LFR an ARCADIS company

September 14, 2009 001-09359-58

Ms. Barbara Cook, P.E.
Performance Manager
Brownfields and Environmental Restoration Program
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, California 94710
Attention: Lynn Nakashima

Subject: Response to Comments from the Department of Toxic Substances Control Regarding the 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.

Dear Ms. Cook:

LFR Inc. an Arcadis Company (LFR) has prepared this letter on behalf of Cherokee Simeon Venture I, LLC, Zeneca Inc. ("Zeneca"), and Bayer CropScience Inc., collectively referred to as "the Respondents,"[1] to provide the information requested by the Department of Toxic Substances Control (DTSC) in a August 20, 2009 letter (DTSC Letter). The DTSC Letter provided the Respondents with comments regarding the July 14, 2009 LFR document, "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" (Pilot Study Work Plan").

In the DTSC Letter, the methods and approaches proposed by the Pilot Study Work Plan were approved by the DTSC. However, the DTSC required that the Pilot Study Work Plan be revised to include references to the groundwater characterization data collected at the study areas and previously discussed in the October 10, 2008 LFR document, "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" (the "Pilot Study Summary Report"). Accordingly, LFR revised the Pilot Study Work Plan to include and reference the applicable data tables and figures provided in the Pilot Study Summary Report. In addition, LFR

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

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revised the Pilot Study Work Plan to clarify that at the conclusion of performance monitoring, a Pilot Study Report Addendum will be prepared that will present the monitoring network, the pre- and post-treatment groundwater analytical data (including sampling intervals), and the subsurface soil types at the treatment areas.

The field activities described in the Pilot Study Work Plan are tentatively scheduled to begin the week of September 28, 2009. If you have any questions regarding the information attached, please do not hesitate to call Andrew Romolo, Bill Carson, or Peter Zawislanski at (510) 652-4500.

Sincerely,

Andrew M. Romolo, P.G. (8110)
Senior Associate Geologist

Attachment:

cc: Mr. Mark Vest, DTSC
Ms. Kimiko Klein, DTSC
Mr. Doug Mosteller, Cherokee Investment Partners
Mr. Brian Spiller, Zeneca Inc.
Mr. Bill Marsh, Esq.
Mr. Nicholas Targ, Esq.
Mr. Anthony O. Garvin, Esq.

Revised 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

September 14, 2009
001-09359-58

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

CONTENTS

1.0 INTRODUCTION

LFR Inc. an Arcadis company (LFR) has prepared this Revised Second Addendum to the Treatability and Pilot Study Work Plan ("Revised Second Work Plan Addendum"). This Revised Second Work Plan Addendum describes the approach to pilot test remedial alternatives for volatile organic compounds (VOCs) detected in groundwater underlying two locations on Lot 1 at the Campus Bay Site, former Zeneca Facility, located 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"). LFR has prepared this Revised Second 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 and 2007 LFR 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 LFR documents 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"); and
- "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").

The pilot test monitoring data were assessed and reported to the DTSC in LFR's "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 (the "Pilot Study Summary Report"). The results of the previous pilot tests indicated that successful reductive dechlorination of VOCs occurred in several pilot test areas. Additional pilot testing is proposed herein to further evaluate remediation technology options, including bioaugmentation, alternative substrate delivery methods, alternative substrate, and injection of substrate into Lower Horizon groundwater.

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

1.2 Objectives

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

- Substrate alternatives not included in the Pilot Study Work Plan and the First Work Plan Addendum;
- The addition of bioaugmentation to the enhanced reductive dechlorination (ERD) approach;
- Alternative substrate delivery methods; and
- The ability to successfully inject substrate into Lower Horizon groundwater.

To accomplish these objectives, additional pilot testing activities will be completed in the areas on Lot 1 discussed below. The explanation for additional pilot testing in each area is presented in Section 3.

2.0 GENERAL APPROACH

The additional pilot test activities are summarized below by test area. 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, 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; and
- "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 Area Lot 1-2

Previous pilot study activities in Area Lot 1-2 (Figure 2) took place in 2006 after site investigations identified trichloroethene (TCE) as the primary VOC groundwater contaminant in this area. Enhanced Reductive Dechlorination (ERD) was selected as a potential remedial approach at this location, and a pilot-scale injection program was conducted using cheese whey as a carbon substrate. In October and November 2006, approximately 34,000 gallons of cheese whey solution, containing approximately 38,000 pounds of cheese whey, were injected into 70 temporary points. The injections were performed in 1-foot intervals starting at 21 feet below ground surface (bgs) and

proceeded up to 9 feet bgs. The baseline analytical data and performance monitoring analytical data was presented in LFR's "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 ("the Pilot Study Summary Report"). Additional performance monitoring data are presented in the quarterly surface-water and groundwater monitoring reports submitted since 2007.

A decrease in the concentration of TCE from 170 micrograms per liter (μg/l) to below 10 μg/l during the pilot test showed that ERD was effective at degrading TCE; however, based on data from groundwater samples collected subsequent to the injections, the degradation process of TCE did not consistently and completely proceed past cis-1,2-dichloroethene (cis-1,2-DCE). Table 1 of the Pilot Study Summary Report provides the performance monitoring analytical data for VOCs in groundwater at the Lot 1-2 area and has been included in Appendix A. Figures 3 and 9 of the Pilot Study Summary Report illustrate pre- and post-injection VOC concentrations at the Lot 1-2 area and have been included in Appendix A for reference.

As discussed in the Pilot Study Summary Report, analysis of dechlorinating bacteria (e.g., *Dehalococcoides*) at Lot 1-2 showed that population concentrations were relatively low. The low bacterial concentrations suggest that microbial conditions in Lot 1-2 may be limiting the effectiveness of the ERD process. Thus, based on the results of the field sampling completed during the previous pilot test activities in Area Lot 1-2, bioaugmentation may be necessary for complete dechlorination to occur. Therefore, the objective of the additional pilot test activities in Area Lot 1-2 is to assess if bioaugmenting after substrate delivery will facilitate complete VOC degradation at this location.

To assess the effectiveness of bioaugmentation, the pilot test in Area Lot 1-2 will be injected with 3D-Microemulsion (formerly known as HRC Advanced) followed by bioaugmentation using SiREM's KB-1® culture to help achieve complete degradation of TCE and its daughter products, including cis-1,2-DCE. The substrate will be injected through 18 temporary Geoprobe borings (Figure 2). Performance monitoring will be completed through the four existing temporary monitoring wells (IMW-1, IMW-2, IMW-3, and IMW-4), one existing groundwater monitoring well (MW-30), and one new groundwater monitoring well (MW-33). The approximate locations of the monitoring wells are illustrated on Figure 2.

2.2 Areas Lot 1-5 and MW-25

Tetrachloroethene (PCE) and TCE in groundwater are the primary VOCs of concern in Areas Lot 1-5 and MW-25. The groundwater characterization data collected at the Lot 1-5 and MW-25 pilot study area were presented and discussed in the Pilot Study Summary Report. Figures 4 and 5 of the Pilot Study Summary Report illustrate the groundwater characterization data and have been included in Appendix A. Tables 3 and

4 of the Pilot Study Summary Report provide the groundwater characterization data and have also been included in Appendix A.

TCE was the primary VOC identified as a potential contaminant of concern (COC) in the Lot 1-5 pilot study area. The majority of the mass was determined to be located between approximately 16 and 31 feet bgs as illustrated on Figure 4 of Appendix A. In the MW-25 pilot study area, PCE and TCE were identified as the potential COCs. The majority of the mass was encountered from approximately 20 to 32 feet bgs within the lateral extent illustrated on Figure 5 of Appendix A.

The groundwater analytical data suggest that VOCs detected in groundwater at MW-25 may be co-mingled with the VOCs detected at Lot 1-5. Upon completion of pilot testing activities and performance monitoring, LFR will prepare a Pilot Study Summary Report Addendum that will present the monitoring network, the pre- and post-treatment groundwater analytical data (including sampling intervals), and the subsurface soil types at the treatment areas. The data collected at the Lot 1-5 and MW-25 area will be presented as one area.

Between June and August 2008, the Respondents conducted soil removal activities on Lot 1 in the vicinity of former monitoring well MW-25 in accordance with the "Final Lot 1 PCB/VOC Area Removal Action Work Plan," prepared by Erler and Kalinowski and dated June 9, 2008. The soil removal activities consisted of excavating approximately 2,800 tons of VOC- and polychlorinated biphenyls- (PCB-) affected soil from a 200-foot by 30-foot area to a maximum depth of approximately 11 feet bgs. Prior to the excavation activities, groundwater monitoring well MW-25 was abandoned due to its location within the proposed excavation footprint. Upon completion of the excavation activities, the Respondents submitted two Completion Reports to the DTSC for review. The DTSC approved the removal activities and certified the Completion Reports in a letter dated May 15, 2009. Therefore, pilot testing remedial alternatives for VOCs detected in groundwater underlying this area can now be initiated.

Area Lot 1-5

The pilot test in Area Lot 1-5 will involve injecting Emulsified Oil Substrate (EOS) to enhance the degradation of PCE and TCE detected in groundwater. The substrate will be injected into Upper and Lower Horizon groundwater through 40 temporary Geoprobe borings to 34 feet bgs (Figure 3). Three existing temporary monitoring wells, along with four new temporary monitoring wells, will be used for performance monitoring. The approximate locations of the monitoring wells are illustrated on Figure 3.

This test will evaluate the effectiveness of: (1) a substrate (EOS) that has not been previously tested at the Site and (2) the ability to inject substrate into the Lower Horizon.

Area MW-25

The pilot test in Area MW-25 will involve injecting 3D-Microemulsion to enhance the degradation of PCE and TCE. The substrate will be injected into the Upper Horizon through 60 temporary injection wells to 22 feet bgs (Figure 4) and into the Lower Horizon through 12 temporary Geoprobe borings to 34 feet bgs (Figure 5). Six new temporary monitoring wells and one new monitoring well (Replacement Well MW-25) will be used for performance monitoring in the Upper Horizon. One new temporary monitoring well will be used for performance monitoring in the Lower Horizon. The approximate locations of the Upper and Lower Horizon monitoring wells are illustrated on Figure 4 and Figure 5, respectively.

This test will evaluate the efficacy of injecting substrate through injection wells and the ability to inject substrate into the Lower Horizon.

3.0 PILOT TEST PROCEDURES

3.1 Area Lot 1-2

3.1.1 Substrate Injection

A summary of the proposed injection specifications including the proposed treatment technology, number of injection points, spacing, and volume is presented in Table 1. LFR has selected 3D-Microemulsion (formerly HRC Advanced) as a substrate for Lot 1-2 due to the effectiveness and longevity of the testing demonstrated in the Lot 2-27 Area (LFR 2008). Based on LFR's experience during the previous pilot test, approximately 1,000 gallons of substrate solution can be injected at each injection location. Based on the results of the original pilot study, the manufacturers recommendations, and a conservative approach, an approximately 10 percent substrate to water [volume-to-volume mixture] will be injected).

LFR selected SiREM's KB-1® culture for the biological amendment. The material safety data sheet for SiREM's KB-1® culture has been provided as Appendix B. The pre-injected concentration of KB-1® is approximately 10^{11} *Dehalococcoides* gene copies per liter. Prior to bioaugmentation, substrate injections will be performed to precondition the subsurface environment by depleting the dissolved oxygen (DO) and creating reducing conditions necessary for the organisms to survive. Preconditioning of the subsurface is done by injecting a substrate to serve as an electron donor to satisfy the immediate electron needs of the various acceptors. LFR proposes to inject approximately 95 percent of the planned substrate load to induce the anaerobic conditions.

The injection points will be advanced in a line perpendicular to the direction of groundwater flow to distribute the carbon substrate in a transect across a portion of the area. Orientation of the injection locations in this manner should create a treatment

zone through which affected groundwater will pass as it migrates, allowing organic carbon to migrate downgradient from the transect and extend the treatment zone.

The injection points will be spaced 20 feet apart based on the 15-foot radius of influence (ROI) observed during the original pilot test with injections of 600 gallons of substrate solution. Three treatment zones will be spaced approximately 60 feet apart. Approximately 1,000 gallons of the 3D-Microemulsion solution will be injected at each location. The solution will be injected at an interval from approximately 10 to 20 feet bgs (Table 1). Injection procedures will be performed in accordance with the Pilot Study Work Plan and the First Work Plan Addendum.

LFR estimates that reducing conditions should be achieved within four to six weeks of injections; however, groundwater samples will be collected from the existing temporary monitoring wells to verify reducing conditions. Bioaugmentation injections will be performed after reducing conditions are detected, as documented by negative oxidation-reduction potential (ORP), reduced DO levels (approximately <1.0 milligram per liter DO), and sufficient electron donor concentrations to support dechlorination.

Injections of KB-1® will be performed according to SiREM's recommended injection procedures. Injection tubing will be placed in the injection point to the desired injection depth and will be purged with argon or nitrogen gas to displace oxygen from the well column and maintain an inert gas blanket in the well above the water table. A 5-minute purge is recommended by SiREM. KB-1® will then be injected into the injection point using compressed gas. Compressed gas will be used to pressurize the KB-1® vessel (typical maximum pressure required is up to 30 pounds per square inch for injection depths up to 30 feet bgs) and will push the KB-1® culture into the injection tubing and into the injection point at the desired depth interval. Each KB-1® culture injection will be approximately 1 liter.

Following injections of the KB-1® microbes, flushing will be performed using the approximately remaining 5 percent of the substrate diluted with anaerobic water using approximately 500 to 1,000 gallons at each location. Prior to KB-1® injections, anaerobic water will be prepared on site in 21,000-gallon poly tank. The tank will be filled with hydrant water that will be mixed with native soil and substrate. This mixture will remain in the holding tank until reducing/anaerobic conditions are achieved, based on measurements of ORP and DO. Once reducing conditions are detected, the KB-1® mixture will be injected into the injection points, followed by the anaerobic substrate mixture using the injection process described earlier. This flushing technique will help disperse the microbial culture away from the well and farther into the formation.

3.2 Areas Lot 1-5 and MW-25

3.2.1 Substrate Injection

Area Lot 1-5

An EOS solution will be injected in Area Lot 1-5 at approximately 42 locations along seven rows of injection locations, forming a reactive zone. The EOS 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. Dilution with water (at a ratio of approximately 10 parts water to one part EOS) will be performed on site.

The injection points will be advanced in a line perpendicular to the direction of groundwater flow to distribute the carbon substrate in a transect across a portion of the area. Orientation of the injection locations in this manner should create a treatment zone through which affected groundwater will pass as it migrates, allowing organic carbon to migrate downgradient from the transect and extend the treatment zone.

The injection points will be spaced 15 feet apart based on the 15-foot ROI observed during the original pilot test. The seven treatment zones will be spaced approximately 40 feet apart. Approximately 1,000 gallons of the EOS solution will be injected at each location. The solution will be injected at an interval from approximately 10 feet to approximately 34 feet bgs (Table 1). Injection procedures will be performed in accordance with the Pilot Study Work Plan and the First Work Plan Addendum.

Area MW-25

A pilot-scale injection of 3D-Microemulsion will take place in the Upper Horizon (Figure 4) and Lower Horizon (Figure 5) of Area MW-25. However, the delivery method in the Upper Horizon will differ from the injection methods previously used at the Site. For this pilot test, the substrate will be delivered to the subsurface using temporary injection wells. Temporary injection wells were selected to account for the large size of the treatment area. The use of temporary injection wells will allow for a larger spacing between injection locations and, if needed, will allow for additional injection of the substrate. Based on the dimensions of the area and the estimated groundwater velocity, multiple injections may be necessary to maintain reducing conditions within this area.

Approximately 60 injection wells will be installed in the Upper Horizon across Area MW-25 and the adjacent University of California (UC) Berkeley Field Station property (Figure 4). Field activities conducted within the UC Berkeley property boundary will be conducted under an access agreement with UC Berkeley. The injection wells will be installed along lines perpendicular to the direction of groundwater flow to distribute the carbon substrate along a treatment zone through which affected groundwater will pass

as it migrates, allowing organic carbon to migrate downgradient from the transect and broaden the lateral extent of the treatment zone.

Temporary injection wells will be installed using 8-inch hollow-stem or light-flight auger drilling equipment as described in the Pilot Study Work Plan. The temporary injection wells will be installed by a California-licensed drilling contractor under the direct supervision of an LFR California Professional Geologist. Each injection well will be installed to a total depth of approximately 22 feet bgs. Injection wells will be completed using 2-inch-diameter Schedule 40 polyvinyl chloride (PVC) pipe with a screened interval extending from the total depth of the well to approximately 12 feet bgs. Sand will be placed in the annular space of the boring to a depth of approximately 1 foot above the screened interval. Bentonite and cement seals will be installed above the sand pack. The injection well construction details are included in Table 1.

The injection wells will be spaced 15 feet apart based on the 15-foot ROI observed during the original pilot test. A total of five treatment zones, approximately 65 feet apart, will be established in this area. Approximately 1,000 gallons of EOS solution will be injected at each location. The solution will be injected at an interval from 12 feet to 22 feet bgs (Table 1).

In the Lower Horizon, 3D-Microemulsion will be injected at 12 locations on a 15-foot grid spacing, using Geoprobe injection points in accordance with the Pilot Study Work Plan and First Work Plan Addendum. Approximately 1,000 gallons of the diluted mixture will be injected at each location. The solution will be injected at an interval from 23 feet to 34 feet bgs (Table 1).

4.0 PERFORMANCE MONITORING

4.1 Performance Monitoring Network

Area Lot 1-2

Performance monitoring in Area Lot 1-2 will be performed at the six existing monitoring wells and a newly installed monitoring well (Figure 2) to assess the performance of the pilot study.

A new groundwater monitoring well (MW-33) will be installed downgradient from Area Lot 1-2 at the approximate location illustrated in Figure 2. Well MW-33 will be used to monitor performance criteria downgradient from Area Lot 1-2. The monitoring well construction details are provided in Table 2. The monitoring well will be installed using the hollow-stem auger (HSA) procedures described in the Lots 1 and 2 FSAP.

Area Lot 1-5

Performance monitoring in Area Lot 1-5 will be completed using three previously constructed temporary monitoring wells and four additional temporary groundwater monitoring well pairs (Figure 3). The temporary monitoring well construction details are provided in Table 2. The temporary monitoring wells will be installed using HSA technology in accordance with the procedures described in the Pilot Study Work Plan.

Area MW-25

Groundwater monitoring well MW-25 will be re-installed at the approximate location illustrated on Figure 4 in accordance with the HSA procedures described in the Lots 1 and 2 FSAP. Six additional temporary monitoring wells will be installed in the Upper Horizon, and one additional temporary monitoring well will be installed in the Lower Horizon. The temporary monitoring wells will be installed using HSA technology in accordance with the procedures described in the Pilot Study Work Plan. In addition, two piezometers (PZ-11 and PZ-12) will be installed on the UC Berkeley property, south and west of the MW-25 injection area (Figure 4). The piezometers will be installed in the Upper Horizon, approximately 20 feet from the temporary injection wells at the MW-25 area. The purpose of the piezometers will be to provide additional groundwater elevation data in the vicinity of the MW-25 area and to monitor VOC concentrations in groundwater near the buildings located west of the MW-25 area.

4.2 Performance Monitoring Duration

Performance monitoring will be performed at the existing monitoring wells and newly installed monitoring wells, as described in the Pilot Study Work Plan, to assess the performance of the pilot study. 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 at 21 wells and two piezometers. The groundwater monitoring wells and piezometers to be monitored include:

- Lot 1-2 Area: Previously existing temporary groundwater monitoring wells IMW-1, IMW-2, IMW-3, IMW-4, and MW-30; new groundwater monitoring well MW-33.
- MW-25 Area: Six new Upper Horizon temporary monitoring wells (Figure 4); one new Lower Horizon temporary monitoring well (Figure 5); replacement groundwater monitoring well MW-25R; piezometers PZ-11 and PZ-12 (Figure 4).
- Lot 1-5 Area: Previously existing temporary monitoring wells IMW-15, IMW-16, and IMW-17; two new Upper Horizon temporary groundwater monitoring wells; two new Lower Horizon temporary groundwater monitoring wells.

4.3 Performance Monitoring Parameters

Prior to substrate injection, the static groundwater elevations, baseline groundwater parameters, and VOC concentrations in the existing surrounding groundwater monitoring wells and temporary monitoring wells 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:

- Metals using U.S. Environmental Protection Agency (EPA) Method 6010
- total organic carbon using EPA Method 415.1
- VOCs using EPA Method 8260
- sulfate using EPA Method 300.0
- sulfide using EPA Method 376.2
- nitrate and nitrite using EPA Method 353.2
- methane, ethene, and ethane using RSK 175
- total and dissolved iron using EPA Method 6010A
- *Dehalococcoides* and functional gene (Area Lot 1-2 only)

Baseline groundwater monitoring will be conducted within approximately two to three weeks prior to the planned injection event at each area.

5.0 REPORTING

A Pilot Study Summary Report Addendum will be prepared following one year of performance monitoring. This report will include a summary of the additional pilot-scale injections and associated field and laboratory data in tabular format. This report will also include the groundwater monitoring results and a discussion of the relative changes in VOC concentrations resulting from the additional treatment described in this Revised Second Work Plan Addendum. The document will also illustrate the monitoring network, the performance monitoring analytical data (including baseline data), and the soil types at the treatment areas.

6.0 REFERENCES

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
Injection and Characterization Specifications
Pilot Study Areas, 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)
Lot 1-2	TCE, cis-1,2-DCE, VC	ERD using Cheese Whey	ERD using HRC Advanced, coupled with Bioaugmentation	Point Injections (curtain wall)	1,000	22	10 - 20	60	20
Lot 1-5 Shallow and Deep Zones	PCE, TCE	NA	ERD using EOS	Point Injections (curtain wall)	1,000	42	10 - 34	40	15
MW-25 Shallow Zone	PCE, TCE	NA	ERD using HRC Advanced	Temporary Injection Wells (curtain wall)	1,000	60	12 - 22	65	15
MW-25 Deep Zone	PCE, TCE	NA	ERD using HRC Advanced	Point Injections (grid pattern)	1,000	12	23 - 34	NA	15

Notes:

bgs:	Below ground surface
cis-1,2-DCE:	cis-1,2-dichloroethene
EOS:	Edible Oil Substrate
ERD:	Enhanced reductive dechlorination
HRC:	Hydrogen Release Compound
NA:	Not applicable
PCE:	Tetrachloroethene
TCE:	Trichloroethene
VC:	Vinyl chloride

Table 2
Proposed Temporary Monitoring Well, Monitoring Well and Piezometer Construction Details
Pilot Study Areas, Lot 1
Campus Bay, Richmond, California

Area	Number of Wells/Piezometers	Well/Piezometer Name(s)	Approximate Total Depth (feet bgs)	Casing Diameter (inches)	Approximate Screen Interval (feet bgs)	Borehole Diameter (inches)	Surface Mount
Temporary Monitoring Wells							
Lot 1-5 Upper Horizon	2	TBD	20.0	1.0 PVC	10.0 - 20.0	4.0	Flush
Lot 1-5 Lower Horizon	2	TBD	36.0	1.0 PVC	21.0-36.0	4.0	Flush
MW-25 Upper Horizon	6	TBD	22.0	1.0 PVC	12.0 - 22.0	4.0	Flush
MW-25 Lower Horizon	1	TBD	34.0	1.0 PVC	23.0 - 34.0	4.0	Flush
Monitoring Wells							
MW-25 Upper Horizon	1	MW-25R	23.0	2.0 PVC	10.0 - 23.0	8.0	Flush
Lot 1-2	1	MW-33	20.0	2.0 PVC	10.0 - 20.0	8.0	Flush
Piezometers							
MW-25 Upper Horizon	1	PZ-11	20	2.0 PVC	10.0 - 20.0	8.0	Flush
MW-25 Upper Horizon	1	PZ-12	20	2.0 PVC	10.0 - 20.0	8.0	Flush

Notes:
bgs = Below ground surface
PVC = Polyvinyl chloride
TBD = To be determined
MW-25R construction details based on original monitoring well construction details

SOURCE: THOMAS BROS MAP - Bay Area 2001

Approximate Campus Bay Property Boundary

Approximate HEA Boundary

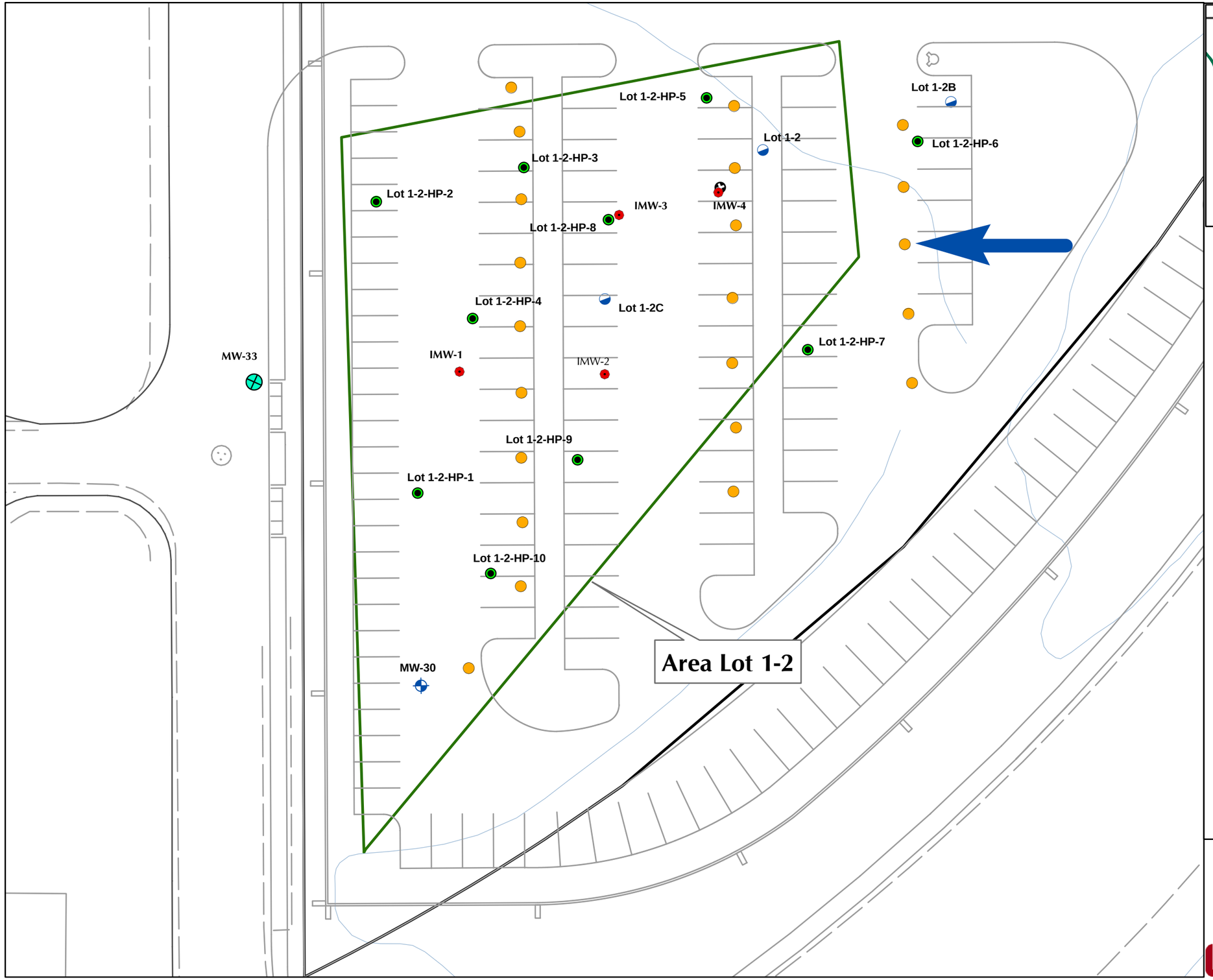
Site Vicinity Map

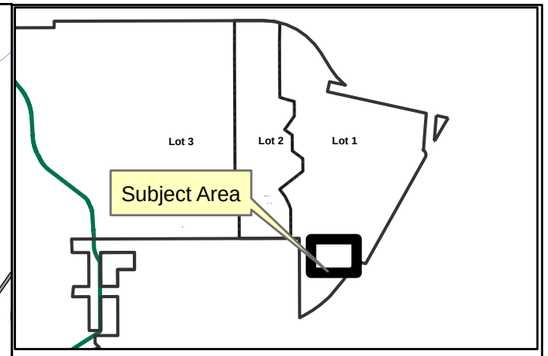
Campus Bay, Richmond, California

LFR

Figure 1

DESIGN\001\09358\Campus Bay Site Vicinity Map.CDR 120203





LEGEND

- MW-33 — Proposed monitoring well
- Injection points
- Lot 1-1 — Location of previous soil boring w/ grab groundwater sample
- MW-1 — Location of Existing Monitoring Well
- IMW-1 — Existing Monitoring Well Installed for Pilot Study
- Lot-1-2-HP-1 — Previous HydroPunch Locations
- Pilot Study Areas
- Estimated groundwater flow direction. Data obtained from quarterly groundwater and surface-water monitoring report dated 4/30/2009.

N

30 0 30 Feet

Lot 1-2 Area
Proposed Point Injections

Campus Bay, Richmond, California

LFR

Figure 2

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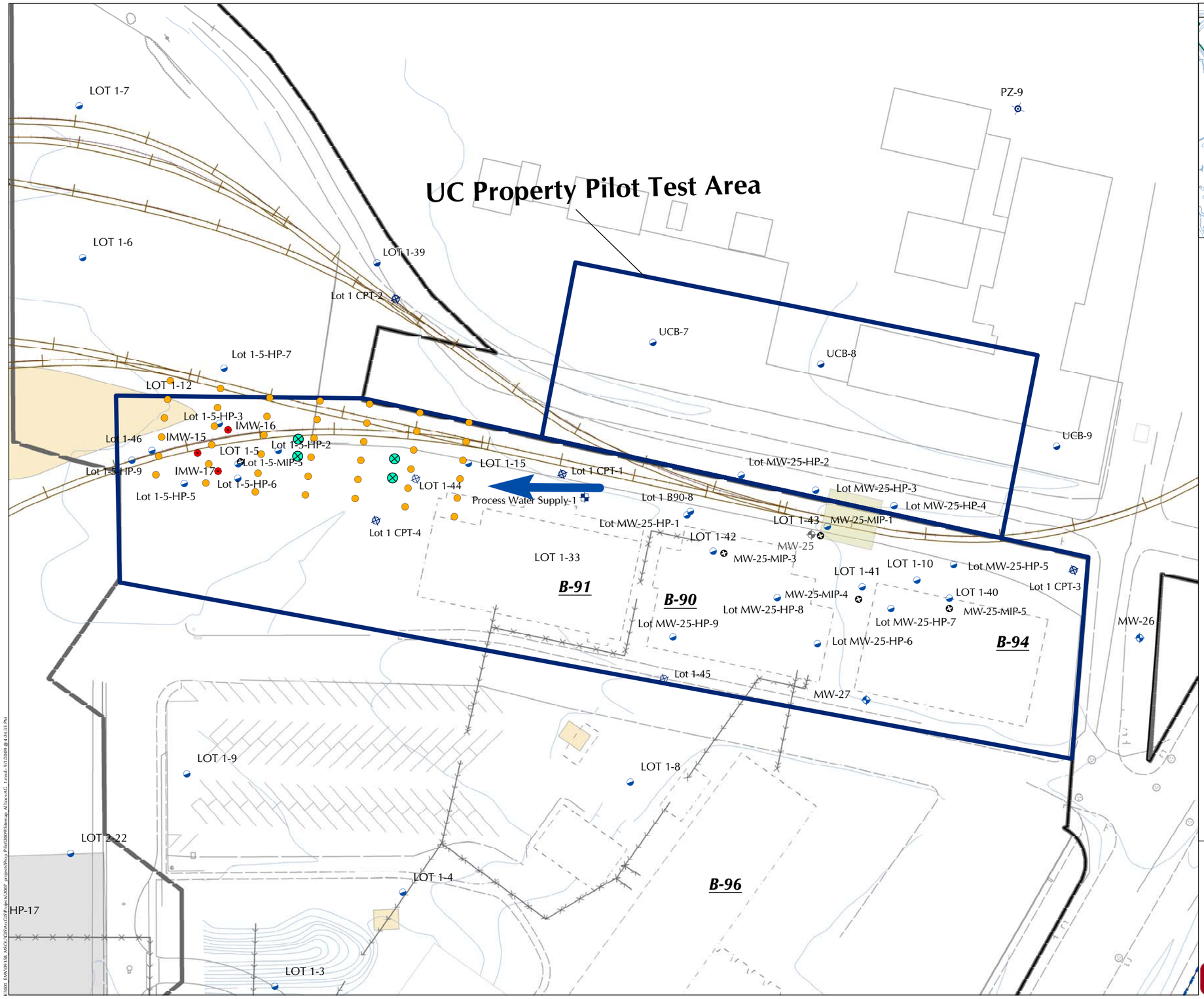

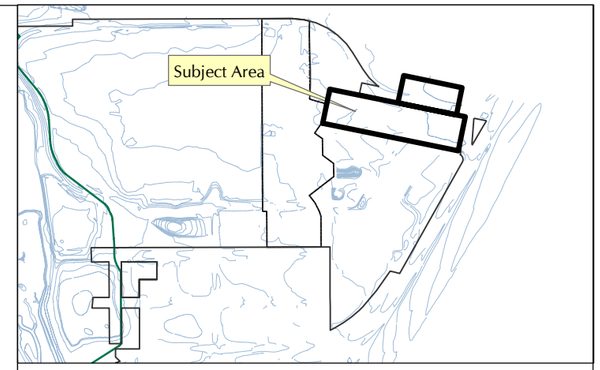

LEGEND

- Approximate location of existing CPT
- Approximate location of existing MIP
- Proposed injection points
- Proposed temporary monitoring well
- 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 — Existing monitoring well installed for pilot study
- Railroad spurs removed
- Lot boundary
- Previous arsenic excavation
- Previous excavation area
- Property boundary
- B-96 — Former building
- Road
- Freeway
- Cinder excavation area
- 2-ft contour interval
- Estimated groundwater flow direction. Data obtained from quarterly groundwater and surface-water monitoring report dated 4/30/2009.

N

40 0 40 80 Feet

Lot 1-5 Area
Proposed Point Injections

Campus Bay, Richmond, California

LFR

Figure 3

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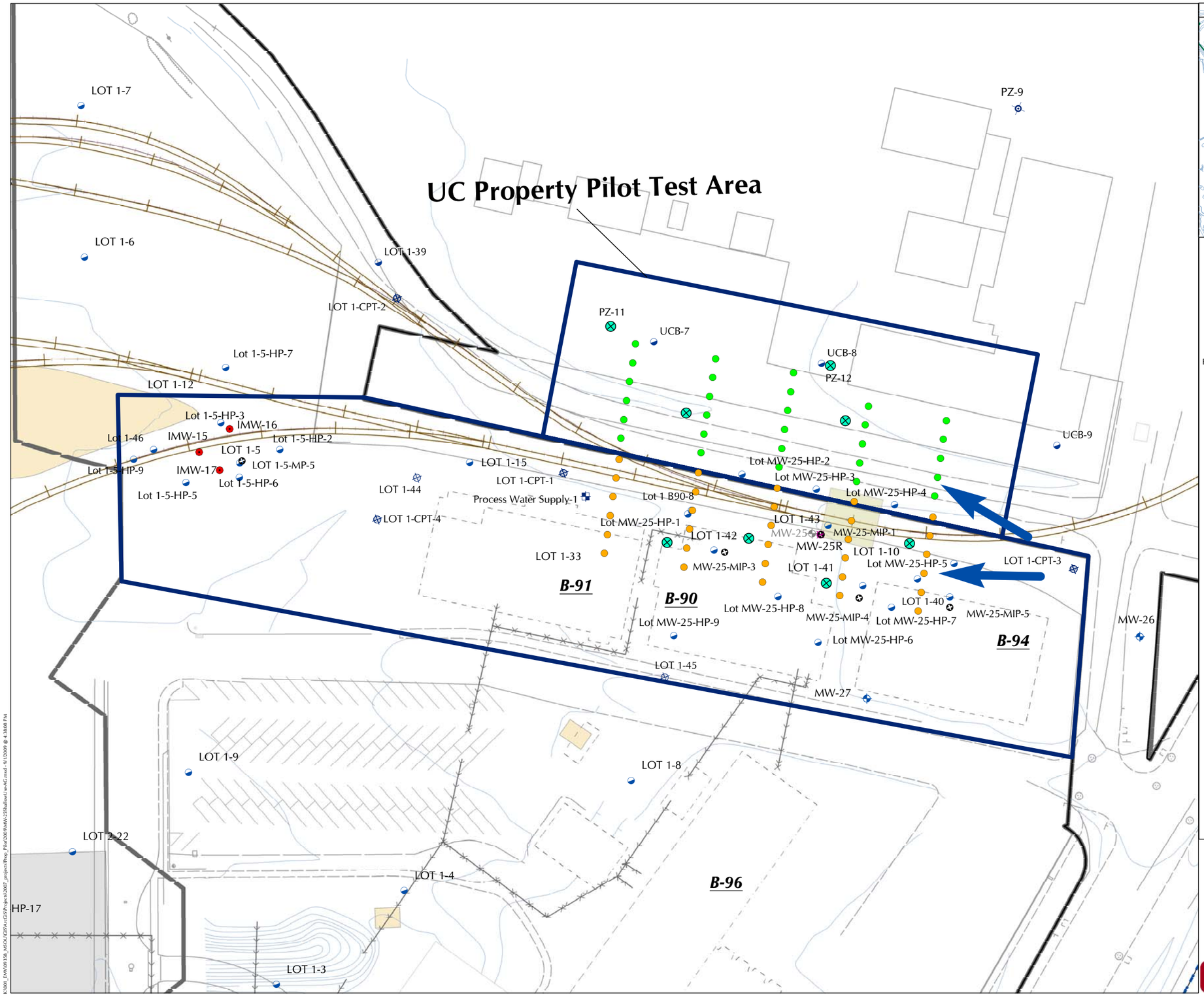

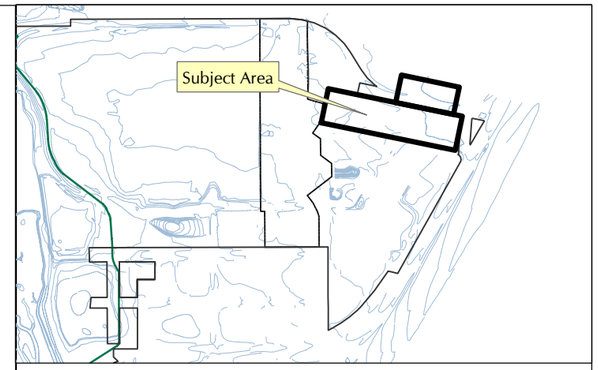

LEGEND

- Approximate location of existing CPT
- Approximate location of existing MIP
- Proposed temporary monitoring well/Piezometer
- MW-25R: Proposed location of replacement monitoring well for MW-25
- Process Water Supply-1: Proposed UC injection points
- Proposed injection points
- P-1 s/d: Approximate location of existing piezometer (shallow and deep)
- 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: Existing monitoring well installed for pilot study
- Railroad spurs removed
- Lot boundary
- Previous arsenic excavation
- Previous excavation area
- Property boundary
- B-96: Former building
- Road
- Freeway
- Cinder excavation area
- 2-ft contour interval
- Estimated groundwater flow direction. Data obtained from quarterly groundwater and surface-water monitoring report dated 4/30/2009.

N

40 0 40 80 Feet

MW-25 Area
Shallow-Zone
Proposed Injection Wells

Campus Bay, Richmond, California

LFR

Figure 4

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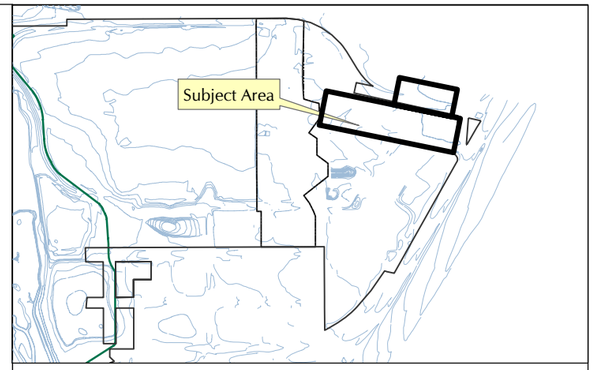
UC Property Pilot Test Area



LOT 1-7
LOT 1-6
LOT 1-39
LOT 1-CPT-2
PZ-9
UCB-7
UCB-8
UCB-9
Lot 1-5-HP-7
LOT 1-12
Lot 1-5-HP-3
IMW-16
Lot 1-46
IMW-15
Lot 1-5-HP-2
LOT 1-5
Lot 1-5-MIP-5
Lot 1-5-HP-9
IMW-17
Lot 1-5-HP-6
Lot 1-5-HP-5
LOT 1-44
LOT 1-15
LOT 1-CPT-1
Process Water Supply-1
Lot 1 B90-8
Lot MW-25-HP-1
LOT 1-CPT-4
LOT 1-42
MW-25
MW-25-MIP-1
MW-25-MIP-3
LOT 1-43
Lot MW-25-HP-2
Lot MW-25-HP-3
Lot MW-25-HP-4
LOT 1-10
Lot MW-25-HP-5
LOT 1-41
LOT 1-CPT-3
MW-25-MIP-4
LOT 1-40
Lot MW-25-HP-8
Lot MW-25-HP-7
MW-25-MIP-5
Lot MW-25-HP-9
Lot MW-25-HP-6
MW-26
B-91
B-90
B-94
LOT 1-45
MW-27
LOT 1-9
LOT 1-8
LOT 2-22
LOT 1-4
B-96
HP-17
LOT 1-3

LEGEND

- Approximate location of existing CPT
- Approximate location of existing MIP
- Proposed temporary monitoring well
- Proposed UC injection points
- Proposed injection points
- 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 — Existing monitoring well installed for pilot study
- Railroad spurs removed
- Lot boundary
- Previous arsenic excavation
- Previous excavation area
- Property boundary
- B-96 — Former building
- Road
- Freeway
- Cinder excavation area
- 2-ft contour interval
- Estimated groundwater flow direction. Data obtained from quarterly groundwater and surface-water monitoring report dated 4/30/2009.

N

40 0 40 80 Feet

MW-25 Area
Deep-Zone
Proposed Point Injections

Campus Bay, Richmond, California

LFR

Figure 5

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APPENDIX A

Referenced Components of LFR's "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

Table 1
Groundwater Volatile Organic Compound Analytical Results and General Performance Parameters
Lot 1-2 (Cheese Whey Injections), Campus Bay
Richmond, California

Concentrations in micrograms per liter (µg/l)

Sample ID	Sample Date	PCE	TCE	cis-1,2-Dichloroethene	Vinyl Chloride	1,1-DCA	1,2-DCA	Chlorobenzene	MEK	Acetone	TOC	Total Iron	Dissolved Iron	Nitrate	Nitrite	Sulfate	Sulfide	BOD	Toluene	Methane	Ethane	Ethene
IMW-1	09/29/2006	<0.5	150	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	1,900	180	<100	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
IMW-1	10/19/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5,600	<50	140,000	<40	<6,000	NA	<5	<5	<5
IMW-1	01/04/2007	<20	54	60	<20	<20	<20	<20	7,500	1,500	2,100,000	14,000	7,200	<50	<250	37,000	<40	8,000,000	<20	522	<1	<1
IMW-1-DUP	01/04/2007	<7.1	52	56	<7.1	<7.1	<7.1	<7.1	7,400	970J	NA	NA	NA	NA	NA	NA	NA	NA	<7.1	NA	NA	NA
IMW-1	03/01/2007	<0.5	<0.5	51	0.6	<0.5	<0.5	<0.5	NA	NA	1,000,000	10,000	12,000	<100	<100	2,400	<40	1,700,000	0.7	26,000	0.12	0.15
IMW-1	04/27/2007	<31	<31	65	<31	<31	<31	<31	230J	160J	43,000	12,000	570	<50	<50	<500	<40	89,000	4,300	14,000	<0.025	<0.025
IMW-1	08/07/2007	<1.3	0.6J	57	0.6J	<1.3	<1.3	0.2J	0.5J	1.2J	8,100	11,000	12,000	<50	<50	<500	<40	29,000	200	14,000	0.035	0.22
IMW-2	09/29/2006	<1	170	<1	<1	<1	<1	<1	<20	<20	2,400	<100	<100	NA	NA	NA	NA	NA	<1	NA	NA	NA
IMW-2	10/19/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4,800	<50	140,000	<40	<6,000	NA	<5	<5	<5
IMW-2	01/03/2007	<6.3	130	59	<6.3	<6.3	<6.3	<6.3	3,700	950	4,200,000	12,000	11,000	<500	<500	26,000	140	7,900,000	<6.3	740	<1	<1
IMW-2	03/01/2007	<6.3	20	77	<6.3	<6.3	<6.3	<6.3	NA	NA	2,000,000	15,000	16,000	<100	<100	11,000	<40	6,800,000	770	28,000	0.15	0.1
IMW-2	04/27/2007	<5	3.9J	110	1.1J	<5	<5	<5	1,200	280	310,000	8,400	170	<50	<50	3,100	<40	760,000	540	14,000	<0.025	<0.025
IMW-2	08/07/2007	<10	<10	77	<10	<10	<10	<10	49J	13J	14,000	8,800	8,200	<50	<50	2,200	<40	91,000	9,000	12,000	0.039	0.16
IMW-3	09/29/2006	<0.5	130	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	2,100	580	<100	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
IMW-3	10/19/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4,900	<50	130,000	<40	<6,000	NA	<5	<5	<5
IMW-3	01/03/2007	<5	93	24	<5	<5	<5	<5	5,000	1,300	5,500,000	25,000	22,000	<500	<500	35,000	150	10,000,000	<5	110	<1	<1
IMW-3	02/28/2007	<5	17	82	<5	<5	<5	<5	NA	NA	2,600,000	NA	12,000	<100	<100	11,000	<40	3,700,000	12	27,000	<0.025	0.1
IMW-3	04/27/2007	<71	27J	91	<71	<71	<71	<71	95J	170J	66,000	20,000	2,400	<50	<50	2,100	70	240,000	7,400	14,000	<0.025	<0.025
IMW-3	08/07/2007	<10	<71	60	<10	<10	<10	<10	16J	11J	12,000	20,000	22,000	<50	<50	<500	<40	15,000	1,600	12,000	0.021J	0.12
IMW-3-DUP	08/07/2007	<10	<10	74	<10	<10	1.6J	<10	23J	23J	12,000	20,000	25,000	<50	<50	<500	40	18,000	1,900	11,000	0.02J	0.061
IMW-4	09/29/2006	<1	160	<1	<1	<1	<1	<1	<20	<20	2,200	300	170	NA	NA	NA	NA	NA	<1	NA	NA	NA
IMW-4	10/19/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4,700	<50	130,000	<40	<6,000	NA	<5	<5	<5
IMW-4	01/03/2007	<10	99	22	<10	<10	<10	<10	3,000	3,100	6,400,000	9,400	1,500	<500	<500	97,000	<40	14,000,000	<10	479	<1	<1
IMW-4	02/28/2007	<5	40	91	<5	<5	<5	<5	NA	NA	2,200,000	NA	29,000	<100	<100	1,600	<40	3,700,000	4.7J	11,000	0.048	0.13
IMW-4	04/27/2007	<10	<10	85	<10	<10	<10	<10	12J	14J	19,000	19,000	270	<50	<50	5,800	<40	15,000	1,200	12,000	<0.025	<0.025
IMW-4	08/07/2007	<3.6	1J	87	1J	<3.6	1J	<3.6	0.9J	<71	7,300	18,000	21,000	<50	<50	3,700	120	6,300	490	14,000	0.016J	0.067
MW-30	04/18/2006	<0.5	40	<0.5	<0.5	0.4J	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	200,000	<40	NA	<0.5	NA	NA	NA
MW-30	05/08/2006	<0.5	52	<0.5	<0.5	0.7	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-30	08/14/2006	<0.5	33	<0.5	<0.5	0.5J	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-30	09/28/2006	<0.5	50	<0.5	<0.5	0.8	<0.5	<0.5	<10	<10	2,000	NA	<690	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-30	10/19/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4,800	<50	170,000	<40	<6,000	NA	<5	<5	<5
MW-30	11/06/2006	<4.2	30	<4.2	<4.2	<4.2	<4.2	<4.2	<83	87	NA	NA	NA	NA	NA	NA	NA	NA	<4.2	NA	NA	NA
MW-30	01/04/2007	<5	24	<5	<5	<5	<5	<5	2,400	1,400	2,000,000	43,000	37,000	<50	<100	6,800	1,200	4,200,000	130	533	<1	<1
MW-30	03/01/2007	<0.5	<0.5	4.6	0.5J	<0.5	<0.5	<0.5	NA	NA	660,000	35,000	38,000	<100	<100	4,800	<40	1,300,000	11,000J	16,000	0.09	0.12
MW-30	04/27/2007	<31	<31	<31	<31	<31	<31	<31	750	310J	580,000	36,000	<100	630	<50	13,000	<40	1,100,000	5,600	9,600	<0.025	0.099
MW-30	08/07/2007	<20	9.4J	5.7J	<20	<20	<20	<20	170J	110J	82,000	20,000	28,000	120	<50	58,000	<40J	110,000	3,200	15,000	0.008J	1.5
MW-30-DUP	08/07/2007	<25	<25	<25	<25	<25	<25	<25	<500	<500	NA	NA	25,000	NA	NA	NA	<40J	NA	3,000	NA	NA	NA
Lot1-2-GW	03/24/2006	<0.5	160	0.8	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot-1-2A-GW	04/28/2006	<0.5	21	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA

Table 1
Groundwater Volatile Organic Compound Analytical Results and General Performance Parameters
Lot 1-2 (Cheese Whey Injections), Campus Bay
Richmond, California

Concentrations in micrograms per liter (µg/l)

Sample ID	Sample Date	PCE	TCE	cis-1,2-Dichloroethene	Vinyl Chloride	1,1-DCA	1,2-DCA	Chlorobenzene	MEK	Acetone	TOC	Total Iron	Dissolved Iron	Nitrate	Nitrite	Sulfate	Sulfide	BOD	Toluene	Methane	Ethane	Ethene
Lot-1-2B-GW	04/28/2006	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot-1-2C-GW	04/28/2006	<0.5	85	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot-1-2-HP-1	08/29/2006	<0.5	4.4	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot 1-2-HP-2	08/30/2006	<0.5	3.6	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot 1-2-HP-3	08/30/2006	<0.5	39	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot-1-2-HP-4	08/29/2006	<1	110	<1	<1	<1	<1	<1	<20	<20	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	NA	NA
Lot-1-2-HP-5	08/29/2006	<0.5	6.2	1.7	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot 1-2-HP-6	08/30/2006	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.6J	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot-1-2-HP-7	08/29/2006	<0.5	62	<0.5	<0.5	0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot-1-2-HP-8	08/29/2006	<1	140	<1	<1	<1	<1	<1	<20	<20	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	NA	NA
Lot-1-2-HP-9	08/29/2006	<1	120	<1	<1	<1	<1	<1	<20	<20	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	NA	NA
Lot 1-2-HP-10	08/30/2006	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA

Notes:

1,1-DCA = 1,1-Dichloroethane
1,2-DCA = 1,2-Dichloroethane
MEK = Methyl ethyl ketone
TOC = Total Organic Carbon
BOD =Biochemical Oxygen Demand
PCE = tetrachloroethene
TCE = trichloroethene
NA = Not Analyzed
J = Laboratory Estimated Value
DUP = Duplicate
< = Values represent concentrations below the laboratory reporting limit.
Volatile Organic Compounds analyzed using EPA method 8260.

Table 3
Groundwater Volatile Organic Compound Analytical Results and General Performance Parameters
Lot 1-5 , Campus Bay
Richmond, California

Concentrations in micrograms per liter (µg/l)

Sample ID	Sample Date	PCE	TCE	cis-1,2-Dichloroethene	Vinyl Chloride	1,1-DCA	1,2-DCA	Chlorobenzene	MEK	Acetone	TOC	Total Iron	Dissolved Iron	Nitrate	Nitrite	Sulfate	Sulfide	BOD	Toluene	Methane	Ethane	Ethene
IMW-15	09/28/2006	<7.1	1,300	24	<7.1	<7.1	<7.1	<7.1	<140	<140	1,600	<100	<100	3,400	<50	1,500,000	<40	NA	<7.1	<5	<5	<5
IMW-16	09/28/2006	<5	980	8.7	<5	<5	<5	<5	<100	<100	1,200	<100	<100	4,200	<50	1,500,000	<40	NA	<5	<5	<5	<5
IMW-17	09/28/2006	<6.3	1,100	20	<6.3	<6.3	<6.3	<6.3	<130	<130	1,800	<100	<100	3,500	<50	940,000	<40	NA	<6.3	5	<5	<5
IMW-17-DUP	09/28/2006	<5	1,200	21	<5	<5	<5	<5	<100	<100	1,800	<100	<100	3,400	<50	920,000	<40	NA	<5	6	<5	<5
Lot-1-5-GW	03/22/2006	<3.1	370	18	<3.1	<3.1	<3.1	<3.1	<63	<63	NA	NA	NA	NA	NA	NA	NA	NA	<3.1	NA	NA	NA
Lot 1-5-HP-2	09/01/2006	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
Lot 1-5-HP-3	09/01/2006	<1	380	6	<1	<1	<1	<1	<20	<20	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	NA	NA
Lot 1-5-HP-5	09/01/2006	<0.7	160	14	<0.7	<0.7	<0.7	<0.7	<14	<14	NA	NA	NA	NA	NA	NA	NA	NA	<0.7	NA	NA	NA
Lot 1-5-HP-6	09/01/2006	<0.7	390	6	<0.7	<0.7	1.2	<0.7	<14	<14	NA	NA	NA	NA	NA	NA	NA	NA	<0.7	NA	NA	NA
Lot-1-5-HP-7	10/16/2006	<7.1	920	5.5J	<7.1	<7.1	<7.1	<7.1	<140	<140	NA	NA	NA	NA	NA	NA	NA	NA	<7.1	NA	NA	NA
Lot-1-5-HP-9	10/16/2006	<10	1,400	32	<10	<10	<10	<10	<200	<200	NA	NA	NA	NA	NA	NA	NA	NA	<10	NA	NA	NA

Notes:

1,1-DCA = 1,1-Dichloroethane
1,2-DCA = 1,2-Dichloroethane
MEK = Methyl ethyl ketone
TOC = Total Organic Carbon
BOD =Biochemical Oxygen Demand
PCE = tetrachloroethene
TCE = trichloroethene
NA = Not Analyzed
J = Laboratory Estimated Value
DUP = Duplicate
< = Values represent concentrations below the laboratory reporting limit.
Volatile Organic Compounds analyzed using EPA method 8260.

Table 4
Groundwater Volatile Organic Compound Analytical Results and General Performance Parameters
MW-25 , Campus Bay
Richmond, California

Concentrations in micrograms per liter (µg/l)

Sample ID	Sample Date	PCE	TCE	cis-1,2-Dichloroethene	Vinyl Chloride	1,1-DCA	1,2-DCA	Chlorobenzene	MEK	Acetone	TOC	Total Iron	Dissolved Iron	Nitrate	Nitrite	Sulfate	Sulfide	BOD	Toluene	Methane	Ethane	Ethene
Lot1-10-GW	03/24/2006	11	840	7.8	<6.3	<6.3	<6.3	<6.3	<130	<130	NA	NA	NA	NA	NA	NA	NA	NA	<6.3	NA	NA	NA
Lot-1-B90-8-GW	04/21/2006	14	110	7.6	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-25	12/16/2005	99	2,400	16J	<17	<17	<17	<17	<330	<330	NA	NA	NA	NA	NA	NA	NA	NA	<17	NA	NA	NA
MW-25	02/08/2006	160	1,800	24	<6.3	<6.3	<6.3	<6.3	<130	<130	NA	NA	NA	NA	NA	NA	NA	NA	<6.3	NA	NA	NA
MW-25	05/09/2006	200	1,100	36	<6.3	<6.3	<6.3	<6.3	<130	<130	NA	NA	NA	NA	NA	NA	NA	NA	<6.3	NA	NA	NA
MW-25	08/15/2006	100	990	13	<7.1	<7.1	<7.1	<7.1	<140	<140	NA	NA	NA	NA	NA	NA	NA	NA	<7.1	NA	NA	NA
MW-25	11/07/2006	76	1,300	11	<7.1	<7.1	<7.1	<7.1	<140	<140	NA	NA	NA	NA	NA	NA	NA	NA	<7.1	NA	NA	NA
MW-25	02/12/2007	61	1,700	9.4	<7.1	<7.1	<7.1	<7.1	<140	<140	NA	NA	NA	NA	NA	NA	NA	NA	<7.1	NA	NA	NA
MW-25-DUP	02/12/2007	60	1,900	11J	<13	<13	<13	<13	<250	<250	NA	NA	NA	NA	NA	NA	NA	NA	<13	NA	NA	NA
MW-25	05/08/2007	70	1,800	6.6J	<10	<10	<10	<10	<200	<200	NA	NA	NA	NA	NA	NA	NA	NA	<10	NA	NA	NA
MW-25-DUP	05/08/2007	74	1,900	7J	<13	<13	<13	<13	<250	<250	NA	NA	NA	NA	NA	NA	NA	NA	<13	NA	NA	NA
MW-26	12/16/2005	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-26	02/08/2006	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-26	05/09/2006	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-26	08/15/2006	0.4J	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-26	11/07/2006	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-26	02/12/2007	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-26	05/07/2007	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-27	12/16/2005	<8.3	970	4.2J	<8.3	<8.3	<8.3	<8.3	<170	<170	NA	NA	NA	NA	NA	NA	NA	NA	<8.3	NA	NA	NA
MW-27	02/08/2006	0.6J	130	1.8	<1	<1	<1	<1	<20	<20	NA	NA	NA	NA	NA	NA	NA	NA	<1	NA	NA	NA
MW-27	05/09/2006	<0.5	97	2	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-27	08/15/2006	0.7J	140	2	<0.7	<0.7	<0.7	<0.7	<14	<14	NA	NA	NA	NA	NA	NA	NA	NA	<0.7	NA	NA	NA
MW-27	11/07/2006	0.3J	94	1.9	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-27	02/12/2007	0.3J	68	1.6	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-27	05/08/2007	0.3J	78	1.2	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-25-HP-1	09/01/2006	<0.5	0.3J	<0.5	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-25-HP-2	09/01/2006	18	1,300	6.7	<4.2	<4.2	<4.2	<4.2	<83	<83	NA	NA	NA	NA	NA	NA	NA	NA	<4.2	NA	NA	NA
MW-25-HP-3	09/01/2006	6.8	570	4.4	<3.6	<3.6	<3.6	<3.6	<71	<71	NA	NA	NA	NA	NA	NA	NA	NA	<3.6	NA	NA	NA
MW-25-HP-4	09/01/2006	4.7	75	4.2	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-25-HP-5	09/01/2006	340	1,900	38	<17	<17	<17	<17	<330	<330	NA	NA	NA	NA	NA	NA	NA	NA	<17	NA	NA	NA
MW-25-HP-6	09/01/2006	17	95	8.2	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA
MW-25-HP-7	09/01/2006	130	1,400	12	<5	<5	<5	<5	<100	<100	NA	NA	NA	NA	NA	NA	NA	NA	<5	NA	NA	NA
MW-25-HP-8	09/01/2006	94	570	7.7	<2	<2	<2	<2	<40	<40	NA	NA	NA	NA	NA	NA	NA	NA	<2	NA	NA	NA
MW-25-HP-9	09/01/2006	12	68	2.1	<0.5	<0.5	<0.5	<0.5	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	<0.5	NA	NA	NA

Table 4
Groundwater Volatile Organic Compound Analytical Results and General Performance Parameters
MW-25 , Campus Bay
Richmond, California

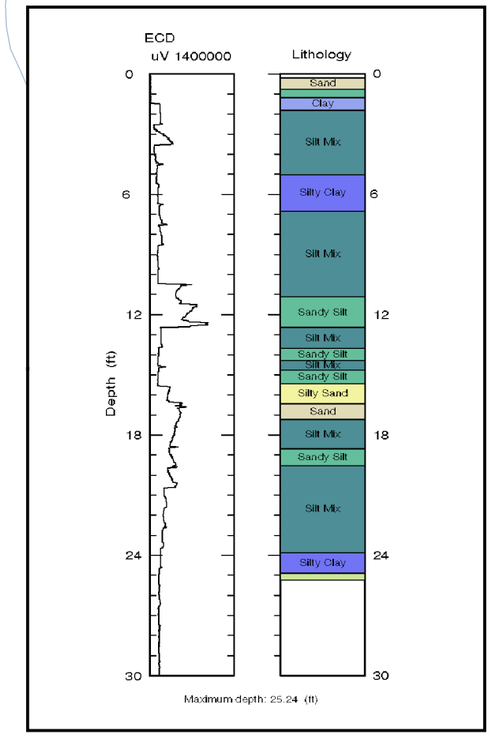
Concentrations in micrograms per liter (µg/l)

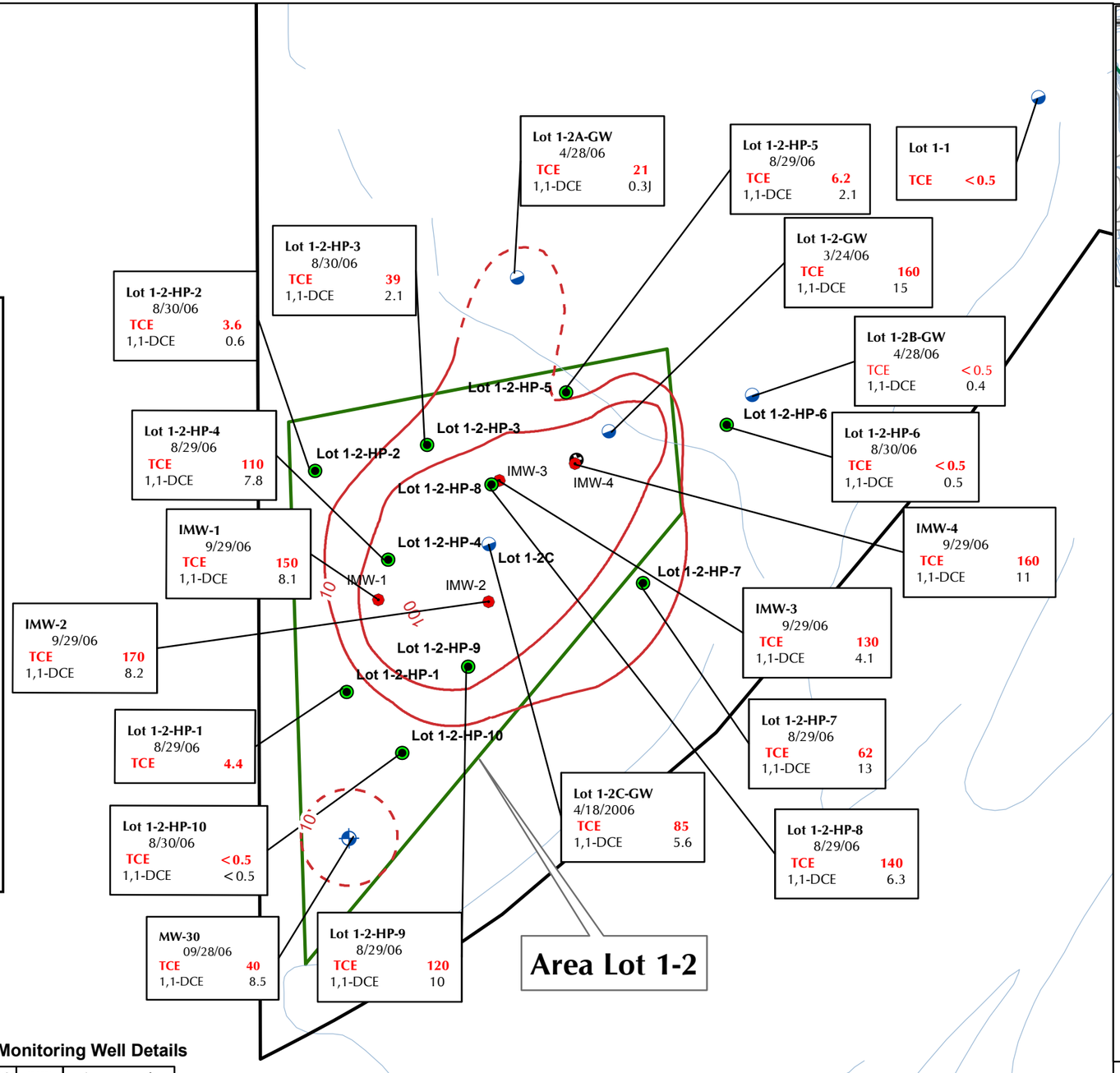
Sample ID	Sample Date	PCE	TCE	cis-1,2-Dichloroethene	Vinyl Chloride	1,1-DCA	1,2-DCA	Chlorobenzene	MEK	Acetone	TOC	Total Iron	Dissolved Iron	Nitrate	Nitrite	Sulfate	Sulfide	BOD	Toluene	Methane	Ethane	Ethene

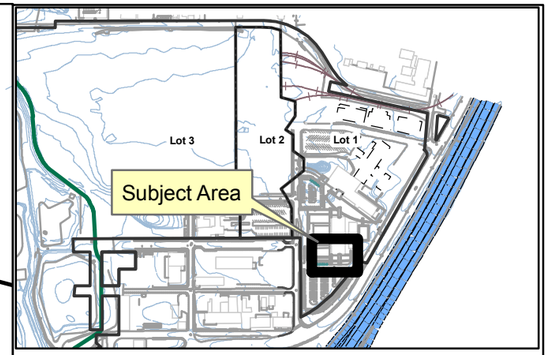
Notes:

1,1-DCA = 1,1-Dichloroethane
1,2-DCA = 1,2-Dichloroethane
MEK = Methyl ethyl ketone
TOC = Total Organic Carbon
BOD =Biochemical Oxygen Demand
PCE = tetrachloroethene
TCE = trichloroethene
NA = Not Analyzed
J = Laboratory Estimated Value
DUP = Duplicate
< = Values represent concentrations below the laboratory reporting limit.
Volatile Organic Compounds analyzed using EPA method 8260.

Lot 1-2 MIP/CPT 9/14/06







LEGEND

- Lot 1-11 — Location of soil boring
- Lot 1-1 — Location of soil boring w/ grab groundwater sample
- Lot 1 CPT-1 — Location of cone penetrometer test boring with groundwater sample(s)
- Process Water Supply-1 — Process Water Supply Well (not in use)
- MW-1 — Location of monitoring well
- P-1 s/d — Location of piezometer (shallow and deep)
- SGT-1 — Location of soil-gas point
- SG-1 — Location of soil-gas monitoring well
- IMW-1 — Temporary Monitoring Wells
- Lot-1-2-HP-1 — HydroPunch Locations
- MIP Locations
- VOC = Volatile Organic Compound
- TCE Concentrations (Dashed where inferred)
- Pilot Study Areas

Sample ID
Lot 1-2C
4/18/06
TCE 85
1,1-DCE 5.6
Analyte
Analytical Result in µg/l (micrograms per liter)

DCE = Dichloroethene
TCE = Trichloroethene
msl = Mean sea level
ft = Feet
bgs = Below ground surface

50 0 50 Feet

Lot 1-2 Hydropunch Details

Well No.	TD (ft bgs)	Sample Depth (ft bgs)
HP-1	12.0	10.0
HP-2	12.0	10.0
HP-3	12.0	10.0
HP-4	12.0	10.0
HP-5	12.0	10.0
HP-6	12.0	10.0
HP-7	12.0	10.0
HP-8	12.0	10.0
HP-9	12.0	10.0
HP-10	12.0	10.0

Lot 1-2 Injection Monitoring Well Details

Well No.	Elevation (ft msl)	TOC (ft bgs)	DTW (ft bgs)	Screen Interval (ft bgs)
IMW-1	15.13	14.81	5.50	10.0 - 20.0
IMW-2	15.30	15.05	5.63	10.0 - 20.0
IMW-3	15.80	15.34	5.65	10.0 - 20.0
IMW-4	15.97	15.83	6.11	10.0 - 20.0

Pilot Study Area Lot 1-2 with Preinjection Select VOC Concentrations

Campus Bay, Richmond, California

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Figure 3

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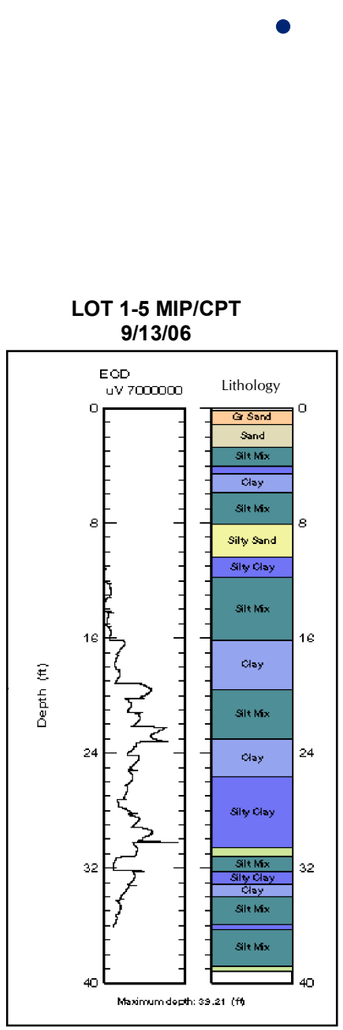

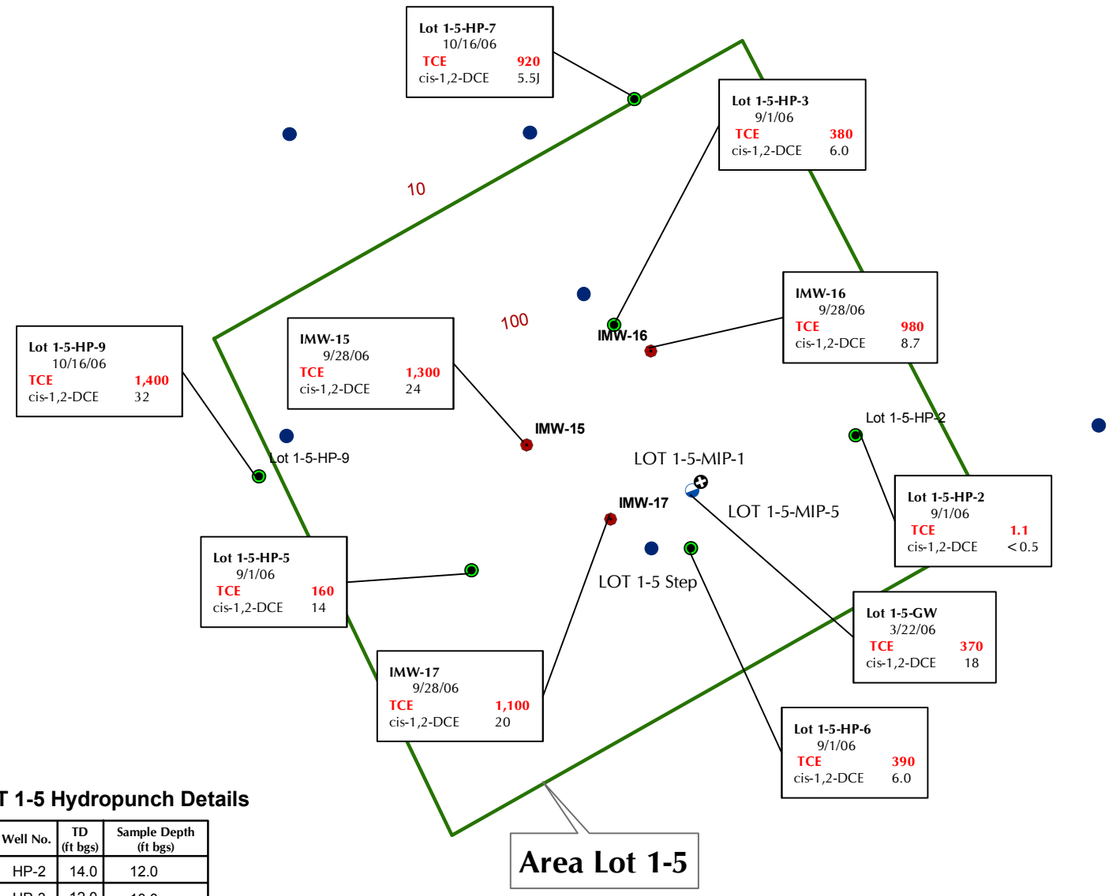

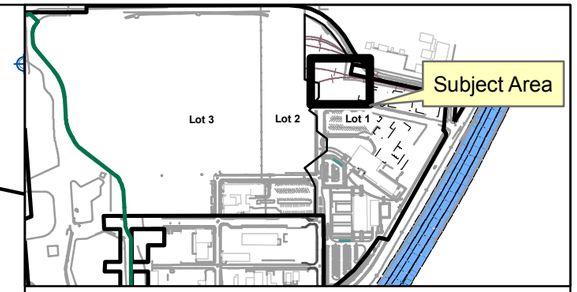

LEGEND

Lot 1-11	Location of soil boring
Lot 1-1	Location of soil boring w/ grab groundwater sample
Lot 1 CPT-1	Location of cone penetrometer test boring with groundwater sample(s)
Process Water Supply-1	Process Water Supply Well (not in use)
MW-1	Location of monitoring well
P-1 s/d	Location of piezometer (shallow and deep)
SGT-1	Location of soil-gas point
SG-1	Location of soil-gas monitoring well
IMW-15	Temporary Monitoring Wells
Lot 1-5-HP-2	HydroPunch Locations
	MIP Locations
*	Boring was dry to 20 ft bgs, no grab groundwater sample collected
	Pilot Study Areas

Sample ID

Lot 1-5-GW
3/22/06
TCE 370
cis-1,2-DCE 18

Analyte

Analytical Result in µg/l (micrograms per liter)

DCE = Dichloroethene
TCE = Trichloroethene
msl = Mean sea level
ft = Feet
bgs = Below ground surface
VOC = Volatile Organic Compound

30 0 30 Feet

LOT 1-5 Hydropunch Details

Well No.	TD (ft bgs)	Sample Depth (ft bgs)
HP-2	14.0	12.0
HP-3	12.0	10.0
HP-5	12.0	10.0
HP-6	12.0	10.0
HP-7	25.0	24.0
HP-9	25.0	24.0

LOT 1-5 Injection Monitoring Well Details

Well No.	Elevation (ft msl)	TOC (ft bgs)	DTW (ft bgs)	Screen Interval (ft bgs)
IMW-15	20.19	20.01	10.79	16.0 - 31.0
IMW-16	20.56	20.33	11.15	16.0 - 31.0
IMW-17	20.40	20.29	11.05	16.0 - 31.0

Pilot Study Area Lot 1-5 with Select VOC Concentrations

Campus Bay, Richmond, California

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Figure 4

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Lot 1-B90-8
04/21/2006
PCE 14
TCE 110
cis-1,2-DCE 7.6
1,1-DCE 0.4*

MW-25-HP-9
9/1/2006
PCE 12
TCE 68
cis-1,2-DCE 2.1

MW-25-HP-8
9/1/2006
PCE 94
TCE 570
cis-1,2-DCE 7.7

MW-25-HP-7
9/1/2006
PCE 130
TCE 1,400
cis-1,2-DCE 12

Lot 1-10-GW
03/24/2006
PCE 11
TCE 840
cis-1,2-DCE 7.8*

MW-25-HP-6
9/1/2006
PCE 17
TCE 95
cis-1,2-DCE 8.2

MW-25-HP-5
9/1/2006
PCE 340
TCE 1,900
cis-1,2-DCE 38

MW-25
5/9/2006
PCE 200
TCE 1100
cis-1,2-DCE 36
trans-1,2-DCE 4.9J*

MW-25-HP-4
9/1/2006
PCE 4.7
TCE 75
cis-1,2-DCE 4.2

MW-25-HP-1
9/1/2006
PCE ND
TCE 0.3J
cis-1,2-DCE ND

MW-25-HP-3
9/1/2006
PCE 6.8
TCE 570
cis-1,2-DCE 4.4

MW-25-HP-2
9/1/2006
PCE 18
TCE 1300
cis-1,2-DCE 6.7

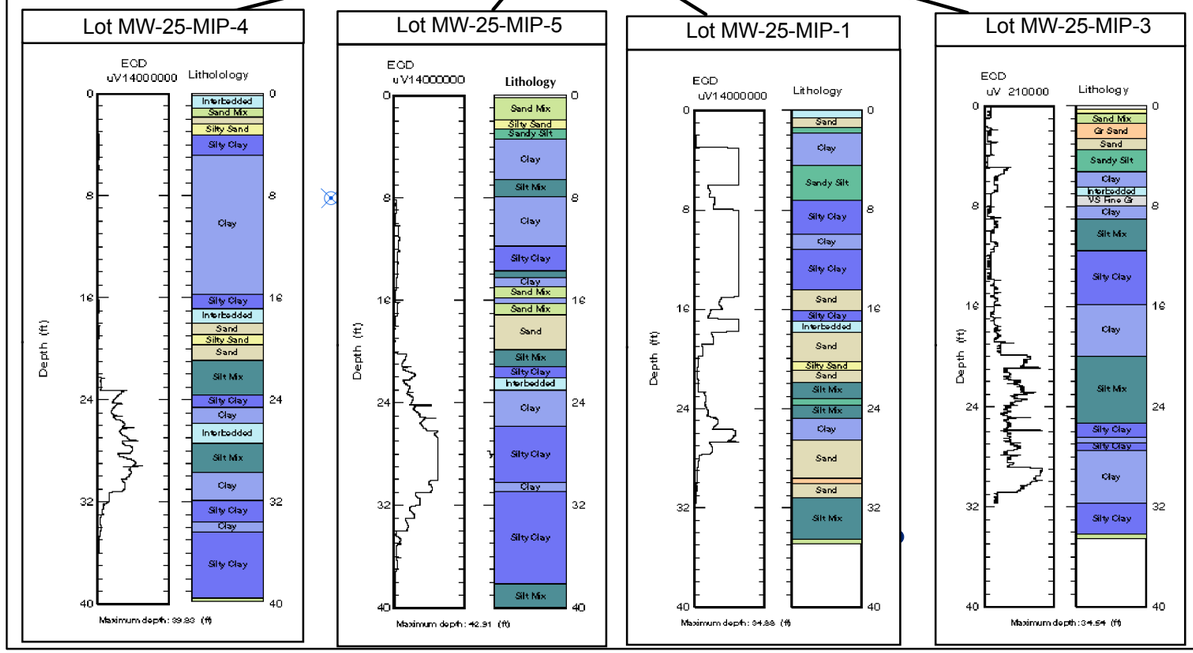
MW-27
08/15/2006
PCE 0.7J
TCE 140
cis-1,2-DCE 2.0

MW-26
08/15/2006
PCE 0.4J
TCE <0.5

Lot MW-25-HP-1
Lot MW-25-HP-2
Lot MW-25-HP-3
Lot MW-25-HP-4
Lot MW-25-HP-5
Lot MW-25-HP-6
Lot MW-25-HP-7
Lot MW-25-HP-8
Lot MW-25-HP-9
Lot MW-25-MIP-1
Lot MW-25-MIP-3
Lot MW-25-MIP-4
Lot MW-25-MIP-5
IMW-18
IMW-19
IMW-20

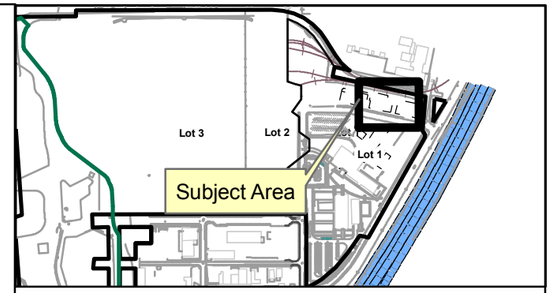
Area MW-25

MW-25 MIP/CPT 9/14/06



MW-25 Hydropunch Details

Well No.	TD (ft bgs)	Sample Depth (ft bgs)
HP-1	19.0	18.0
HP-2	19.0	18.0
HP-3	19.0	18.0
HP-4	19.0	18.0
HP-5	16.0	15.0
HP-6	16.0	15.0
HP-7	16.0	15.0
HP-8	16.0	15.0
HP-9	16.0	15.0



LEGEND

- Lot 1-11 — Location of soil boring
- Lot 1-1 — Location of soil boring w/ grab groundwater sample
- Lot 1 CPT-1 — Location of cone penetrometer test boring with groundwater sample(s)
- Process Water Supply-1 — Process Water Supply Well (not in use)
- MW-1 — Location of monitoring well
- P-1 s/d — Location of piezometer (shallow and deep)
- SGT-1 — Location of soil-gas point
- SG-1 — Location of soil-gas monitoring well
- IMW-18 — Temporary Monitoring Wells
- MW-25-HP-1 — HydroPunch Locations
- MIP Locations
- Pilot Study Areas

Sample ID

Lot 1-B90-8
04/21/2006
PCE 14
TCE 110
cis-1,2-DCE 7.6
1,1-DCE 0.4*

Analyte

Analytical Result in µg/l (micrograms per liter)

DCE = Dichloroethene
PCE = Tetrachloroethene
TCE = Trichloroethene
ft = Feet
bgs = Below ground surface
VOC = Volatile Organic Compound

60 0 60 Feet

Pilot Study Area MW-25 with Select VOC Concentrations

Campus Bay, Richmond, California

LFR

Figure 5

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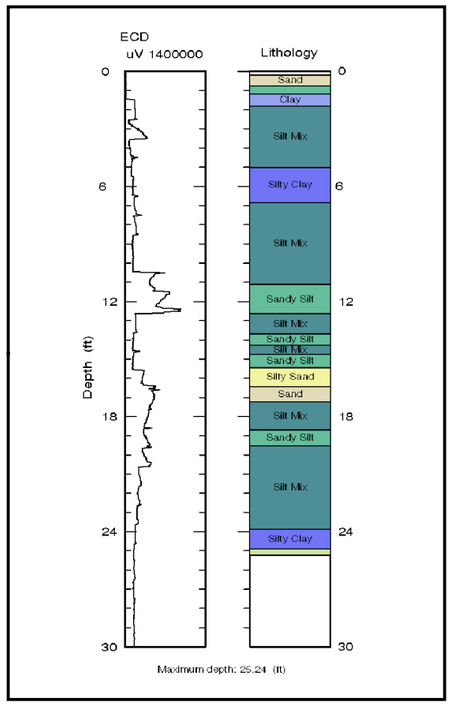
LOT 1-2 MIP/CPT 9/14/06

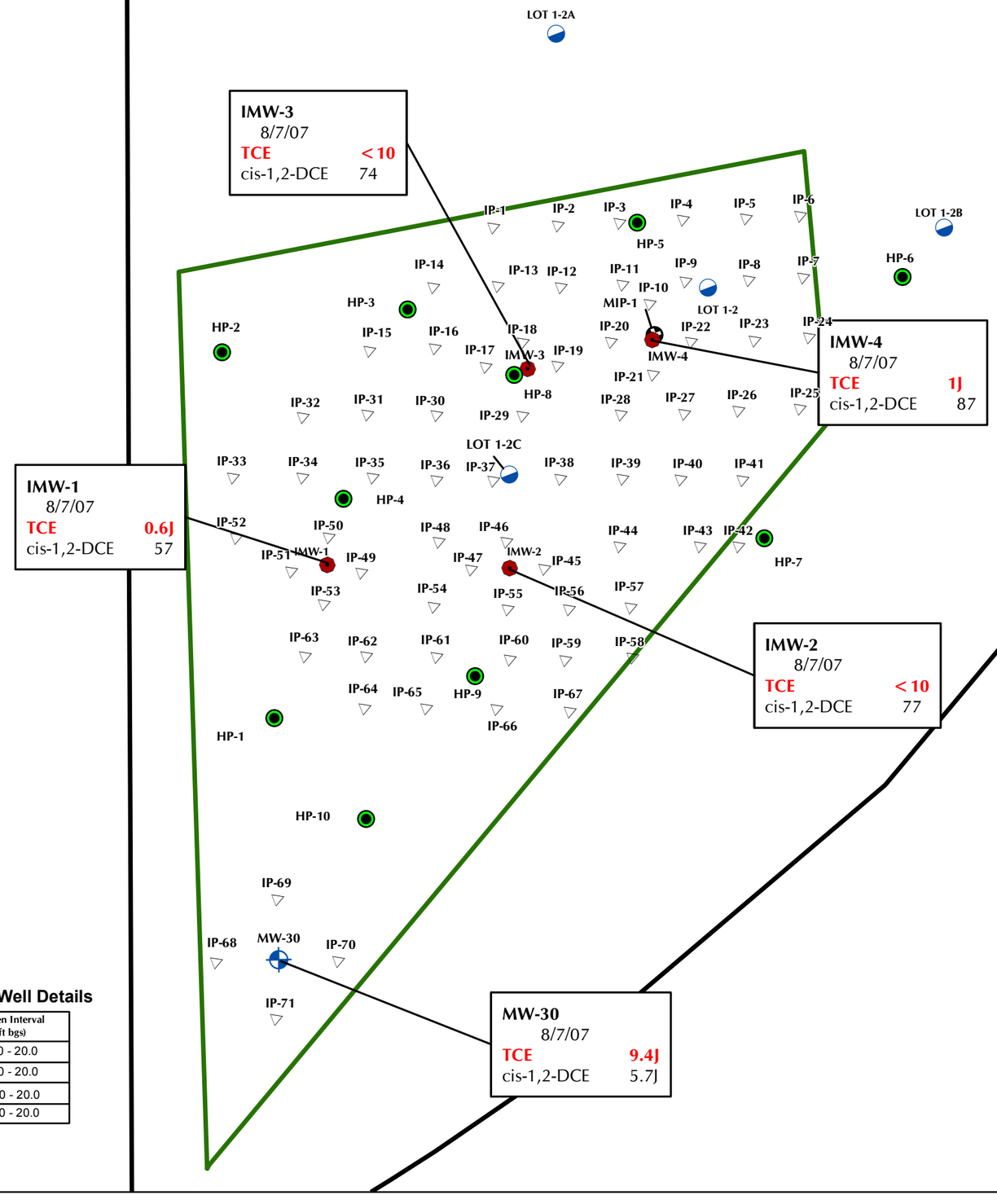


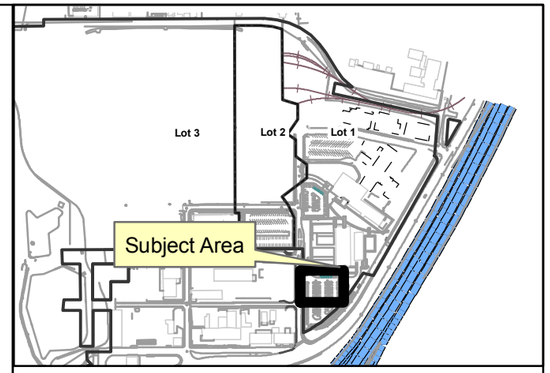
LOT 1-2 Hydropunch Details

Well No.	TD (ft bgs)	Sample Depth (ft bgs)
HP-1	12.0	10.0
HP-2	12.0	10.0
HP-3	12.0	10.0
HP-4	12.0	10.0
HP-5	12.0	10.0
HP-6	12.0	10.0
HP-7	12.0	10.0
HP-8	12.0	10.0
HP-9	12.0	10.0
HP-10	12.0	10.0

LOT 1-2 Injection Monitoring Well Details

Well No.	Elevation (ft msl)	TOC (ft bgs)	DTW (ft bgs)	Screen Interval (ft bgs)
IMW-1	15.13	14.81	5.50	10.0 - 20.0
IMW-2	15.30	15.05	5.63	10.0 - 20.0
IMW-3	15.80	15.34	5.65	10.0 - 20.0
IMW-4	15.97	15.83	6.11	10.0 - 20.0



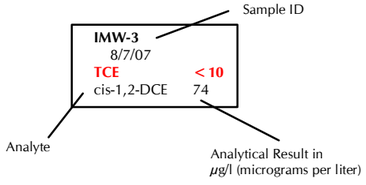


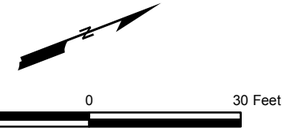
LEGEND

- MW-30 — Location of Monitoring Well
- Lot 1-2 — Location of soil boring w/ grab groundwater sample
- IMW-4 — Temporary Monitoring Wells
- IP-1 — Injection Point Locations
- HP-3 — HydroPunch Locations
- MIP-1 — MIP Locations
- Pilot Study Areas

TCE = Trichloroethene
cis-1,2-DCE = Dichloroethene
ft = Feet
bgs = Below ground surface
msl = Mean sea level

Note :
Injection Depth = 9 - 21 ft bgs.





Pilot Test Location Area Lot 1-2

Campus Bay, Richmond, California

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Figure 9

APPENDIX B

Material Safety Data Sheet for SiREM's KB-1® Culture

130 Research Lane, Suite 2 Guelph◆Ontario ◆ N1G 5G3 ◆ Canada ◆ Tel: (519) 822-2265 ◆ Fax: (519) 822-3151

KB-1® Dechlorinator Material Safety Data Sheet

Section 1: Material Identification

Trade Name: KB-1® Dechlorinator
Chemical Family: bacterial mixture
Chemical name: No IUC name for mixture is known to exist
Manufacturer/Supplier: SiREM
130 Research Lane, Suite 2,
Guelph, Ontario,
Canada N1G 5G3

For Information call: 519-822-2265 / 1-866-251-1747
Emergency Number: 519-822-2265
Description: Microbial inoculum (non-pathogenic, non-hazardous)
Trade Name: KB-1® Dechlorinator
Product Use: Bioremediation of contaminated groundwater.
Date Prepared: 2 February 2005

Section 2: Composition, Information on Ingredients

KB-1® Dechlorinator is a microbial culture grown in an aqueous dilute mineral salt solution media containing no hazardous ingredients.

The microbial composition of KB-1® Dechlorinator (as determined by phylogenetic analysis) is listed in Table 1. Identification of organisms was obtained by matching 16S rRNA gene sequence of organisms in KB-1® Dechlorinator to other known organisms. The characteristics of related organisms can be used to identify potential or likely characteristics of organisms in KB-1® Dechlorinator.

Table 1. Genus' identified in KB-1® Dechlorinator Microbial Inoculum

Genus
Dehalococcoides sp.
Geobacter sp.
Methanomethylovorans sp.

Section 3: Hazards Identification:

A review of the available data does not indicate any known health effects related to normal use of this product.

Section 4: First Aid Measures:

Avoid direct contact with skin and eyes. In any case of any exposure which elicits a response, a physician should be consulted immediately.

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Eye Contact: Flush eyes with water for at least 15 minutes, occasionally lift upper and lower eyelids, if undue irritation or redness occurs seek medical attention.

Skin Contact: Remove contaminated clothing and wash skin thoroughly with water and antibacterial soap. Seek medical attention if irritation develops or open wounds are present.

Ingestion: Do not induce vomiting, drink several cups of water, seek medical attention.

Inhalation: Remove to fresh air. If not breathing give artificial respiration. In case of labored breathing give oxygen. Call a physician.

Section 5 - Fire Fighting Measures:

Non-flammable
Flash Point: not applicable
Upper flammable limit: not applicable
Lower flammable limit: not applicable

Section 6 – Accidental Release Procedures

Spilled KB-1® Dechlorinator should be soaked up with sorbant and saturated with a 10% bleach solution (prepared by making a one in ten dilution of diluted standard bleach [normally sold at a strength of 5.25% sodium hypochlorite] to disinfect affected surfaces. Sorbant should be double bagged and disposed of as indicated in section 12. After removal of sorbant, area should be washed with 10% bleach solution to disinfect. If liquid from the culture vessel is present on the fittings, non-designated tubing or exterior of the stainless steel pressure vessel liquid should be wiped off and the area washed with 10% bleach solution.

Section 7 - Handling and Storage

KB-1® Dechlorinator is shipped in stainless steel pressure vessels and connected to injection lines and inert gas is used to pressurize the vessel to displace the contents. KB-1® Dechlorinator should be handled with care to avoid any spillage. Vessels are shipped with 1 pound per square inch (psi) pressure; valves should not be opened until connections to appropriate lines for subsurface injection are in place.

Storage Requirements: Avoid exposing stainless steel pressure vessels to undue temperature extremes (i.e., temperatures less than 0°C or greater than 30°C may result in harm to the microbial cultures and damage to the vessels). All valves should be in the closed position when the vessel is not pressurized to prevent the escape of gases and to maintain anaerobic conditions in the vessel. Avoid exposure of the culture to air as the presence of oxygen will kill dechlorinating microorganisms.

Section 8 - Exposure Controls/Personal Protection

Personal protective equipment:

Skin: Protective gloves (latex, vinyl or nitrile) should be worn.
Eye Protection: Wear appropriate protective eyeglasses or goggles when opening pressure vessels valves or when pressurizing vessels to inject contents into the subsurface.
Respiratory: No respiratory protection is required.
Engineering Controls: Good general room ventilation is expected to be adequate.

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Section 9: Physical and Chemical Properties:

Physical State: liquid
Odour: skunky odour
Appearance: dark grey, slightly turbid liquid under anaerobic conditions, pink if exposed to air (oxygen).
Specific gravity: not determined
Vapor pressure: not applicable
Vapor density: not applicable
Evaporation rate: not determined
Boiling point: ~100° C
Freezing point/melting point: ~ 0°C
pH: 6.5-7.5
Solubility: fully soluble in water

Section 10 – Stability and Reactivity Data

Stable and non-reactive.
Maintain under anaerobic conditions to preserve product integrity.
Materials to avoid: none known

Section 11 - Toxicological Information

Potential for Pathogenicity:

KB-1® Dechlorinator has tested negative (i.e., the organisms are not present) for a variety of pathogenic organisms listed in Table 2. While there is no evidence that virulent pathogenic organisms are present in KB-1® Dechlorinator, there is potential that certain organisms in KB-1® Dechlorinator may have the potential to act as opportunistic (mild) pathogens, particularly in individuals with open wounds and/or compromised immune systems. For this reason standard hygienic procedures such as hand washing after use should be observed.

Table 2, Results of Human Pathogen Screening of KB-1® Dechlorinator

Organism	**Disease(s) Caused**	***Test result***
Salmonella sp.	Typhoid fever, gastroenteritis	Not Detected
Listeria monocytogenes	Listerioses	Not Detected
Vibrio sp.,	Cholera, gastroenteritis	Not Detected
Campylobacter sp.,	Bacterial diarrhea	Not Detected
Clostridia sp.,	Food poisoning, Botulism, tetanus, gas gangrene	Not Detected
Bacillus anthracis	Anthrax	Not Detected
Pseudomonas aeruginosa	Wound infection	Not Detected
Yersinia sp.,	Bubonic Plague, intestinal infection	Not Detected
Yeast and Mold	Candidiasis, Yeast infection etc.	Not Detected
Fecal coliforms	Indicator organisms for many human pathogens diarrhea, urinary tract infections	Not Detected
Enterococci	Various opportunistic infections	Not Detected

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Section 12. Disposal Considerations

Material must be disinfected or sterilized prior to disposal. Consult local regulations prior to disposal.

Section 13 – Transport Information

Non-hazardous, non-pathogenic microbial inoculum – Biosafety Risk Group 1.

Chemicals, Not Otherwise Indexed (NOI), Non-hazardous

Not subject to TDG or DOT guidelines.

Disclaimer:

The information provided on the MSDS sheet is based on current data and represents our opinion based on the current standard of practice as to the proper use and handling of this product under normal, reasonably foreseeable conditions.

Last revised: 24 June 2008