).

The analytical results for groundwater samples collected from wells located in the MW-25 Area after the pilot study indicate that dechlorination is occurring in some wells within the MW-25 Area. However, there appears to be an area, in the vicinity of PZ-12, that was not influenced by the pilot study. Therefore, an additional pilot study is being proposed in the vicinity of PZ-12 to determine if the area was uninfluenced due to the previous injection method, substrate, and/or hydrogeologic influences. In addition to addressing these questions, a pilot study in this area will assist in developing cost-benefit information for the FS/RAP.

The additional pilot test being proposed in Area MW-25 will entail injecting Newman Zone to enhance the degradation of PCE and TCE. The substrate will be injected into the Upper Horizon through 12 temporary Geoprobe borings advanced to approximately 21 feet bgs (Figure 3). Four temporary monitoring wells and two piezometers will be used for performance monitoring for the previous and proposed pilot studies in the Upper Horizon in this area. The approximate locations of the Upper Horizon monitoring wells are illustrated on Figure 2.

The area selected for the pilot test is in the vicinity of piezometer PZ-12, located just west of the 2009 MW-25 injection area (Figure 3). The TCE concentrations detected in samples collected from piezometer PZ-12 have remained elevated and show little effect from the 2009 injections (Table 1). The PZ-12 area was selected for the additional pilot test due to the elevated TCE concentrations and its proximity to the 2009 injection area (therefore having similar lithology).

2.2 Substrate Selection

All carbon amendments enhance the same degradation sequence, and the differences among amendments are generally in their physical properties and longevity in the subsurface. The carbon source evaluated and selected for pilot testing in the additional MW-25 Area injection points is Newman Zone Emulsified Vegetable Oil (“Newman

Zone”) by Remediation & Natural Attenuation Services Inc. (RNAS). The Material Safety Data Sheet (MSDS) for Newman Zone is provided in Appendix A.

Newman Zone contains both fast- and slow-release electron donors, which includes sodium lactate for stimulating microbial growth almost immediately following injections. In addition, emulsified vegetable oil provides a continuous supply of hydrogen and volatile fatty acids (VFAs). The hydrogen and VFAs support anaerobic microbial activity for long periods of time, commonly for several years after injection. The vegetable oil is held in suspension as submicron drops by a proprietary mix of additives and stabilizing agents.

Based on conversations with representatives of RNAS, Newman Zone should be similar to the 3DMe™ previously used in the MW-25 Area in its short- and long-term effectiveness and viscosity. This makes the Newman Zone a good candidate to test the differences in injection methods and effectiveness, and still utilize an alternative substrate, for which cost-benefit information may be obtained.

3.0 PILOT TEST PROCEDURES

3.1 Substrate Injection

A pilot-scale injection of Newman Zone will take place in the MW-25 Area on the University of California (UC) Richmond Field Station (RFS) property (Figure 3). However, the delivery method in the shallow groundwater will differ from the injection method used in the area in 2009. For this pilot test, the substrate will be delivered to the subsurface using injection points in a grid pattern, as opposed to injection wells in rows perpendicular to interpreted groundwater flow.

The Newman Zone solution will be injected in Area MW-25 into approximately 12 locations on a 20-foot grid spacing, using Geoprobe injection points in accordance with the Pilot Study Work Plan, First Work Plan Addendum, and Second Work Plan Addendum (Figure 3). Approximately 1,000 gallons of a 13% Newman Zone solution (volume-to-volume mixture; approximately 130 gallons of Newman Zone with approximately 870 gallons of water) will be injected at each location. The solution will be injected at an interval from approximately 11 to 21 feet bgs (Table 2). The Newman Zone solution will be delivered by the vendor in a condensed, emulsified state to eliminate the need for on-site mixing with emulsifiers and the equipment associated with the emulsification process.

To reduce the risk of unintentional surfacing of injected solution, the injection pressures will be limited to approximately 50 pounds per square inch and the flow rate will be limited to 10 gpm. This will decrease the chance of creating hydraulic fractures that can lead to surfacing.

Should surfacing of the injection solution be observed, the injections will be immediately stopped to alleviate the pressures in the subsurface. A barrier will be placed around any storm drain inlets to prevent the injection solution from entering the storm drains. An industrial vacuum will always be on hand to capture any material that is surfacing. This captured material will be stored in a 55-gallon drum for future characterization and disposal.

The proposed locations of the injection points were selected to assess the radius of influence that can be achieved using injection points relative to the radius of influence observed using the nearby injection wells. This comparison will be made using field observations and the analytical results from nearby temporary groundwater monitoring wells and piezometers. The results of this comparison will be used to evaluate each substrate delivery system and will be used in a cost-benefit analysis with respect to the potential full-scale injection implementation program for portions of the Site.

Field activities conducted on the UC RFS property boundary will be conducted under an access agreement with UC.

4.0 PERFORMANCE MONITORING

4.1 Performance Monitoring Duration

Performance monitoring will be completed at wells selected to evaluate the proposed pilot study and ongoing performance of the previous pilot study. Performance monitoring will be performed by collecting samples from the existing temporary monitoring wells and piezometers, as described in the Pilot Study Work Plan. Sampling will take place prior to injection (baseline sampling) and on a quarterly basis for one year after injection, for a total of five sampling events. The wells sampled for the baseline sampling event and for performance monitoring are listed below.

Baseline Sampling:

- Upper Horizon temporary monitoring well IMW-24
- Piezometers PZ-11 and PZ-12
- Upper Horizon Tetra Tech Piezometer RFS-GW-B473

These locations were selected since they are within (PZ-12), proximate (IMW-24), and downgradient (PZ-11) from the proposed pilot study.

Performance Monitoring:

- Upper Horizon temporary monitoring wells IMW-23, IMW-24, and IMW-28
- Lower Horizon temporary monitoring well IMW-29

- Piezometers PZ-11 and PZ-12
- Upper Horizon Tetra Tech Piezometer RFS-GW-B473

The temporary monitoring well and piezometer locations are illustrated on Figures 2 and 3.

4.2 Performance Monitoring Parameters

Prior to substrate injection, the static groundwater elevations, baseline groundwater parameters, and VOC concentrations in the temporary monitoring wells and piezometers listed above will be measured. Groundwater samples will be collected in accordance with the procedures described in the Lots 1 and 2 FSAP.

For the baseline monitoring event and the performance monitoring events, groundwater samples will be submitted to a state-certified analytical laboratory for the following analyses:

- Total and dissolved metals using U.S. Environmental Protection Agency (EPA) Method 6010B
- total organic carbon using Standard Method 5310C
- VOCs using EPA Method 8260
- sulfate using EPA Method 300.0
- sulfide using Standard Method 4500S-D
- nitrate and nitrite using EPA Method 300.0
- methane, ethene, and ethane using method AM20GAX
- total iron using EPA Method 6010B
- ferrous iron using Standard Method SM3500FE-B

It is anticipated that the baseline groundwater monitoring will be conducted in February 2011. Performance monitoring events are anticipated in April, July, and October 2011 and January 2012.

5.0 REPORTING

A pilot study report will be prepared following one year of performance monitoring, containing a summary of the pilot-scale injection and field and laboratory data in tabular format. The pilot study report will also include the groundwater monitoring results and a discussion of the relative changes in VOC concentrations resulting from the treatment.

6.0 REFERENCES

- LFR Inc. an ARCADIS Company (LFR). 2009. Second Addendum to the Treatability and Pilot Study Work Plan for Localized Occurrences of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California. July 14.
- LFR Inc. (LFR). 2006a. Treatability and Pilot Study Work Plan for Localized Occurrences of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California. September 6.
- . 2006b. Addendum to the Treatability and Pilot Study Work Plan for Localized Occurrences of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California. October 10.
- . 2008. Revised Pilot Study Summary Report for Treatment of Volatile Organic Compounds in Groundwater, Lots 1 and 2, Former Zeneca Facility, Campus Bay Project, Richmond, California. October 10.
- LFR Levine-Fricke (LFR). 2005a. Revised Health and Safety Plan, Environmental and Associated Activities, Campus Bay Site, Former Zeneca, Inc., Richmond Facility, Richmond, California. July 18.
- . 2005b. Revised Quality Assurance Project Plan Approval, Former Zeneca Property, Campus Bay Site. July 18.
- . 2005c. Revised Quarterly Monitoring, Well Installation/Repair, and Lot 1/Lot 2 Field Sampling and Analysis Plan, Campus Bay Site, Former Zeneca, Inc., Richmond Facility, Richmond, California. September 19.

Table 1
Groundwater Performance Monitoring Analytical Results
MW-25 Area (3DMe Injections)
Campus Bay, Richmond, California

Sample ID	Sample Date	PCE (µg/L)	TCE (µg/L)	cis-1,2-DCE (µg/L)	VC (µg/L)	1,2-DCA (µg/L)	TOC (mg/L)	Iron (µg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Toluene (µg/L)	Methane (µg/L)	Ethane (µg/L)	Ethene (µg/L)	pH (SU)	ORP (mV)	Notes
Upper Horizon																			
IMW-23	10/29/2009	6.5	91	4.5	<0.5	<0.5	1.6	<100	3.8	<0.25	2300	<0.04	<0.5	2	0.063	0.065	6.44	1.9	Baseline
	2/3/2010	6.7	91	6.1	<0.5	<0.5	1.5	<100	3.7	<0.25	2300	<0.04	<0.5	1.5	0.11	0.06	6.61	65.4	
	5/14/2010	1.4	13	0.5	<0.5	<0.5	1.7	<100	0.48	<0.1	980	<0.04	<0.5	-	-	-	7.60	203.5	
	5/27/2010	-	-	-	-	-	-	-	-	-	-	-	-	0.04	0.036	0.560	-	-	
	8/5/2010	2.6	28	1.3	<0.5	<0.5	1.5	110	1.3	<0.25	1300	<0.04	<0.5	1.70	0.034	0.045	6.24	136.1	
	11/8/2010	5.1	53	2.9	<0.5	<0.5	1.5	<100	2.5	<0.25	1800	<0.04	<0.5	1.6	0.045	0.044	6.18	44.9	
IMW-24	10/27/2009	91	930	6.6	<5.0	<5.0	2.0	<100	2.3	<0.05	380	<0.04	<5.0	1.6	0.097	0.088	5.95	-23.7	Baseline
	2/3/2010	72	740	7.4	<6.3	<6.3	2	240	0.41	<0.05	390	0.09	<6.3	1.4	0.061	0.1	6.56	-89.3	
	5/14/2010	37	510	3J	<3.6	<3.6	2	150	0.22	<0.05	290	<0.04	<3.6	-	-	-	6.64	-148.1	
	5/26/2010	-	-	-	-	-	-	-	-	-	-	-	-	0.21	0.083	27.00	-	-	
	5/26/2010	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.084	26.00	-	-	Duplicate
	8/5/2010	76	670	4.9	<4.2	<4.2	1.6	<100	0.56	<0.05	380	0.07	<4.2	19.0	0.061	0.067	6.52	-104.8	
	11/8/2010	110	620	20	<3.6	<3.6	2.0	<100	0.33	<0.05	360	0.05	<3.6	440	0.083	0.066	6.56	-15.7	
IMW-25	10/27/2009	0.3J	3.2	0.5	<0.5	<0.5	5.2	<100	0.12	<0.10	530	<0.04	<0.5	6.5	0.13	0.064	7.07	93.9	Baseline
	2/3/2010	<0.5	2.4	<0.5	<0.5	<0.5	5.9	<100	0.5	<0.1	580	<0.04	<0.5	270	0.053	0.042	7.09	65.7	
	5/13/2010	0.4J	3.8	<0.5	<0.5	<0.5	5.4	<100	0.67	<0.1	600	<0.04	<0.5	460	0.015J	0.022J	6.58	143.1	
	8/9/2010	<0.5	2.7	<0.5	<0.5	<0.5	5.6	<100	0.06	<0.05	550	<0.04	<0.5	330	0.010J	0.044	6.63	-14.4	
	11/3/2010	0.3J	3.3	0.3J	<0.5	<0.5	5.2	600	<0.10	<0.10	570	0.12	<0.5	1200	0.016J	0.054	6.93	-163.7	
IMW-26	10/27/2009	17	200	3.2	<1.0	<1.0	2.8	<100	7.4	<0.10	730	<0.04	<1.0	4.6	0.043	0.07	6.68	7.4	Baseline
	2/2/2010	10	76	1.5	<0.5	<0.5	4.6	1000	0.77	<0.1	660	0.45	<0.5	1.7	0.027	<0.025	6.96	-170	
	5/13/2010	5.2	33	0.6	<0.5	<0.5	3.1	1900	0.12	<0.05	390	<0.04	<0.5	6.7	0.015J	0.04	6.71	-123.4	
	8/5/2010	3.6	19	6.6	<0.5	<0.5	3.3	2600	0.31	<0.05	620	0.04	<0.5	46	0.035	0.072	6.78	-113.2	
	11/3/2010	3	22	44	0.4J	<0.5	3.3	3000	0.15	<0.05	440	<0.04	<0.5	7700	0.035	0.085	6.78	-233.4	
IMW-27	10/27/2009	13	210	2.2	<1.0	<1.0	3.1	<100	2.2	<0.10	640	<0.04	<1.0	4.7	0.13	0.11	6.43	101.1	Baseline
	2/2/2010	19	710	4.2	<3.6	<3.6	2.8	<100	5.9	<0.1	470	<0.04	<3.6	1.9	0.062	<0.025	6.67	-69.5	
	5/13/2010	12	450	<3.6	<3.6	<3.6	2.7	<100	7.6	<0.1	470	<0.04	<3.6	1.5	0.04	0.027	6.34	155.5	
	8/9/2010	12	590	2.1J	<3.6	<3.6	3	<100	10	<0.05	520	<0.04	<3.6	1.9	0.051	0.064	6.63	3.5	
	11/3/2010	21	650	20	<3.6	<3.6	3.4	<100	6.5	<0.25	560	<0.04	<3.6	53	0.069	0.063	6.76	-231.7	
IMW-28	10/27/2009	84	5000	46	<20	<20	2.4	<100	2.9	<0.10	650	<0.04	<20	5.1	0.26	0.15	6.32	-45.3	Baseline
	2/2/2010	38	2100	24	<10	<10	3.9	120	<0.1	<0.1	430	<0.04	<10	3.3	1.1	0.28	6.63	-14.5	
	5/13/2010	26	1200	19	<13	<13	3	<100	<0.1	<0.1	370	<0.04	<13	7.1	0.38	0.25	6.75	-60.1	
	8/5/2010	30	1200	290	<13	<13	3.1	140	<0.05	<0.05	400	<0.04	<13	980	0.44	1.1	6.74	-78.9	
	11/3/2010	8.9J	280	1600	6.2J	<10	4.6	240	<0.05	<0.05	220	<0.04	<10	14000	0.33	1	6.9	-223.1	
MW-25R	10/27/2009	610	730	48	<2.5	<2.5	3.1	<100	5.9	<0.10	960	<0.04	<2.5	4.6	0.14	0.16	6.67	-17.3	Baseline
	2/2/2010	920	450	120	<5	<5	3.5	<100	3.6	<0.25	1500	<0.04	<5	1.8	0.055	0.037	6.39	33.6	
	5/13/2010	250	230	13	<1.7	<1.7	3.7	<100	3.5	<0.1	890	<0.04	<1.7	0.73	0.045	0.083	6.67	91.8	
	8/5/2010	250	280	17	<2.5	<2.5	2.9	110	3.7	<0.1	890	<0.04	<2.5	0.85	0.061	0.2	6.66	-46.4	
	11/8/2010	510	480	18	<3.1	<3.1	3.1	<100	5.7	<0.1	840	<0.04	<2.5	2	0.11	0.12	6.63	62.4	
PZ-11	10/29/2009	130	1300	13	<6.3	<6.3	3.1	160	0.99	<0.10	1000	<0.04	<6.3	5.4	0.11	0.17	5.47	9	Baseline
	2/3/2010	110	1100	16	<10	<10	3.4	<100	<0.25	<0.25	1300	<0.04	<10	5.3	0.19	0.13	6.68	27.8	
	5/14/2010	67	950	10	<7.1	<7.1	3.4	<100	<0.25	<0.25	1600	<0.04	<7.1	-	-	-	5.81	233.6	
	5/26/2010	-	-	-	-	-	-	-	-	-	-	-	-	0.130	0.130	1.90	-	-	
	8/5/2010	80	640	9.3	<7.1	<7.1	3.7	<100	<0.25	<0.25	1500	<0.04	<7.1	44	0.14	0.17	6.56	179.6	
	8/5/2010	78	650	9.2	<7.1	<7.1	3.6	<100	<0.25	<0.25	1500	<0.04	<7.1	42	0.14	0.18	-	-	Duplicate
	11/8/2010	100	850	24	<5.0	<5.0	3.6	<100	<0.25	<0.25	970	<0.04	<5.0	290	0.24	0.40	6.50	0.7	
PZ-12	10/27/2009	67	860	8.1	<5.0	<5.0	3.0	130	1.6	<0.05	380	<0.04	<5.0	1.8	0.077	0.16	6.29	13.7	Baseline
	2/3/2010	64	880	11	<5	<5	2.4	360	1.1	<0.1	500	0.06	<5	2.3	0.077	0.15	6.59	-104.6	
	5/14/2010	33	790	7.7	<5	<5	2.2	320	0.99	<0.1	500	0.13	<5	-	-	-	6.62	-137	
	5/14/2010	36	860	7.9	<5	<5	2.6	290	1.1	<0.1	500	0.12	<5	-	-	-	-	-	Duplicate
	5/26/2010	-	-	-	-	-	-	-	-	-	-	-	-	0.075	0.076	3.10	-	-	
	8/5/2010	61	890	9.5	<5	<5	2.5	600	0.95	<0.1	540	0.1	<5	6.5	0.068	0.079	6.45	-90.6	
	11/8/2010	70	820	12	<6.3	<6.3	2.3	490	0.93	<0.05	510	0.07	<6.3	7.5	0.066	0.082	6.52	-8.9	
Lower Horizon																			
IMW-29	10/27/2009	100	11000	<71	<71	<71	2.0	<100	3.4	<0.10	390	<0.04	<71	9	0.39	0.072	6.53	56.2	Baseline
	2/2/2010	<17	3200	21	<17	<17	250	1600	<0.05	<0.05	97	2.6	<17	6.5	2.2	0.7	5.83	-64.2	
	5/13/2010	<25	4200	20J	<25	<25	340	17000	<0.05	<0.05	<0.5	0.2	<25	120	2.2	13	5.09	-37.7	
	5/13/2010	<25	4400	21J	<25	<25	330	17000	0.11	<0.05	0.58	0.79	<25	88	2.6	11	-	-	Duplicate
	8/5/2010	16J	3200	700	<25	<25	370	22000	0.46	<0.05	<0.5	0.23	<25	5000	2.6	22	6.00	-106.6	
	11/3/2010	<50	2100	9400	73	<50	370	39000	<0.05	<0.05	<0.5	0.13	<50	5000					

Table 1
Groundwater Performance Monitoring Analytical Results
MW-25 Area (3DMe Injections)
Campus Bay, Richmond, California

Notes:

Baseline = Baseline Sampling event conducted prior to the start of injections

Bold Text = Most recent sampling event

<0.50 = Concentration not detected at or above indicated laboratory reporting limit

1,2-DCA = 1,2-Dichloroethene

- = Sample not analyzed

µg/L = Micrograms per liter

cis-1,2-DCE = cis-1,2-Dichloroethene

Duplicate = Duplicate sample collected from a well

IMW = Temporary Monitoring Well

J = Estimated value

mg/L = Milligrams per liter

MW = Monitoring Well

mV = millivolts

ORP = Oxidation Reduction Potential

PCE = Tetrachloroethene

PZ = Piezometer

SU = standard units

TCE = Trichloroethene

TOC = Total Organic Carbon

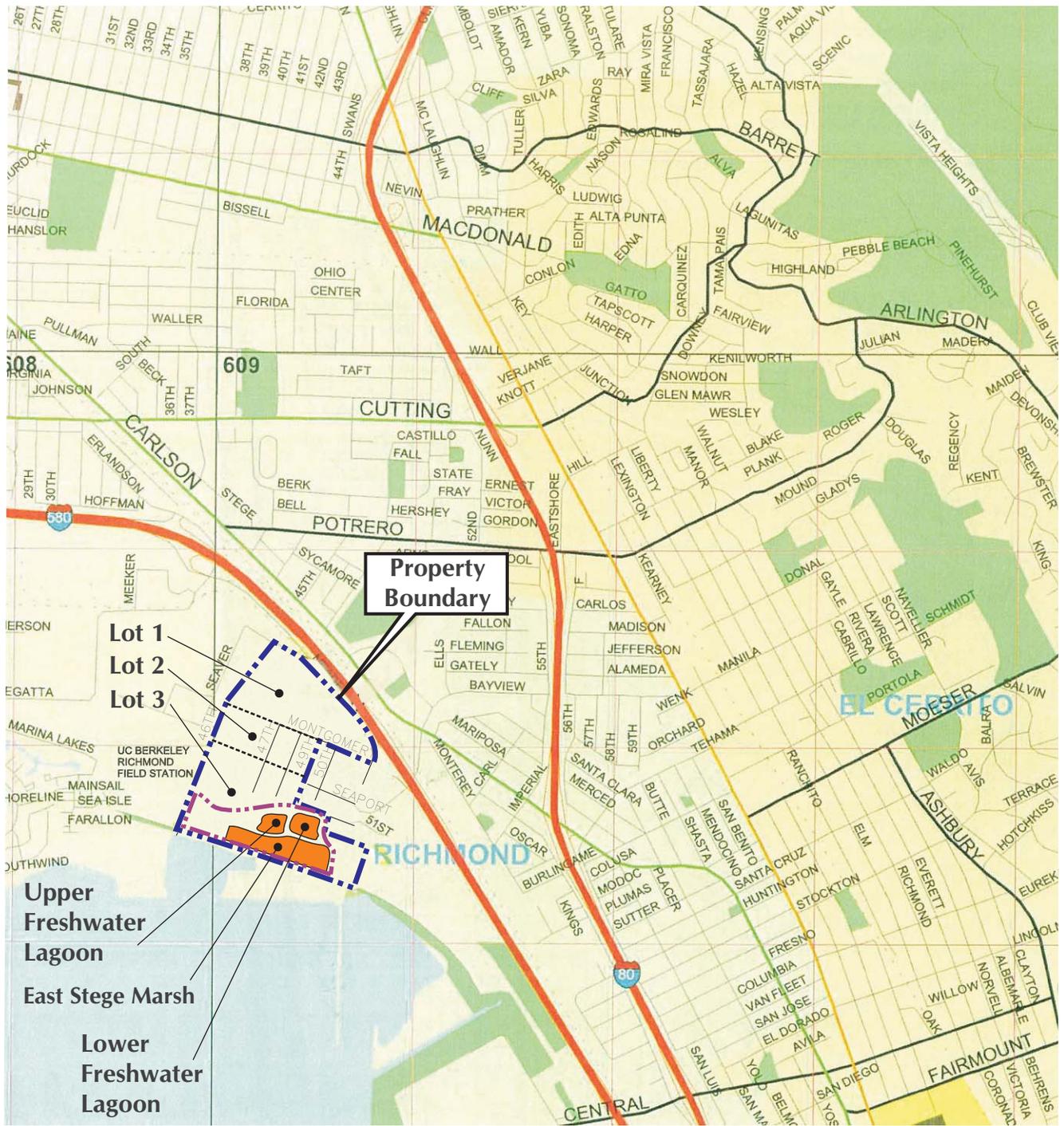
VC = Vinyl Chloride

Table 2
Injection and Characterization Specifications
MW-25 Area, Lot 1
Campus Bay
Richmond, California

Area	Chemicals of Concern	Previous Treatment Technology	Proposed Treatment Technology	Application Technology	Approximate Injection Volume per Point	Number of Injection Points	Approximate Screen or Injection Interval (feet bgs)	Approximate Row Spacing (feet)	Approximate Point Spacing (feet)
MW-25 Shallow Zone	PCE, TCE	ERD using HRC Advanced	ERD using Newman Zone	Point Injections (grid pattern)	1,000	12	11 - 21	NA	20

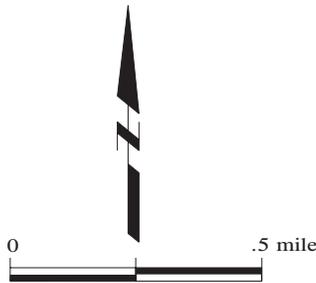
Notes:

bgs: Below ground surface
ERD: Enhanced reductive dechlorination
NA: Not applicable
PCE: Tetrachloroethene
TCE: Trichloroethene

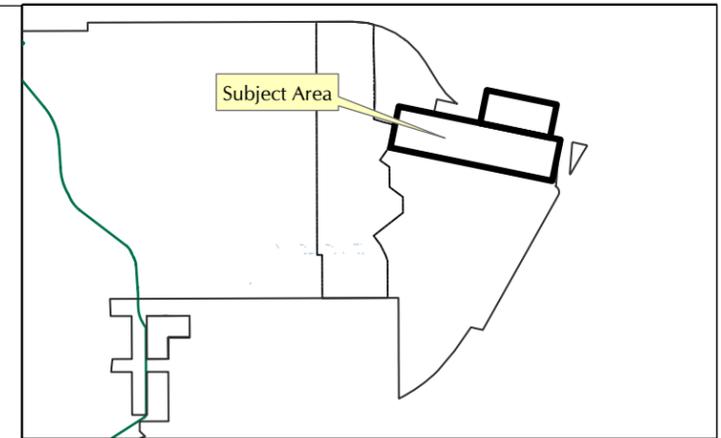
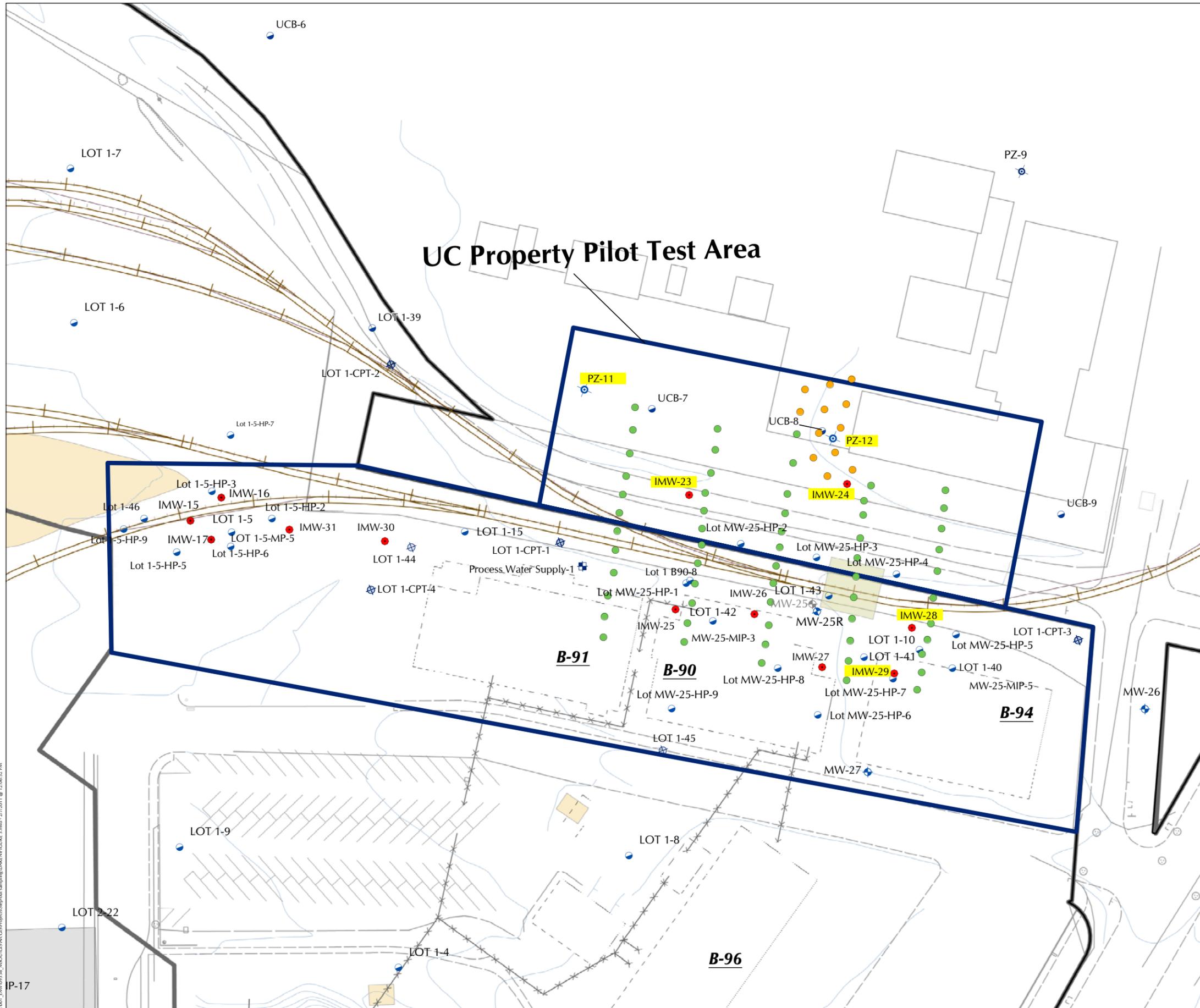


SOURCE: THOMAS BROS MAP - Bay Area 2001

-  Approximate Campus Bay Property Boundary
-  Approximate HEA Boundary



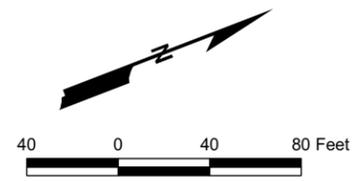
CAMPUS BAY, RICHMOND, CALIFORNIA	
SITE VICINITY MAP	
	FIGURE 1



LEGEND

- Proposed MW-25 area injection points
- MW-25 area injection wells
- ⊕ Approximate location of existing CPT
- P-1 s/d ⊕ Approximate location of existing piezometer (shallow and deep)
- Process Water Supply-1 ⊕ Process water supply well (not in use)
- Lot 1-1 ⊕ Approximate location of previous soil boring w/ grab groundwater sample
- MW-1 ⊕ Approximate location of existing monitoring well
- MW-25 ⊕ Approximate location of abandoned monitoring well
- IMW-11 ● Approximate location of existing temporary monitoring well installed for pilot study
- Railroad spurs removed
- Lot boundary
- Previous arsenic excavation
- Previous excavation area
- Property boundary
- Former building
- Road
- Cinder excavation area
- 2-ft contour interval

Note
Highlighted temporary monitoring wells and piezometers to be used to monitor pilot study performance.



CAMPUS BAY, RICHMOND, CALIFORNIA

**MW-25 AREA
SHALLOW-ZONE
PROPOSED POINT INJECTIONS**



K:\001_EMW20138_MSDUCS\ArcGIS\Project\05\post\mapimg\DAKENV\FIGURE 3.mxd - 2/7/2011 @ 11:06:51 PM

APPENDIX A

Material Safety Data Sheet

Remediation and Natural Attenuation Services Incorporated
 6712 West River Road
 Brooklyn Center, MN 55430

Product Information: 763-585-6191 Issue Date: December 7, 2007

Section 1: IDENTIFICATION

- 1.1 Product Name: Newman Zone -Buffered Nonionic Formulation 190-6730
- 1.2 Product Type: Edible Industrial Nutrient for Microbial Organisms
- 1.3 Hazard Rating: Health: 1 Fire: 1 Reactivity: 1
- 1.4 Formula: Proprietary

 Substances Subject to SARA 313 Reporting Are Indicated by "#"

It is our opinion that the above named product does not meet the definition of "hazardous Chemical" as defined in the OSHA "Hazard Communication Standard" regulation 29 CFR 1910.1200. This material Safety Data Sheet is provided as general information for health and safety guidelines.

Section 2: INGREDIENTS/COMPOSITION

	CAS No.	%	PEL	TWA
Soybean Oil (food grade)	8001-22-7	46	15(Mist)	10(Mist)
Sodium-L-Lactate	867-56-1	4		
Sodium Bicarbonate	144-55-8	1		
Food Additives/Emulsifiers/Preservatives (Proprietary)		<10		
Water		<45		

EMERGENCY ONLY, 24-HOUR SERVICE: CHEMTREC: 1-800-424-9300

Section 3: PHYSICAL AND CHEMICAL CHARACTERISTICS

This section completed per formulation ingredient data unless stated.

- Solubility: Dispersible in water (product)
- PH: 8.3 (product)
- Specific Gravity: 0.99 (product)
- Boiling Point: NA
- Vapor Pressure: NA
- Vapor Density: NA
- Percent Volatile By Volume (%): NA
- Evaporation Rate: NA
- Viscosity: 23.6 cps @ 68°F (Brookfield)(product)
- Product Appearance and Odor: White opaque liquid, vegetable oil odor.

=====
Section 4: FIRE AND EXPLOSION HAZARDS

This section completed per formulation ingredient data unless stated.

4.1 Special Fire Hazards: Product - none, does not support combustion.

Flash Point: >540 degrees F (Pure Soybean Oil Closed Cup).

Flammable Limits

LEL ND

UEL ND

4.2 Fire Fighting Methods: Use method appropriate for surrounding fire.

4.3 Extinguishing Media: Dry Chemical or CO₂ Preferable; water may cause spattering or spreading.

=====
Section 5: HEALTH HAZARD DATA

5.1 THIS PRODUCT IS USED FOR SOIL AND GROUND WATER REMEDIATION BUT IS FORMULATED USING FOOD AND FOOD GRADE ADDITIVES. PROCESSING, PACKAGING, SANITATION AND STORAGE OF THE PRODUCT FOLLOWS THE BEST PRACTICES USED FOR FOOD PRODUCTS.

5.2 Effects of Overexposure: NA

5.3 Emergency and First Aid Procedures: If inhaled, remove from contaminated atmosphere. For eye contact immediately flush eyes with large amounts of water. Ensure rinsing entire surface of eye & under lid. For skin contact wash affected areas thoroughly with soap and water. Seek medical help for persistent irritation.

5.4 Hydrolyzed soy protein has been identified by the United States Food and Drug Administration as a food allergen. Symptoms include swelling of the lips, stomach cramps, vomiting, diarrhea, skin hives, rashes, eczema and breathing problems.

5.5 Occupational Exposure Limits [8-hour time weighted averages (TWA)]:

	CAS No.	mg/m ³ OSHA PEL/ACGIH TLV
Soybean Oil (food grade)	8001-22-7	15(Mist)/10(Mist)

=====
Section 6: REACTIVITY DATA

This section completed per formulation ingredient data unless stated.

6.1 Stability: Stable under normal conditions.

6.2 Conditions to Avoid: NA

6.3 Incompatibilities: None known

6.4 Hazardous Decomposition Products: Product - None identified.
 Ingredients - Carbon oxides. Biological decomposition (spoilage) may result in offensive odors.

6.5 Hazardous Polymerization; None known

=====
Section 7: SPILL OR LEAK PROCEDURES

This section completed per formulation ingredient data unless stated.

- 7.1 Spill Response: Water dispersible. Same as for vegetable oil spills: isolate spill, prevent from entering waterways, and sewer systems. Sorb or remove spilled materials as soon as possible. Oils and specific quantities of oils may be reportable under federal, state, or local regulations.
- 7.2 Waste Disposal Method: This product is not hazardous, however, wastes must be disposed in accordance with local, state or federal regulations. Consult with local sewer authority, or solid waste facility prior to disposition.

=====
Section 8: SPECIAL PRECAUTIONS

No protective equipment is necessary under normal use conditions.

- 8.1 Eyes: If splashing may occur, eye protection recommended.
- 8.3 Skin: Wear impervious gloves for prolonged or repeated exposure.
- 8.4 Respiratory: Avoid breathing mists of this product

=====
Section 9: TRANSPORTATION PRECAUTIONS

This section completed per formulation ingredient data unless stated.

- 9.1 Transportation Considerations: This product is not classified as dangerous in the meaning of transport regulations. Shippers and transporters may need to meet packaging and transportation requirements for certain oils and respective quantities under CFR 49 Part 130.

The above information is believed to be correct with respect to the formula used to manufacture the product in the country of origin. As data, standards, and regulations change, and conditions of use and handling are beyond our control, NO WARRANTY, EXPRESS OR IMPLIED, IS MADE AS TO THE COMPLETENESS OR CONTINUING ACCURACY OF THIS INFORMATION.