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May 17, 2001

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ENVIRONMENTAL REMEDIATION

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Mr. Dave Walsh
Kansas Department of Health and Environment
Forbes Field Building 740
Topeka, KS 66620-0001

Enhanced Bioremediation Pilot Test Results and
Direct-push Sampling Results for Samples Collected in September 1999
at the Eastern Portion of the
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Dear Mr. Walsh:

This letter report has been prepared by Harding ESE (formerly Harding Lawson Associates [HLA]) on behalf of Union Oil Company of California (dba Unocal) to provide the Kansas Department of Health and Environment (KDHE) with data from recent activities at the Former Unocal Chemicals Distribution Facility (Site) (Figure 1). This report presents data from the following activities:

- Direct-push sampling activities conducted in support of the Enhanced Bioremediation Pilot Test (Pilot Test)
- Evaluation of using soil gas sampling techniques to identify source areas
- Groundwater monitoring activities during the Pilot Test

These activities were conducted in accordance with the KDHE-approved Letter Work Plan dated September 2, 1999 (Work Plan) and the Addendum to the Work Plan (Work Plan Addendum) dated September 16, 1999 submitted by HLA to KDHE.

Previously and in accordance with KDHE's request and on behalf of Unocal, HLA prepared a report entitled "Direct-push Sampling Results for Samples Collected in September 1999 at the Western Portion of the Former Unocal Chemicals Distribution Facility". This report was submitted to KDHE on February 2, 2000 (HLA, 2000a). In addition, per KDHE's request, Unocal submitted on February 23, 2000 to KDHE a report entitled "Preliminary Analytical Results for the Enhanced Bioremediation Pilot Test" (HLA, 2000b). This report provided the Pilot Test results from September 27, 1999 to January 24, 2000.

The following presents a summary of the direct-push sampling activities, the soil vapor sampling activities, and the Pilot Test activities.

DIRECT-PUSH SAMPLING ACTIVITIES

Direct-push sampling activities were conducted at the Site between September 19 and September 29, 1999 in accordance with the Work Plan. As identified in the Work Plan, the objective of the sampling was to identify an area on the Site for the Pilot Test that met the following criteria:

- The area must have elevated concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) greater than 100 micrograms per liter (μg/l)
- The area must have concentrations of PCE and TCE which were greater than the concentrations of the degradation daughter products cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride
- The area must have concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) in groundwater less than approximately 1,000 μg/l
- The area must be downgradient of the PCE/TCE source area
- The area must be on Unocal property

The following summarizes the sample locations, the sampling procedures and the results from the eastern portion of the Site collected in support of the Pilot Test.

Direct-push Sample Locations and Sampling Procedures

In support of the Pilot Test, soil and/or groundwater samples were collected and analyzed from a total of 38 direct-push locations (DP-41, DP-42, DP-44 through DP-73, DP-90 through DP-93, DP-95, and DP-96) in the eastern portion of the Site between September 20 and 29, 1999 (Figure 2). Table 1 summarizes the direct-push boring survey data and the samples collected at each location. The logs of the borings for the 38 direct-push sample locations sampled in the eastern portion of the Former Unocal Chemicals Distribution Facility are presented in Appendix A.

The direct-push subcontractor was Environmental Services Network (ESN), which at the time was called teg, Rocky Mountain (TEG). A Strataprobe direct-push rig using a 1.5-inch diameter steel rod collected the soil samples to groundwater. Groundwater samples were collected using new silicon tubing and a peristaltic pump through the steel rod or from an open borehole.

Continuous soil cores, soil samples, and groundwater samples were collected from direct-push locations DP-41, DP-42, DP-44 through DP-46, DP-49 through DP-53, DP-61, DP-62, DP-66, DP-67, DP-70, DP-71, DP-95, and DP-96 in accordance with the Work Plan. Eighteen locations (DP-47, DP-54 through DP-60, DP-63 through DP-65, DP-68, DP-69, DP-73, DP-90, DP-92, and DP-93) were sampled only for groundwater. Two locations (DP-72 and DP-91) did not produce groundwater during the field investigation and therefore no samples were obtained at these locations.

The soil and groundwater samples were analyzed for volatile organic compounds (VOCs) in the field by TEG using a modified Environmental Protection Agency (EPA) Method 8021(8021M). Split soil and groundwater samples from locations DP-95 and DP-96 were sent to Southern Petroleum Laboratories (SPL), Houston, Texas as quality control checks on the TEG mobile laboratory in accordance with the Work Plan. The split samples were analyzed by SPL using EPA Method 8021B. Three soil samples (DP-41, DP-42, and DP-46) were sent to SPL for total organic carbon analysis using a modified EPA Method 415.1.

Direct-push Sampling Results

Based on the results of soil sampling conducted in support of the Pilot Test in the eastern portion of the Site, the upper lithology is comprised of clays with silt and sand. Bedrock was not encountered in the eastern portion of the Site during direct-push operations conducted in support of the Pilot Test. Weathered bedrock was encountered at approximately 25 to 30 feet below ground surface (bgs) in the eastern portion of the Site during the Phase III Investigation (Phase III Investigation Technical Memorandum [HLA, 1998]). Groundwater generally was encountered between approximately 6 to 10 feet bgs.

As discussed above, soil and groundwater samples that were obtained from the 38 direct-push locations were analyzed for VOCs in the eastern portion of the Site with the goal of identifying the best location for the placement of the Pilot Test. The analytical data for soil and groundwater samples collected in support of the Pilot Test are summarized in Table 2. The field laboratory (TEG) and offsite laboratory (SPL) reports are included in Appendix B. In general, the chlorinated and aromatic hydrocarbon analytes and the distribution of these analytes observed during the Pilot Test were similar to the types and distribution of analytes that were previously observed in groundwater in this area of the Site during the Phase III Investigation (HLA, 1998).

The highest concentrations of PCE and TCE detected were 118,840 μg/l and 4,480 μg/l, respectively, from sample location DP-45. The concentrations of PCE and TCE for sample location DP-45 were greater than those of cis-1,2-DCE and vinyl chloride. This location also did not have elevated BTEX concentrations and was on Unocal property. Subsequent sampling was used to characterize the VOC concentrations in groundwater downgradient of location DP-45 to the property boundary. In general, the PCE concentrations for sample locations in this area were greater than the concentrations of TCE, cis-1,2-DCE, and vinyl chloride as desired for the Pilot Test. The concentrations of TCE for sample locations in this area slightly exceeded or were generally similar to those of cis-1,2-DCE, and were greater than those of vinyl chloride. Additional sampling to the east of the Tank Farm indicated that the concentrations of BTEX constituents exceeded the maximum criteria of approximately 1,000 μg/l, thereby eliminating that area from further consideration for the Pilot Test. The only area sampled that met the requirements for the Pilot Test was the area south of sample location DP-45 and it was therefore selected for the Pilot Test.

Quality Control Sample Results

The quality control (QC) samples collected in the eastern portion of the Site consisted of 1 soil field duplicate (DP- 95), 2 MS/MSD pairs (DP-53, DP-96), 3 rinse-blanks of the sampler, and 2 split-samples each of soil (DP-95 and DP-96). The groundwater QC samples consisted of 3 groundwater duplicate samples (DP-46, DP-93, and DP-96), 2 MS/MSD pairs (DP-56 and DP-73), and 2 groundwater split-samples (DP-95 and

DP-96). The results for these QC samples are summarized in Table 3. In addition, a trip blank sample accompanied each split-sample sent offsite to SPL. With the exception of PCE for the groundwater investigative/split-sample pair for location DP-95, the results between associated investigative samples and the QC samples show good correlation. Both the investigative and split groundwater sample for DP-95 identified similar constituents, but the split-sample showed a higher concentration of PCE than did the investigative sample. No targeted analytes were detected in any of the trip blank samples.

SOIL VAPOR EVALUATION

An attempt was made to collect soil vapor samples in accordance with the Work Plan in order to assess the applicability of using this method to delineate elevated concentrations of VOCs in the unsaturated soil. Soil vapor samples were collected at two locations in the western portion of the site, but no soil vapor samples were collected in the eastern portion of the Site due to mechanical problems with the soil vapor sampler that rendered it inoperable. Because of these mechanical problems, no evaluation as to the applicability of using soil vapor samples for source delineation could be made.

ENHANCED BIOREMEDIATION PILOT TEST

At the conclusion of the direct-push sampling activities, the Enhanced Bioremediation Pilot Test was implemented. Figure 3 presents the location of the Pilot test. Figure 4 presents an enlargement of the Pilot Test configuration. The objective of the Pilot Test was to test the applicability of using commercially available products to enhance the currently active bioattenuation of VOCs at the Site. The product selected for the test was Hydrogen Release Compound™ (HRC) a product of Regenesis.

Enhanced Bioremediation Pilot Test Design, Construction, and Procedures

The area downgradient of sample location DP-45 was selected for the installation of the Pilot Test (Figure 3). Based on field data and previous aquifer testing data, a configuration of seven monitoring piezometers consisting of six new piezometers and one pre-existing piezometer was selected (Figure 4). Piezometer P-05 was established close to DP-45 as the upgradient piezometer. Piezometer P-06 was set in the middle of the injection array. Piezometers P-07, P-08, and P-09, as well as existing piezometer P-02 were used to monitor the effect of the HRC downgradient in the plume. Piezometer P-10 was installed to the west of P-06 to monitor the lateral effects of the HRC injection. Layne Western, a State of Kansas-licensed drilling company, installed the piezometers. Boreholes were drilled to approximately 16 feet bgs (approximately 7 feet below the encountered groundwater level). A 2-inch diameter schedule 40 polyvinyl chloride (PVC) casing was installed in each borehole in accordance with Kansas regulations. Table 4 summarizes the piezometer installation information. Copies of the Piezometer Construction Diagrams are included in Appendix C. The new piezometers were then developed using a surge and bail technique in accordance with the Work Plan. Copies of the development records and piezometer permit applications are also included in Appendix C.

In accordance with the Work Plan, the seven piezometers were sampled 2 days after development to establish the baseline analytical results. Copies of the baseline Groundwater Sampling Field Data Sheets are presented in Appendix D.

Upon completion of the baseline sampling activities, the HRC was injected on September 28 and 29, 1999 in the nine locations of the injection array (Figure 4) using a 1.5-inch diameter steel rod with a disposable steel point. Each injection location was comprised of two injection holes. The first hole was driven to 15 feet bgs, and HRC was injected in 1-foot intervals starting at approximately 14 to 15 feet, and ending with injection between 5 to 6 feet. Each 1-foot interval had approximately 0.5 gallon (5 pounds) of HRC injected into it. This corresponds to approximately 5 gallons or 50 pounds of HRC for each of the first holes at each location. The second hole of the injection location, immediately adjacent to the first hole, was driven to approximately 30 feet or refusal. HRC was injected in 1-foot intervals from approximately 30 feet up to 14 feet bgs. This hole also received approximately 5 gallons (50 pounds) of HRC. Excess HRC was added to some holes until a total of approximately 120 gallons (1,200 pounds) of HRC was injected into the array. Upon the completion of injection for each hole, the hole was back-filled with bentonite and sealed.

The piezometer array was sampled monthly from October 1999 to January 2000 in accordance with the Work Plan and Work Plan Addendum. Based upon analytical results, the sampling schedule was changed after the January event to a bimonthly schedule. The piezometers were sampled bimonthly in March and May 2000, whereupon the sampling schedule was changed again based on analytical data to a four month schedule. The piezometers were sampled in September 2000 at which time the sampling phase of the Pilot Test was concluded. Copies of the Groundwater Sampling Field Data Sheets are presented in Appendix D.

Enhanced Bioremediation Pilot Test Results

A summary of the VOC analytical results from the Pilot Test groundwater samples is presented in Table 5. Copies of the SPL and Keystone laboratory reports are not included in this report, but are available upon request. Groundwater elevations are also presented in Figure 5, and will be discussed under groundwater results. A summary of the analytical results for ethane, ethene, and methane is presented in Table 6. A graphical presentation of the VOC analytical results is presented in Figure 5. A graphical presentation of the ethane and ethene analytical results is presented in Figure 6. A graphical presentation of molar ratio percentages for PCE, TCE, cis-1,2-DCE, vinyl chloride, ethane and ethene is presented in Figure 7.

VOC Analytical Results

The analytes of primary interest for this pilot test were PCE, TCE, cis-1,2-DCE, and vinyl chloride. The concentrations of the degradation products ethane and ethene were monitored because they are important tools in assessing the process of de-chlorination. Initial concentrations of PCE ranged from 3,900 μg/l to approximately 35,000 μg/l. The initial concentrations of TCE ranged from 200 μg/l to 2,600 μg/l. The initial concentrations of cis-1,2-DCE and vinyl chloride ranged from 140 μg/l to 1,400 μg/l and less than 100 μg/l to 290 μg/l, respectively. Initially, ethane and ethene were not detected at a detection limit of 10 μg/l.

During the course of the Pilot Test, concentrations of PCE fluctuated. For example, the concentration of PCE in the upgradient well (P-05) increased to 55,000 μg/l, decreased to 8,300 μg/l, and then climbed back to 47,000 μg/l. The concentration of PCE in the crossgradient piezometer (P-10) also decreased and increased during the Pilot Test. The concentrations of PCE for the downgradient wells generally decreased during the

Pilot Test. At the time of the final sampling event in September 2000, the furthest downgradient piezometer, P-09, had no detectable concentration of PCE at a detection limit of 5 μg/l. The other two downgradient piezometers (P-02 and P-08) had PCE concentrations of less than 50 μg/l (41 μg/l and 47 μg/l, respectively).

The concentrations of TCE, cis-1,2-DCE, vinyl chloride, and ethene also fluctuated during the course of the Pilot Test. The concentrations of TCE generally decreased then increased at the downgradient piezometers, but increased in the upgradient piezometer (P-05). The concentrations of TCE remained within the same order of magnitude for the cross-gradient piezometer P-10. For the downgradient piezometers, the concentrations for cis-1,2-DCE generally increased before stabilizing or decreasing by the end of the Pilot Test. The concentrations of vinyl chloride in downgradient piezometers generally increased during the Pilot Test. By the final sampling event, ethane had only been detected once (P-06 in January 2000) at a concentration slightly above the detection limit of 20 μg/l. Ethene, however, had been detected in the five down-gradient piezometers (P-02, P-06, P-07, P-08, and P-09). As seen in Figure 6, the concentration of ethene generally increased as the test progressed with the maximum detected concentration (1,310 μg/l) recorded at P-09 in September 2000.

Based on the data collected during the Pilot Test, it appears that concentrations of analytes can vary from one sampling event to another based on various field conditions such as depth to groundwater. A trend in the concentration of VOCs in groundwater with respect to the groundwater level is evident in the upgradient piezometer (see Figure 5). In general, the concentrations of PCE at P-05 increased as groundwater elevation decreased.

In an attempt to evaluate the degradation process and eliminate the variations associated with field condition changes (e.g., groundwater elevation changes) molar ratio percentages of the chlorinated VOCs through time were assessed. Molar ratio percentages provide a view of the relative proportions of an analyte to the sample as a whole. The total number of moles of organic compounds of interest in a sample is the sum of the moles for each of those analytes. In order to obtain the molar ratio percentage the concentration of that analyte is divided by its molecular weight to give the number of moles of that analyte in the sample. The molar ratio percentage is obtained by dividing the number of moles of an analyte by the total number of moles of organic compounds of interest from that sample. Only the targeted analytes (PCE, TCE, cis-1,2-DCE, vinyl chloride, ethane and ethene) were included in this molar ratio percentage evaluation. Ethane was included in the calculations, although it was only detected once at a very low concentration.

Figure 7 presents a graphical presentation of the molar ratio percentages for the analytical results. Piezometer P-05, the up-gradient piezometer, shows a relatively consistent molar ratio composition throughout the test. Likewise, the molar ratio composition of the groundwater from P-10 remains similar despite changes in concentrations of the chlorinated VOC analytes through time. The molar ratio percentages for the down-gradient piezometers show a decrease in percentage of PCE and TCE in groundwater. Eventually, the samples from the down-gradient piezometers transform from being primarily composed of PCE and TCE to primarily composed of cis-1,2-DCE and vinyl chloride. Ethene first appeared as a minor component in Piezometer P-09 in December 1999, approximately 90 days after injection of the HRC. By January 2000 (approximately 119 days after injection), the percentage of ethene in P-09 had increased, making it a major component of the sample. Ethene remained a major component in P-09 for the remainder of the test.

Inorganic Analytical Results

Eight inorganic parameters were monitored for the Pilot Test: Alkalinity, chloride, dissolved organic carbon (DOC), manganese, nitrate (as Nitrogen [N]), nitrite (as N), sulfate, and sulfide. Table 9 presents a summary of the laboratory supplied inorganic data.

Volatile Acid Results

The HRC is a polylactic ester that breaks down into volatile acids: acetic, butyric, lactic, propionic, and pyruvic. Table 10 presents a summary of the volatile acid data. Figure 8 presents a graphical display of the volatile acid data. Prior to injection, no volatile acids were detected at their respective detection limits. Within 30 days after injection, some volatile acids were found in each of the down-gradient piezometers. The data from the down-gradient piezometers show that propionic and lactic acids were the dominant acids detected. By the final sampling round, concentrations of the acids were increasing in four of the five downgradient piezometers.

Field Parameter Results

Field parameters, including pH, conductivity, temperature, dissolved oxygen, total iron, ferrous iron and oxidation/reduction potential (ORP), were collected during each sampling event. Table 11 presents a summary of field parameter data. Although the pH remains generally consistent for the piezometers, piezometers P-06 and P-07 showed a decrease of approximately 1 to 2 by the final sampling event. The conductivity in the up-gradient and cross-gradient piezometers remained generally consistent while downgradient piezometers showed a generally increasing trend in conductivity. The temperature readings for the up-gradient, cross-gradient, and down-gradient piezometers are generally similar for each sampling event. The concentration of dissolved oxygen fluctuated at each piezometer during the course of the Pilot Test. The fluctuation could be a result of difficulties in obtaining dissolved oxygen results representative of formation conditions in the field. The concentration of total iron in the samples generally increased through the duration of the Pilot Test.

ORP measurements reflect the oxidizing or reductive conditions in groundwater. ORP values that are strongly positive reflect an oxidizing environment. ORP values that are strongly negative reflect a reducing environment. For the up-gradient and cross-gradient piezometers, the ORP remained strongly positive from the start of the test to the end of the test with the exception of one anomalous point (P-05, September 2000). For the down-gradient piezometers, the ORP went from positive or slightly negative to strongly negative within 60 days and generally remained that way for the duration of the Pilot Test.

Groundwater-level Results

A summary of groundwater elevation data is presented in Table 12. The groundwater elevation data are presented in Figure 5. The depth to groundwater at the time of injection was approximately 7 feet bgs. This corresponds to an approximate elevation of 1,341 feet above mean sea level (MSL). Over the course of the

year for the Pilot Test, the groundwater elevation in the area of the test fluctuated approximately 7.2 feet lower (between 1,336.5 feet above MSL, [September 2000] to 1,343.7 feet above MSL [March 2000]).

Quality Control for the Enhanced Bioremediation Pilot Test

During the Pilot Test, quality control samples including both field and laboratory samples were analyzed. These samples included 3 field duplicates, 14 trip blanks, several laboratory internal MS/MSD samples, and 3 split-samples using EPA Method 8260. In addition, the laboratory analyzed method blanks and laboratory control samples for each batch of investigative samples analyzed. The laboratory QC results were generally within laboratory QC limits throughout the Pilot Test. Table 13 presents a summary of the QA/QC VOC data for the Pilot Test. Table 14 presents a summary of the QA/QC data for inorganic analytes, volatile acids, ethane, ethene, and methane for the Pilot Test. Field duplicates show good correlation to the associated investigative samples. A trip blank accompanied each cooler that was shipped containing samples for VOC analysis. None of the trip blanks had detections of VOC analytes. The MS/MSD recoveries and relative percent differences were generally within the method and laboratory control limits. As presented in Table 13, the analytical results obtained using EPA Methods 8021 (identified as investigative samples) and 8260 (identified as split samples) shows a similar overall pattern. The analytes detected are generally similar in concentration and type of analytes detected.

Pilot Test Summary and Conclusions

The overall conclusion based on the results of the Pilot Test is that the injection of the HRC™ into the groundwater may have enhanced the in-situ naturally occurring dechlorination of VOCs at the site. The data that support this conclusion include the following:

- A decrease in concentrations and molar percentages of PCE and TCE in samples from the down-gradient piezometers,
- The increase and subsequent decrease in concentrations and molar percentages of the degradation products of PCE including cis-1,2-DCE and vinyl chloride in samples from the downgradient piezometers,
- The appearance and increase in concentration and molar percentage of ethene, the end-product after total de-chlorination of PCE in the downgradient piezometers,

There is other data, however, that complicate the above conclusion including:

- The fluctuation of the concentration of PCE in the upgradient piezometer P-05
- The fluctuation and general decrease in concentration of PCE in the crossgradient piezometer P-10 over the course of the test without detection of the volatile acids

The data from the volatile acids suggest they persist in the groundwater for over a year. Of the five acids, lactic, pyruvic, and acetic are the primary acids that generate the hydrogen ions. Since the concentrations of the volatile acids were remaining relatively stable at the end of the Pilot Test, conditions can be expected to remain in this state for several more months beyond September 2000 before returning to pre-test conditions. No volatile acids were detected in the cross-gradient piezometer, P-10, fifteen feet from the closest injection point, but were found in the furthest down-gradient piezometer P-09, which is approximately 14 feet away from the injection array. Laterally, the effect of the HRC may be limited to the distance the HRC traveled from the injection point during injection. The effect of the HRC downgradient appears to be controlled by the rate of consumption by the microbes. For this test, the HRC appears to have affected groundwater conditions up to 15 feet downgradient.

In summary, this Enhanced Bioremediation Pilot Test indicates that the HRC injected into the aerobic portions of the aquifer may have contributed to a decrease in the concentrations of PCE and TCE. Other factors in the system, however, may have contributed to the decrease of these compounds in groundwater during the Pilot Test. The Pilot Test was set in a location on the Site that provided relatively optimal conditions, yet the Pilot Test results were mixed. Therefore, there may not be any reason to use HRC at any other location on the Site in the future.

If you have any questions regarding the above-discussed data, please call either Mr. Chris Meyer at (847) 310-6809 or either of the undersigned at (303) 292-5365.

Sincerely,

HARDING ESE, Inc.

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Enclosures: Table 1 – Summary of Survey, Sample, and Boring Data
Table 2 – Summary of Direct-push Sample Volatile Organic Compound Results
Table 3 – Summary of VOC Quality Control Data for Direct-push Sampling
Table 4 – Summary of Piezometer Construction Data

Table 5 – Summary of Pilot Test Volatile Organic Compound Results
Table 6 – Summary of Ethane, Ethene, and Methane Results
Table 7 – Summary of Molar Data
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Table 9 – Summary of Laboratory Inorganic Data
Table 10 – Summary of Volatile Acids Data
Table 11 – Summary of Field Parameter Data
Table 12 – Summary of Groundwater Elevation Data
Table 13 – Summary of VOC Quality Control Results for the Pilot Test Sampling
Table 14 – Summary of Inorganic Quality Control Sample Data for the Pilot Test Sampling

Figure 1 – Site Location Map
Figure 2 – Sample Location Map
Figure 3 – Pilot Test Location Map
Figure 4 – Enhanced Bioremediation Pilot Test Configuration Map
Figure 5 – Summary of Pilot Test VOC Data
Figure 6 – Summary of Pilot Test Ethane and Ethene Data
Figure 7 – Summary of Pilot Test VOC Molar Percentage Data
Figure 8 – Summary of Pilot Test Volatile Acids Data

Appendix A – Log of Borings
Appendix B – TEG and SPL Laboratory Reports for Direct-Push Sampling
Appendix C – Field Forms for Pilot Test Installation
Appendix D – Field Forms for Pilot Test Sampling

cc: Chris Meyer – Unocal
Bridget Balbierz – Unocal
Dong Li – Unocal
Unocal Wichita project file

Table 1: Summary of Survey, Sample, and Boring Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Location Identification Number	Northing[a, c]	Easting[a, c]	Elevation of Measuring Point (feet AMSL)[b, c, d]	Number of Soil Samples Collected	Number of Groundwater samples Collected	Total Depth of Boring (feet bgs)
DP-41	1709860	1656591	NS	1	1	16.0
DP-42	1709870	1656590	NS	1	1	12.0
DP-44	1709873	1656566	NS	1	1	12.0
DP-45	1709901	1656590	NS	1	1	12.0
DP-46	1709878	1656589	NS	1	1	12.0
DP-47	1709935	1656573	NS	0	1	16.0
DP-48	1709977	1656565	NS	0	1	16.0
DP-49	1709890	1656590	NS	1	1	12.0
DP-50	1709901	1656575	NS	1	1	12.0
DP-51	1709917	1656589	NS	1	1	12.0
DP-52	1709901	1656605	NS	0	1	16.0
DP-53	1709887	1656578	NS	0	1	16.0
DP-54	1709879	1656616	NS	0	1	14.0
DP-55	1709871	1656616	NS	0	1	14.0
DP-56	1709860	1656616	NS	0	1	14.0
DP-57	1709850	1656616	NS	0	1	15.0
DP-58	1709869	1656566	NS	0	1	14.5
DP-59	1709859	1656566	NS	0	1	16.0
DP-60	1709849	1656566	NS	0	1	13.5
DP-61	1709870	1656585	NS	3	1	16.0
DP-62	1709878	1656584	NS	3	2	16.0
DP-63	1710029	1656566	NS	0	1	15.0
DP-64	1710076	1656568	NS	0	1	15.0
DP-65	1710074	1656588	NS	0	1	15.0
DP-66	1709851	1656591	NS	3	1	16.0
DP-67	1709890	1656585	NS	3	1	16.0
DP-68	1709980	1656587	NS	0	1	15.0
DP-69	1710029	1656587	NS	0	1	15.0
DP-70	1709901	1656584	NS	3	1	16.0
DP-71	1709934	1656589	NS	3	1	16.0
DP-72	1709934	1656605	NS	0	0	15.0

Table 1: Summary of Survey, Sample, and Boring Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Location Identification Number	Northing[a, c]	Easting[a, c]	Elevation of Measuring Point (feet AMSL)[b, c, d]	Number of Soil Samples Collected	Number of Groundwater samples Collected	Total Depth of Boring (feet bgs)
DP-73	1709918	1656614	NS	0	1	15.0
DP-90	1709954	1656588	NS	0	1	15.0
DP-91	1709956	1656613	NS	0	0	15.0
DP-92	1709954	1656563	NS	0	1	15.0
DP-93	1709954	1656526	NS	0	1	15.0
DP-95	1709903	1656590	NS	1	1	13.0
DP-96	1709861	1656604	NS	1	1	13.0
P-05	1709897	1656596	1349.15	0	8	15.5
P-06	1709880	1656596	1348.88	0	8	16.0
P-07	1709873	1656592	1348.88	0	8	16.0
P-08	1709867	1656592	1348.86	0	8	17.0
P-09	1709861	1656595	1349.07	0	8	15.5
P-10	1709876	1656569	1349.07	0	8	16.5

NS Not surveyed
AMSL Above mean sea level
bgs Below ground surface

Notes:

a) Northings and Eastings shown are Kansas State Plane Coordinates, South Zone, and were derived using ground-based methods.

b) Elevations were surveyed to City of Wichita datum and then converted to NAV29 using a transformation value of 1187.4.

c) Bench Mark: City of Wichita disk, approximately 64 feet north of South Quarter Corner, Section 27, T26S, R1E of the 6th Prime Meridian, Elevation 163.84 (City of Wichita Datum).

d) The measuring point for each well is the north side of the top of the PVC casing.

Table 2: Summary of Direct-Push Sample Volatile Organic Compound Results Soil and Groundwater[a,b] Along the Eastern Portion of Former Unocal Chemicals Distribution Facility Wichita, Kansas

Well No.	Lab	Sample Depth [c]	Date	ACT	2-BUT [d]	CA	CS2	CCl4	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	MeCl2	4-M,2-P [e]	STY	PCE	TCE	VC	1,1,1-TCA	1,1,2-TCA	B	T	E	X	N-BB	IPB	1,2,4-TMB	Nap
Pilot Test Data																													
Groundwater																													
DP-41	TEG	9 to 16	09/20/99	NA	NA	NA	NA	NA	25	207	28	1,149	3	NA	NA	NA	4,633	2,083	350	29	<2	5	19	3	<4	NA	NA	NA	NA
DP-42	TEG	9 to 12	09/20/99	NA	NA	NA	NA	NA	<2	<2	<2	158	<2	NA	NA	NA	826	163	11	<2	13	<2	<2	<2	<4	NA	NA	NA	NA
DP-44	TEG	10 to 12	09/21/99	NA	NA	NA	NA	NA	<10	<10	<10	167	<10	NA	NA	NA	5,267	256	<10	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-45	TEG	9 to 12	09/21/99	NA	NA	NA	NA	NA	16	63	<5	2,490	<5	NA	NA	NA	15,341	4,202	335	191	<5	<5	<5	<5	93	NA	NA	NA	NA
DP-45 DIL	TEG	9 to 12	09/21/99	NA	NA	NA	NA	NA	<200	<200	<200	2,080	<200	NA	NA	NA	118,840	4,480	1,535	260	<200	<200	<200	<200	<400	NA	NA	NA	NA
DP-46	TEG	10 to 12	09/21/99	NA	NA	NA	NA	NA	<10	<10	<10	301	<10	NA	NA	NA	5,658	519	101	<10	69	<10	<10	<10	<20	NA	NA	NA	NA
DP-47	TEG	11 to 16	09/21/99	NA	NA	NA	NA	NA	<10	<10	<10	19	<10	NA	NA	NA	512	<10	98	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-48	TEG	10 to 16	09/21/99	NA	NA	NA	NA	NA	<200	<200	<200	<200	<200	NA	NA	NA	960	<200	254	<200	<200	527	2,797	5,020	8,917	NA	NA	NA	NA
DP-49	TEG	8 to 12	09/22/99	NA	NA	NA	NA	NA	<200	271	<200	638	<200	NA	NA	NA	14,980	726	667	<200	<200	<200	<200	<200	400	NA	NA	NA	NA
DP-50	TEG	8.5 to 12	09/22/99	NA	NA	NA	NA	NA	<100	<100	<100	<100	<100	NA	NA	NA	2,229	<100	319	<100	<100	<100	<100	<100	109	NA	NA	NA	NA
DP-51	TEG	9.5 to 12	09/22/99	NA	NA	NA	NA	NA	<10	43	<10	1,487	<10	NA	NA	NA	4,563	1,116	147	88	<10	<10	<10	<10	122	NA	NA	NA	NA
DP-52	TEG	14 to 16	09/22/99	NA	NA	NA	NA	NA	<50	68	<50	346	<50	NA	NA	NA	570	209	222	<50	<50	<50	<50	<50	<100	NA	NA	NA	NA
DP-53	TEG	14 to 16	09/22/99	NA	NA	NA	NA	NA	<50	69	<50	464	<50	NA	NA	NA	2,365	<50	<50	<50	<50	<50	<50	<50	<100	NA	NA	NA	NA
DP-54	TEG	12 to 14	09/22/99	NA	NA	NA	NA	NA	<50	<50	<50	<50	<50	NA	NA	NA	<50	<50	165	<50	<50	<50	<50	<50	<100	NA	NA	NA	NA
DP-55	TEG	10 to 14	09/22/99	NA	NA	NA	NA	NA	<50	<50	<50	<50	<50	NA	NA	NA	<50	<50	162	<50	<50	<50	<50	<50	<100	NA	NA	NA	NA
DP-56	TEG	10 to 14	09/22/99	NA	NA	NA	NA	NA	<50	<50	<50	<50	<50	NA	NA	NA	<50	<50	<50	<50	<50	<50	<50	<50	<100	NA	NA	NA	NA
DP-57	TEG	12 to 15	09/23/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	9	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-58	TEG	10 to 14.5	09/23/99	NA	NA	NA	NA	NA	<50	<50	<50	52	<50	NA	NA	NA	56	<50	<50	<50	<50	<50	<50	<50	<100	NA	NA	NA	NA
DP-59	TEG	6 to 6.5	09/22/99	NA	NA	NA	NA	NA	<50	<50	<50	1,025	<50	NA	NA	NA	10,215	985	328	<50	<50	<50	<50	<50	<100	NA	NA	NA	NA
DP-60	TEG	8 to 13.5	09/23/99	NA	NA	NA	NA	NA	<50	70	<50	490	<50	NA	NA	NA	5,555	225	<50	<50	<50	<50	<50	<50	<100	NA	NA	NA	NA
DP-61	TEG	14 to 16	09/23/99	NA	NA	NA	NA	NA	<200	299	<200	1,095	<200	NA	NA	NA	10,660	<200	663	<200	<200	<200	<200	<200	<400	NA	NA	NA	NA
DP-62	TEG	11 to 13	09/23/99	NA	NA	NA	NA	NA	<200	<200	<200	434	<200	NA	NA	NA	6,200	<200	642	<200	<200	<200	<200	<200	<400	NA	NA	NA	NA
DP-62	TEG	14 to 16	09/23/99	NA	NA	NA	NA	NA	<200	<200	<200	1,694	<200	NA	NA	NA	15,400	1,220	<200	<200	<200	<200	<200	<200	<400	NA	NA	NA	NA
DP-63	TEG	8 to 15	09/23/99	NA	NA	NA	NA	NA	<200	<200	<200	<200	<200	NA	NA	NA	<200	<200	<200	<200	<200	3,820	1,003	775	11,036	NA	NA	NA	NA
DP-64	TEG	8 to 15	09/23/99	NA	NA	NA	NA	NA	<200	<200	<200	<200	<200	NA	NA	NA	5,888	<200	<200	<200	<200	<200	1,295	6,160	5,880	NA	NA	NA	NA
DP-65	TEG	8 to 15	09/23/99	NA	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	NA	NA	<10	<10	<10	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-67	TEG	13 to 15	09/23/99	NA	NA	NA	NA	NA	<100	150	<100	1,240	<100	NA	NA	NA	12,008	850	337	<100	<100	<100	<100	<100	<200	NA	NA	NA	NA
DP-68	TEG	8 to 15	09/24/99	NA	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	NA	NA	<10	<10	<10	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-69	TEG	11.5 to 12.5	09/24/99	NA	NA	NA	NA	NA	<1	<1	<1	<1	<1	NA	NA	NA	<1	<1	3	<1	<1	<1	<1	<1	<2	NA	NA	NA	NA
DP-70	TEG	13 to 15	09/23/99	NA	NA	NA	NA	NA	<100	<100	<100	3,612	<100	NA	NA	NA	67,211	3,424	670	<100	<100	<100	<100	<100	<200	NA	NA	NA	NA
DP-71	TEG	14 to 15	09/24/99	NA	NA	NA	NA	NA	<10	10	<10	3,132	12	NA	NA	NA	6,531	866	353	46	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-73	TEG	12 to 13	09/24/99	NA	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	NA	NA	429	<10	<10	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-90	TEG	8 to 15	09/25/99	NA	NA	NA	NA	NA	39	60	<10	339	26	NA	NA	NA	<10	<10	503	<10	<10	<10	<10	12	<20	NA	NA	NA	NA
DP-92	TEG	8 to 15	09/25/99	NA	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	NA	NA	<10	<10	<10	<10	<10	64	<10	10	14	NA	NA	NA	NA
DP-93	TEG	8 to 15	09/25/99	NA	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	NA	NA	<10	<10	<10	<10	<10	179	125	198	446	NA	NA	NA	NA
DP-95	TEG	8.5 to 13	09/25/99	NA	NA	NA	NA	NA	10	29	<10	632	<10	NA	NA	NA	3,039	731	43	17	<10	<10	<10	<10	17.3	NA	NA	NA	NA
DP-96	TEG	8.5 to 13	09/25/99	NA	NA	NA	NA	NA	<10	14	<10	<10	<10	NA	NA	NA	259	<10	<10	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
Soil																													
DP-41	TEG	3.5 to 4	09/20/99	NA	NA	NA	NA	NA	<2	3	<2	<2	<2	NA	NA	NA	<2	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-42	TEG	5 to 5.5	09/20/99	NA	NA	NA	NA	NA	<2	3	<2	<2	<2	NA	NA	NA	17	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-44	TEG	5 to 5.5	09/21/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	14	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-45	TEG	5 to 5.5	09/21/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	432	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-46	TEG	3 to 3.5	09/21/99	NA	NA	NA	NA	NA	<3	<3	<3	<3	<3	NA	NA	NA	<3	<3	11	<3	<3	<3	<3	<3	<6.6	NA	NA	NA	NA
DP-49	TEG	5 to 5.5	09/22/99	NA	NA	NA	NA	NA	<4	<4	<4	<4	<4	NA	NA	NA	111	<4	<4	<4	<4	<4	<4	<4	<8	NA	NA	NA	NA
DP-50	TEG	5 to 5.5	09/22/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	56	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-51	TEG	5 to 5.5	09/22/99	NA	NA	NA	NA	NA	<2	<2	<2	4	<2	NA	NA	NA	243	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA

Table 2 (continued)

Well No.	Lab	Sample Depth [c]	Date	ACT	2-BUT [d]	CA	CS2	CCl4	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	MeCl2	4-M,2-P [e]	STY	PCE	TCE	VC	1,1,1-TCA	1,1,2-TCA	B	T	E	X	N-BB	IPB	1,2,4-TMB	Nap
Pilot Test Data																													
Soil																													
DP-52	TEG	5 to 5.5	09/22/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	70	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-53	TEG	3 to 3.5	09/22/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	67	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-61	TEG	5 to 5.5	09/22/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	66	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-61	TEG	9 to 9.5	09/22/99	NA	NA	NA	NA	NA	<2	5	<2	3	3	NA	NA	NA	94	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-61	TEG	13 to 13.5	09/22/99	NA	NA	NA	NA	NA	<2	<2	<2	56	<2	NA	NA	NA	1,027	80	14	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-62	TEG	5 to 5.5	09/23/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	14	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-62	TEG	9 to 9.5	09/23/99	NA	NA	NA	NA	NA	<2	<2	<2	5	<2	NA	NA	NA	252	8	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-62	TEG	14.5 to 15	09/23/99	NA	NA	NA	NA	NA	<2	<2	<2	82	<2	NA	NA	NA	1,131	116	25	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-66	TEG	5 to 5.5	09/23/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	45	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-66	TEG	9 to 9.5	09/23/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	103	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-66	TEG	14.5 to 15	09/23/99	NA	NA	NA	NA	NA	<2	4	<2	298	<2	NA	NA	NA	2,086	450	28	6	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-67	TEG	5 to 5.5	09/23/99	NA	NA	NA	NA	NA	<2	<2	<2	<2	<2	NA	NA	NA	139	<2	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-67	TEG	9 to 9.5	09/23/99	NA	NA	NA	NA	NA	<2	<2	<2	28	<2	NA	NA	NA	1,080	37	<2	<2	<2	<2	<2	<2	<4	NA	NA	NA	NA
DP-67	TEG	14.5 to 15	09/23/99	NA	NA	NA	NA	NA	<10	<10	<10	31	<10	NA	NA	NA	1,050	16	32	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-70	TEG	5 to 5.5	09/23/99	NA	NA	NA	NA	NA	<7	<7	<7	<7	<7	NA	NA	NA	535	<7	<7	<7	<7	<7	<7	<7	<13	NA	NA	NA	NA
DP-70	TEG	9 to 9.5	09/23/99	NA	NA	NA	NA	NA	<10	<10	<10	18	<10	NA	NA	NA	440	<10	<10	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-70	TEG	14.5 to 15	09/23/99	NA	NA	NA	NA	NA	<10	<10	<10	299	<10	NA	NA	NA	6,309	510	53	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-71	TEG	5 to 5.5	09/23/99	NA	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	NA	NA	678	<10	<10	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-71	TEG	9 to 9.5	09/23/99	NA	NA	NA	NA	NA	<10	<10	<10	845	<10	NA	NA	NA	21,340	355	<10	<10	<10	<10	<10	89	73.3	NA	NA	NA	NA
DP-71	TEG	14.5 to 15	09/23/99	NA	NA	NA	NA	NA	<10	14	<10	257	<10	NA	NA	NA	956	33	34	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-95	TEG	5 to 6	09/26/99	NA	NA	NA	NA	NA	<3	<3	<3	29	<3	NA	NA	NA	446	<3	8	<3	<3	<3	31	4	35	NA	NA	NA	NA
DP-96	TEG	5 to 6	09/25/99	NA	NA	NA	NA	NA	<3	<3	<3	<3	<3	NA	NA	NA	<3	<3	8	<3	<3	<3	<3	<3	<5	NA	NA	NA	NA
Phase III Data																													
Groundwater																													
DP-01	TEG	16 to 18	11/02/97	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	NA	<1
DP-01	TEG	24.5 to 27	11/04/97	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	NA	<1
DP-02	TEG	16 to 17.5	11/04/97	<1	<1	<1	<1	<1	62	55	<1	620	<1	<1	<1	<1	27	12	490	37	<1	<9	<1	<1	<1	NA	NA	NA	<1
DP-02	TEG	26.5 to 27	11/04/97	<1	<1	<1	<1	<1	5	<1	<1	11	<1	<1	<1	<1	3	7	77	<1	<1	<1	<1	<1	<1	NA	NA	NA	<1
DP-06 DIL	TEG	13.5 to 16	11/08/97	<10	<10	<10	<10	<10	<10	34	<10	1,000	<10	<10	<10	<10	6,410	860	<10	120	<10	<10	<10	<10	<10	NA	NA	NA	<10
DP-06	TEG	13.5 to 16	11/08/97	<1	<1	<1	<1	<1	<1	18	<1	510	<1	<1	<1	<1	2,190 J	410	<1	27	7	<1	<1	<1	<1	NA	NA	NA	<1
DP-06	TEG	17 to 22	11/26/97	<1	<1	<1	<1	<1	19	5	<1	1,750	<1	<1	<1	<1	2,390	1,420	61	160	<1	<1	<1	<1	<1	NA	NA	NA	<1
DP-06	TEG	25.5 to 28.5	11/09/97	<1	<1	<1	<1	<1	<1	45	<1	340	<1	<1	<1	<1	6,070	600	97	140	<1	<1	<1	<1	<1	NA	NA	NA	<1
DP-30	TEG	8 to 12	12/05/97	<2	<2	<2	<2	<2	31	<2	<2	27	<2	<2	<2	<2	64	13	320	<2	<2	<2	<2	<2	<2	NA	NA	NA	<2
DP-32	TEG	13 to 16	12/06/97	<5	<5	<5	<5	<5	<5	<5	130	41	<5	<5	<5	<5	34	32	<5	<5	<5	<5	17	20	<5	NA	NA	NA	26
DP-34	TEG	13 to 16	12/06/97	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	11	33	10	NA	NA	NA	<5
Soil																													
DP-01	TEG	5 to 6	11/02/97	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	NA	<1
DP-02	TEG	5 to 7	11/04/97	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	NA	<1
DP-06	TEG	5 to 6	11/08/97	<1	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	99	7	<1	<1	<1	4	2	<1	<1	NA	NA	NA	<1
DP-30	TEG	5 to 6	12/05/97	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	80	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	NA	<1
DP-32	TEG	5 to 6	12/06/97	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	11	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	NA	<1
DP-34	TEG	2 to 3	12/06/97	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	NA	<1

Table 2 (continued)

J	Reported concentration is below detection limit
M	Matrix effect present
NA	Not Analyzed
VOC	Volatile Organic Compounds
TEG	TEG Rocky Mtn. Environmental Division
DIL	Investigative sample dilution
<	Not detected above indicated value
Note:	Original (listed first) and diluted results are reported for DP-45 and DP-06
a.	Soil and groundwater samples analyzed for VOCs by TEG were analyzed using EPA method 8021M. Soil and groundwater samples analyzed for VOCs by SPL were analyzed using EPA method 8021B.
b.	Soil results are in micrograms per kilogram, and groundwater results are in micrograms per liter.
c.	Approximate depth in feet below ground surface.
d.	The analyte 2-Butanone is referred to as methyl Ethyl Ketone in SPL reports.
e.	The analyte 4-Methyl-2-Pentanone is referred to as Methyl Isobutyl Ketone in SPL reports.

Abbreviation	Analyte	Abbreviation	Analyte
1,1,1-TCA	1,1,1-Trichloroethane	CS2	Carbon Disulfide
1,1,2-TCA	1,1,2-Trichloroethane	E	Ethylbenzene
1,1-DCA	1,1-Dichloroethane	IPB	Isopropylbenzene
1,1-DCE	1,1-Dichloroethene	MeCl2	Methylene Chloride
1,2,4-TMB	1,2,4-Trimethylbenzene	N-BB	N-Butylbenzene
1,2-DCA	1,2-Dichloroethane	Nap	Naphthalene
2-BUT	2-Butanone	PCE	Tetrachloroethene
4-M,2-P	4-Methyl-2-Pentanone	STY	Styrene
ACT	Acetone	T	Toluene
B	Benzene	TCE	Trichloroethene
CA	Chloroethane	trans-1,2-DCE	Trans-1,2-Dichloroethene
CCl4	Carbon Tetrachloride	VC	Vinyl Chloride
cis-1,2-DCE	Cis-1,2-Dichloroethene	X	Xylene

Table 3: Summary of VOC Quality Control Data for Direct-Push Sampling Soil and Groundwater [a, b] Along the Eastern Portion of Former Unocal Chemicals Distribution Facility Wichita, Kansas

Well No.	Sample Type	Lab	Sample Depth [c]	Date	ACT	2-BUT [d]	CA	CS2	CCl4	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	MeCl2	4-M,2-P [e]	STY	PCE	TCE	VC	1,1,1-TCA	1,1,2-TCA	B	T	E	X	N-BB	IPB	1,2,4-TMB	Nap
Groundwater																														
DP-46	INV	TEG	10 to 12	09/21/99	NA	NA	NA	NA	NA	<10	<10	<10	301	<10	NA	NA	NA	5,658	519	101	<10	69	<10	<10	<10	<20	NA	NA	NA	NA
DP-46	DUP	TEG	10 to 12	09/21/99	NA	NA	NA	NA	NA	<10	<10	<10	260	<10	NA	NA	NA	4,914	410	89	<10	67	<10	<10	<10	<20	NA	NA	NA	NA
DP-93	INV	TEG	8 to 15	09/25/99	NA	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	NA	NA	<10	<10	<10	<10	<10	179	125	198	446	NA	NA	NA	NA
DP-93	DUP	TEG	8 to 15	09/25/99	NA	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	NA	NA	<10	<10	<10	<10	<10	70	44	22	48	NA	NA	NA	NA
DP-95	INV	TEG	8.5 to 13	09/25/99	NA	NA	NA	NA	NA	10	29	<10	632	<10	NA	NA	NA	3,039	731	43	17	<10	<10	<10	<10	17.3	NA	NA	NA	NA
DP-95	SPLT	SPL	8.5 to 13	09/26/99	<1,200	<250	<250	<250	<250	<250	<250	<250	870	<250	<250	<250	<250	22,000	1,200	<250	<250	<250	<250	<250	<250	NA	NA	NA	NA	NA
DP-96	INV	TEG	8.5 to 13	09/25/99	NA	NA	NA	NA	NA	<10	14	<10	<10	<10	NA	NA	NA	259	<10	<10	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-96	DUP	TEG	8.5 to 13	09/25/99	NA	NA	NA	NA	NA	<10	16	<10	<10	<10	NA	NA	NA	254	<10	<10	<10	<10	<10	<10	<10	<20	NA	NA	NA	NA
DP-96	SPLT	SPL	8.5 to 13	09/26/99	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	240	10	<10	<10	<10	<10	<10	<10	NA	NA	NA	NA	<10
TRIP BLANK	TRIP	SPL		09/23/99	<20	<4	<2	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<2	<1	<1	<1	<1	<1	NA	<1	<1	<2	<1
Soil																														
DP-95	INV	TEG	5 to 6	09/26/99	NA	NA	NA	NA	NA	<3	<3	<3	29	<3	NA	NA	NA	446	<3	8	<3	<3	<3	31	4	35	NA	NA	NA	NA
DP-95	DUP	TEG	5 to 6	09/26/99	NA	NA	NA	NA	NA	<3	<3	<3	3	<3	NA	NA	NA	579	<3	<3	<3	<3	<3	<3	<3	<5	NA	NA	NA	NA
DP-95	SPLT	SPL	5 to 6	09/26/99	<20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	20	<1	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA	<1
DP-96	INV	TEG	5 to 6	09/25/99	NA	NA	NA	NA	NA	<3	<3	<3	<3	<3	NA	NA	NA	<3	<3	8	<3	<3	<3	<3	<3	<5	NA	NA	NA	NA
DP-96	SPLT	SPL	5 to 6	09/26/99	<20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NA	NA	NA	NA	<1

Soil results are in micrograms per kilogram, and groundwater results are in micrograms per liter.

DIL	Investigative sample dilution
DUP	Indicates duplicate sample
INV	Investigative sample
NA	Not Analyzed
SPL	Southern Petroleum Laboratory
SPLT	Split sample
TEG	TEG Rocky Mtn. Environmental Division
VOC	Volatile Organic Compound

a. Soil and groudwater samples analyzed for VOCs by TEG were analyzed using EPA method 8021M.
Soil and groudwater samples analyzed for VOCs by SPL were analyzed using EPA method 8021B.

b. Soil results are in micrograms per kilogram, and groundwater results are in micrograms per liter.

c. Approximate depth in feet below ground surface.

d. The analyte 2-Butanone is referred to as methyl Ethyl Ketone in SPL reports.

e The analyte 4-Methyl-2-Pentanone is referred to as Methyl Isobutyl Ketone in SPL reports.

Abbreviation	Analyte	Abbreviation	Analyte
1,1,1-TCA	1,1,1-Trichloroethane	CS2	Carbon Disulfide
1,1,2-TCA	1,1,2-Trichloroethane	E	Ethylbenzene
1,1-DCA	1,1-Dichloroethane	IPB	Isopropylbenzene
1,1-DCE	1,1-Dichloroethene	MeCl2	Methylene Chloride
1,2,4-TMB	1,2,4-Trimethylbenzene	N-BB	N-Butylbenzene
1,2-DCA	1,2-Dichloroethane	Nap	Naphthalene
2-BUT	2-Butanone	PCE	Tetrachloroethene
4-M,2-P	4-Methyl-2-Pentanone	STY	Styrene
ACT	Acetone	T	Toluene
B	Benzene	TCE	Trichloroethene
CA	Chloroethane	trans-1,2-DCE	Trans-1,2-Dichloroethene
CCl4	Carbon Tetrachloride	VC	Vinyl Chloride
cis-1,2-DCE	Cis-1,2-Dichloroethene	X	Xylene

Table 4: Summary of Piezometer Construction Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Well Identification Number	Casing Diameter (inches)	Depth to Top of Screen (feet bgs)	Depth to Bottom of Screen (feet bgs)	Approximate Saturated Thickness (feet)	Depth to Bottom of Casing (feet bgs)	Depth of Borehole (feet bgs)	Stick-up (feet)	Depth to Top of Sandpack (feet bgs)	Depth to Bottom of Sandpack (feet bgs)	Depth to Top of Bentonite Seal (feet bgs)	Depth to Bottom of Bentonite Seal (feet bgs)
P-05	2	5.5	15	6.8	15.5	15.5	1.0	4	15.0	2	4
P-06	2	5.5	15	6.8	15.5	16.0	0.7	4	16.0	2	4
P-07	2	5.5	15	6.5	15.5	16.0	0.8	4	16.0	2	4
P-08	2	5.5	15	6.4	15.5	17.0	1.0	4	17.0	2	4
P-09	2	5.0	15	6.6	15.5	15.5	0.9	4	15.5	2	4
P-10	2	5.0	15	6.6	15.5	16.5	1.0	4	16.5	2	4

bgs Below ground surface

Notes:
1) Piezometers P-05 through P-10 were constructed of Schedule 40 polyvinyl chloride (PVC).
2) Piezometers P-05 through P-10 were installed using a hollow-stem auger.

Table 5: Summary of Pilot Test Volatile Organic Compound Results
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility, Wichita, Kansas

Well No.	Lab	Date	ACT	2-BUT[d]	CA	CS2	CCl4	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	4-M,2-P[c]	MeCl2	STY	PCE	TCE	VC	1,1,1-TCA	1,1,2-TCA	B	T	E	X	NAP
Groundwater																									
P-02	SPL	09/27/99	<100	<100	<100	<100	<100	<100	<100	<100	490	<100	<100	<100	<100	6,400	1,400	180	<100	<100	<100	<100	<100	<100	<100
	SPL	10/26/99	<100	49	<5.0	<5.0	<5.0	17	37	<5.0	1,800	<5.0	<5.0	<5.0	<5.0	4,800	890	510	31	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	11/30/99	<10	<1.0	2.1	<1.0	<1.0	18	65	2.0	6,100	12	<1.0	<1.0	<1.0	510	960	280	48	1.2	1.6	1.5	<1.0	3.8	4.7
	SPL	12/22/99	<500	240	<10	<100	<10	14	48	<10	6,500	<10	<100	<10	<10	2,700	2,300	390	94	<10	<10	<10	<10	<10	<10
	SPL	01/25/00	<2,000	710	<25	<100	<25	<25	130	<25	10,000	<25	<100	<25	<25	1,700	3,300	880	180	<25	<25	<25	<25	<25	<25
	SPL	03/28/00	<2,000	2,000	<25	<100	<25	<25	53	<25	7,800	<25	<100	<25	<25	2,600	1,800	3,600	83	<25	<25	<25	<25	<25	<25
	SPL	05/24/00	<2,000	1,200	<50	<100	<50	<50	87	<50	7,000	<50	<100	<50	<50	1,800	8,200	1,300	200	<50	<50	<50	<50	<50	<50
	SPL	09/27/00	<250	12,000	<25	<25	<25	<25	66	<25	17,000	26	<25	38	<25	41	240	2,400	180	<25	<25	<25	<25	<25	<25
P-05	SPL	09/28/99	<100	<100	<100	<100	<100	<100	<100	<100	1,400	<100	<100	<100	<100	35,000	2,600	250	<100	<100	<100	<100	<100	<100	<100
	SPL	10/26/99	<100	<5.0	<500	<5.0	<500	<500	56	<500	2,500	<5.0	<5.0	<500	<5.0	49,000	4,000	240	<500	<500	<5.0	8.5	11	51	26
	SPL	11/29/99	<100	<10	<25	<10	<25	<25	64	<25	3,800	<25	<10	250	<25	55,000	4,400	120	100	<25	<25	<25	<25	25	<50
	SPL	12/21/99	<500	<100	<1.0	<100	<1.0	26	110	1.4	3,700	4.4	<100	<1.0	<1.0	45,000	3,900	110	67	11	1.9	12	18	70	36
	SPL	01/24/00	<1,000	<50	<50	<50	<50	<50	73	<50	4,100	<50	<50	<50	<50	45,000	3,100	290	82	<50	<50	<50	<50	<50	<50
	SPL	03/27/00	<2,000	<100	<25	<100	<25	<25	<25	<25	710	<25	<100	<25	<25	10,000	990	170	28	<25	<25	<25	<25	<25	<25
	SPL	05/23/00	<1,000	<50	<10	<50	<10	14	<10	<10	370	<10	<50	<10	<10	8,300	560	160	18	<10	<10	<10	<10	<10	<10
	SPL	09/26/00	<1,000	<100	<100	<100	<100	<100	<100	<100	3,000	<100	<100	<100	<100	47,000	3,200	130	110	<100	<100	<100	<100	<100	<100
P-06	SPL	09/27/99	1,000	<100	<100	<100	<100	<100	<100	<100	550	<100	<100	<100	<100	6,000	1,100	290	<100	<100	<100	<100	<100	<100	<100
	SPL	10/26/99	<100	210	<5.0	<5.0	<5.0	17	28	<5.0	5,200	<5.0	<5.0	<5.0	<5.0	150	120	380	6.9	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	11/29/99	<50	1,300	<10	<25	<10	23	76	<10	11,000	23	<25	81	<10	360	370	1,500	22	<10	<10	<10	<10	<10	<10
	SPL	12/22/99	<500	1,400	<10	<100	<10	14	47	<10	12,000	12	<100	<10	<10	700	960	1,200	19	<10	<10	<10	<10	<10	<10
	SPL	01/24/00	<1,000	1,600	<10	<50	<10	31	170	<10	24,000	34	<50	18	<10	960	2,100	2,800	49	<10	<10	<10	<10	<10	<10
	SPL	03/27/00	<2,000	740	<25	<100	<25	<25	89	<25	14,000	<25	<100	<25	<25	1,700	5,200	2,100	45	<25	<25	<25	<25	<25	<25
	SPL	05/23/00	<1,000	1,100	<10	<50	<10	15	46	<10	12,000	19	<50	110	<10	940	1,300	4,100	24	<10	<10	<10	<10	<10	<10
	SPL	09/26/00	<250	2,400	<25	<25	<25	<25	<25	<25	5,300	<25	<25	32	<25	230	680	1,500	<25	<25	<25	<25	<25	<25	<25
P-07	SPL	09/27/99	1,200	<100	<100	<100	<100	<100	<100	<100	560	<100	<100	<100	<100	6,500	840	160	<100	<100	<100	<100	<100	<100	<100
	SPL	10/26/99	240	750	<5.0	<5.0	<5.0	13	27	<5.0	3,900	<5.0	<5.0	<5.0	<5.0	210	68	140	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	11/30/99	70	63	4.1	<1.0	<1.0	26	87	2.7	8,000	16	<1.0	<1.0	1.2	160	210	390	28	1.4	1.5	1.5	1.5	3.7	4.9
	SPL	12/22/99	<500	1,300	<5.0	<100	<5.0	12	31	<5.0	10,000	17	<100	<5.0	<5.0	180	200	360	12	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	01/25/00	<2,000	2,100	<25	<100	<25	<25	100	<25	15,000	<25	<100	<25	<25	250	540	1,100	<25	<25	<25	<25	<25	<25	<25
	SPL	03/28/00	<2,000	480	<25	<100	<25	<25	36	<25	12,000	<25	<100	<25	<25	270	1,300	540	<25	<25	<25	<25	<25	<25	<25
	SPL	05/23/00	<2,000	1,300	<25	<100	<25	<25	51	<25	14,000	<25	<100	<25	<25	430	2,200	2,200	<25	<25	<25	<25	<25	<25	<25
	SPL	09/26/00	250	6,800	<10	<10	<10	19	26	<10	8,900	21	<10	11	<10	310	410	770	12	<10	<10	<10	<10	<10	<10
P-08	SPL	09/27/99	<500	<100	<100	<100	<100	<100	<100	<100	860	<100	<100	<100	<100	9,000	1,300	170	<100	<100	<100	<100	<100	<100	<100
	SPL	10/26/99	<100	<5.0	<5.0	<5.0	<5.0	<5.0	41	<5.0	4,000	<5.0	<5.0	<5.0	<5.0	950	140	250	13	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	11/30/99	14	31	1.1	<1.0	<1.0	22	69	2.2	5,300	7.9	<1.0	<1.0	<1.0	140	220	930	13	<1.0	1.0	1.0	<1.0	3.1	3.0
	SPL	12/22/99	<500	1,000	<5.0	<100	<5.0	16	33	<5.0	4,900	8.3	<100	<5.0	<5.0	56	40	920	9.9	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	01/25/00	<500	3,100	<10	<25	<10	21	74	<10	9,200	21	<25	<10	<10	31	80	2,000	24	<10	<10	<10	<10	<10	<10
	SPL	03/28/00	<2,000	3,000	<25	<100	<25	<25	<25	<25	5,600	<25	<100	<25	<25	35	60	2,400	<25	<25	<25	<25	<25	<25	<25
	SPL	05/24/00	<2,000	4,100	<25	<100	<25	<25	25	<25	5,900	<25	<100	<25	<25	46	370	2,300	<25	<25	<25	<25	<25	<25	<25
	SPL	09/27/00	160	6,500	<10	<10	<10	19	22	<10	5,600	20	<10	10	<10	47	350	1,000	<10	<10	<10	<10	<10	<10	10

Table 5 (continued)

Well No.	Lab	Date	ACT	2-BUT[d]	CA	CS2	CCl4	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	4-M,2-P	MeCl2[c]	STY	PCE	TCE	VC	1,1,1-TCA	1,1,2-TCA	B	T	E	X	NAP
Groundwater																									
P-09	SPL	09/27/99	<500	<100	<100	<100	<100	<100	<100	<100	160	<100	<100	<100	<100	3,900	640	<100	<100	<100	<100	<100	<100	<100	<100
	SPL	10/26/99	<100	<5.0	<5.0	<5.0	<5.0	9.1	21	<5.0	1,700	<5.0	<5.0	<5.0	<5.0	1,700	390	120	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	11/30/99	<10	62	<1.0	<1.0	<1.0	15	28	1.3	1,600	4.0	<1.0	<1.0	<1.0	140	64	440	6.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	12/22/99	<500	<100	<5.0	<100	<5.0	5.3	<5.0	<5.0	1,000	<5.0	<100	<5.0	<5.0	1,600	310	290	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	01/25/00	<500	290	<10	<25	<10	12	<10	<10	1,100	<10	<25	<10	<10	170	220	530	<10	<10	<10	<10	<10	<10	<10
	SPL	03/28/00	<100	190	<5.0	<5.0	<5.0	8.3	<5.0	<5.0	1,100	7.0	<5.0	<5.0	<5.0	110	120	570	9.9	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	05/24/00	<100	1,200	<5.0	<5.0	<5.0	16	5.0	<5.0	1,900	13	<5.0	<5.0	<5.0	49	210	1,200	19	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	09/27/00	270	7,700	<5.0	<5.0	<5.0	19	<5.0	<5.0	430	12	<5.0	<5.0	<5.0	<5.0	<5.0	190	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	11
P-10	SPL	09/28/99	<500	<100	<100	<100	<100	<100	<100	<100	140	<100	<100	<100	<100	5,300	200	<100	<100	<100	<100	<100	<100	<100	<100
	SPL	10/25/99	<200	<10	<10	NA	<10	<10	<10	<10	98	<10	<10	<10	<10	2,600	120	<10	<10	<10	<10	<10	<10	<10	<10
	SPL	11/30/99	<10	<1.0	<1.0	<1.0	<1.0	2.6	4.8	<1.0	95	<1.0	<1.0	<1.0	<1.0	610	72	3.5	6.2	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	12/21/99	<120	<25	<1.0	<25	<1.0	<1.0	<1.0	<1.0	100	<1.0	<25	<1.0	<1.0	2,200	110	<1.0	3.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	01/24/00	<500	<25	<1.0	<25	<1.0	1.3	1.6	<1.0	97	<1.0	<25	<1.0	<1.0	2,000	120	1.2	2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	03/27/00	<100	<5.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	24	<1.0	<5.0	<1.0	<1.0	940	42	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	05/23/00	<100	<5.0	<1.0	<5.0	<1.0	1.0	<1.0	<1.0	62	10	<5.0	<1.0	<1.0	1,200	84	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	09/26/00	<10	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	47	<1.0	<1.0	<1.0	<1.0	500	67	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

NA Not Analyzed
VOC Volatile Organic Compounds
SPL Southern Petroleum Laboratory
Note: Results are rounded to a maximum of two significant figures.

< Not detected above indicated value

a. Groundwater samples analyzed for VOCs by SPL were analyzed using EPA method 8021B.

b. Groundwater results are in micrograms per liter.

c. The analyte 4-Methyl-2-Pentanone is referred to as Methyl Isobutyl Ketone in SPL reports.

d. The analyte 2-Butanone is referred to as Methyl Ethyl Ketone in SPL reports.

Abbreviation	Analyte	Abbreviation	Analyte
1,1,1-TCA	1,1,1-Trichloroethane	CS2	Carbon Disulfide
1,1,2-TCA	1,1,2-Trichloroethane	E	Ethylbenzene
1,1-DCA	1,1-Dichloroethane	IPB	Isopropylbenzene
1,1-DCE	1,1-Dichloroethene	MeCl2	Methylene Chloride
1,2,4-TMB	1,2,4-Trimethylbenzene	N-BB	N-Butylbenzene
1,2-DCA	1,2-Dichloroethane	Nap	Naphthalene
2-BUT	2-Butanone	PCE	Tetrachloroethene
4-M,2-P	4-Methyl-2-Pentanone	STY	Styrene
ACT	Acetone	T	Toluene
B	Benzene	TCE	Trichloroethene
CA	Chloroethane	trans-1,2-DCE	Trans-1,2-Dichloroethene
CCl4	Carbon Tetrachloride	X	Xylene
cis-1,2-DCE	Cis-1,2-Dichloroethene	VC	Vinyl Chloride

Table 6: Summary of Ethane, Ethene, and Methane Results
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date	9/28/99							
	Collection Date[a]	9/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
	Days Since Injection	-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**Results[b]**							
P-02	Ethane	<10	<10	<30	<20	<20	<10	<20	<20
	Ethene	<10	<10	<30	<20	25.1	373	243	140
	Methane	19.5	9	44.4	715	327	1010	590	710
P-05	Ethane	<10	<20	<20	<20	<20	<8	<20	<30
	Ethene	<10	<20	<20	<20	<20	<7	<20	<30
	Methane	<7.0	<9.0	39.4	56.8	59.9	<4	19.9	60
P-06	Ethane	<10	<30	<20	<20	20.4	<20	<9	<20
	Ethene	<10	<30	<20	<20	20.4	43.9	203	880
	Methane	10	45.2	73.7	191	761	1370	725	1840
P-07	Ethane	<10	<20	<20	<20	<20	<20	<20	<30
	Ethene	<10	<20	<20	<20	<10	88.8	180	240
	Methane	<7.0	18.3	17	16.5	78.3	312	533	630
P-08	Ethane	<10	<20	<30	<20	<20	<20	<30	<20
	Ethene	<10	<20	<30	<20	130	876	1150	580
	Methane	<7.0	<10	38	52.6	659	1050	1540	1260
P-09	Ethane	<10	<20	<30	<20	<20	<10	<20	<30
	Ethene	<10	<20	<30	86.7	447	580	1200	1310
	Methane	7.5	<10	52.1	71.7	274	326	556	1710
P-10	Ethane	<10	<10	<30	<20	<20	<10	<20	<20
	Ethene	<10	<10	<30	<20	<20	<10	<20	<20
	Methane	<7.0	<7.0	<20	<10	<10	<7	<10	20

< Not detected at the indicated concentration

a. Samples are collected on two consecutive days. The first day of sampling is used for the sampling date on this table and for the dates plotted on the attached figures.

b. Units are in micrograms per liter

Table 7: Summary of Molar Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date:		9/28/99							
	Sampling Date		09/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
			-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**mol. Wt. (g/mol)**	**Results (µmol/l)**							
P-02	PCE	165.83	38.6	28.9	3.1	16.3	10.3	15.7	10.9	0.2
	TCE	131.39	10.7	6.8	7.3	17.5	25.1	13.7	62.4	1.8
	cis-1,2-DCE	96.94	5.1	18.6	62.9	67.0	103.2	80.5	72.2	175.4
	VC	62.50	2.9	8.2	4.5	6.2	14.1	57.6	20.8	38.4
	Ethane	30.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ethene	28.05	0.0	0.0	0.0	0.0	0.9	13.3	8.7	5.0
		Total	57.2	62.4	77.8	107.1	153.5	180.7	174.9	220.8
P-05	PCE	165.83	211.1	295.5	331.7	271.4	271.4	60.3	50.1	283.4
	TCE	131.39	19.8	30.4	33.5	29.7	23.6	7.5	4.3	24.4
	cis-1,2-DCE	96.94	14.4	25.8	39.2	38.2	42.3	7.3	3.8	30.9
	VC	62.50	4.0	3.8	1.9	1.8	4.6	2.7	2.6	2.1
	Ethane	30.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ethene	28.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Total	249.3	355.5	406.3	341.0	341.9	77.9	60.7	340.8
P-06	PCE	165.83	36.2	0.9	2.2	4.2	5.8	10.3	5.7	1.4
	TCE	131.39	8.4	0.9	2.8	7.3	16.0	39.6	9.9	5.2
	cis-1,2-DCE	96.94	5.7	53.6	113.5	123.8	247.6	216.6	123.8	54.7
	VC	62.50	4.6	6.1	24.0	19.2	44.8	33.6	65.6	24.0
	Ethane	30.07	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
	Ethene	28.05	0.0	0.0	0.0	0.0	0.7	1.6	7.2	31.4
		Total	54.9	61.5	142.5	154.5	315.5	301.6	212.2	116.6
P-07	PCE	165.83	39.2	1.3	1.0	1.1	1.5	1.6	2.6	1.9
	TCE	131.39	6.4	0.5	1.6	1.5	4.1	9.9	16.7	3.1
	cis-1,2-DCE	96.94	5.8	40.2	82.5	103.2	154.7	123.8	144.4	91.8
	VC	62.50	2.6	2.2	6.2	5.8	17.6	8.6	35.2	12.3
	Ethane	30.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ethene	28.05	0.0	0.0	0.0	0.0	0.0	3.2	6.4	8.6
		Total	53.9	44.3	91.3	111.5	177.9	147.1	205.4	117.7
P-08	PCE	165.83	54.3	5.7	0.8	0.3	0.2	0.2	0.3	0.3
	TCE	131.39	9.9	1.1	1.7	0.3	0.6	0.5	2.8	2.7
	cis-1,2-DCE	96.94	8.9	41.3	54.7	50.5	94.9	57.8	60.9	57.8
	VC	62.50	2.7	4.0	14.9	14.7	32.0	38.4	36.8	16.0
	Ethane	30.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ethene	28.05	0.0	0.0	0.0	0.0	4.6	31.2	41.0	20.7
		Total	75.8	52.1	72.1	65.9	132.3	128.1	141.7	97.4

Table 7: Summary of Molar Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date:		9/28/99							
	Sampling Date		09/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
			-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**mol. Wt. (g/mol)**	**Results (µmol/l)**							
P-09	PCE	165.83	23.5	10.3	0.8	9.6	1.0	0.7	0.3	0.0
	TCE	131.39	4.9	3.0	0.5	2.4	1.7	0.9	1.6	0.0
	cis-1,2-DCE	96.94	1.7	17.5	16.5	10.3	11.3	11.3	19.6	4.4
	VC	62.50	0.0	1.9	7.0	4.6	8.5	9.1	19.2	3.0
	Ethane	30.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ethene	28.05	0.0	0.0	0.0	3.1	15.9	20.7	42.8	46.7
		Total	30.0	32.7	24.9	30.1	38.5	42.7	83.5	54.2
P-10	PCE	165.83	32.0	15.7	3.7	13.3	12.1	5.7	7.2	3.0
	TCE	131.39	1.5	0.9	0.5	0.8	0.9	0.3	0.6	0.5
	cis-1,2-DCE	96.94	1.4	1.0	1.0	1.0	1.0	0.2	0.6	0.5
	VC	62.50	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	Ethane	30.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ethene	28.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Total	34.9	17.6	5.3	15.1	14.0	6.2	8.5	4.0
TOTAL	PCE	165.83	434.8	358.2	343.2	316.2	302.2	94.4	77.0	290.2
	TCE	131.39	61.5	43.6	47.9	59.5	72.0	72.4	98.4	37.7
	cis-1,2-DCE	96.94	42.9	198.0	370.3	394.0	655.0	497.5	425.3	415.5
	VC	62.50	16.8	26.2	58.6	52.3	121.6	150.1	180.2	95.8
	Ethane	30.07	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
	Ethene	28.05	0.0	0.0	0.0	3.1	22.2	69.9	106.1	112.3
		Total	556.0	626.1	820.0	825.2	1173.7	884.4	886.9	951.5
		AREA TOTAL	**1112.0**	**1252.2**	**1640.1**	**1650.3**	**2347.3**	**1768.7**	**1773.8**	**1902.9**

cis-1,2-DCE	cis-1,2-Dichloroethene
g/mol	grams per mole
µmol/l	micromole per liter
PCE	Tetrachloroethene
TCE	Trichloroethene
VC	Vinyl chloride

a. For those results less than the laboratory reporting limit, numeric zeros were listed as results and were used for graphing purposes. Detection limits are subject to variation due to sample matrix interference and sample dilution.

Table 8 : Summary of Molar Percentage Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date:		9/28/99							
	Sampling Date		09/27/99	10/26/99	11/30/99	12/22/99	1/25/00	3/27/00	5/23/00	9/26/00
			-1	28	63	85	119	181	238	364
Site ID	**Parameter**	**mol. Wt. (g/mol)**	**% of Total Moles**							
P-02	PCE	165.83	67	46	4	15	7	9	6	0
	TCE	131.39	19	11	9	16	16	8	36	1
	cis-1,2-DCE	96.94	9	30	81	63	67	45	41	79
	VC	62.50	5	13	6	6	9	32	12	17
	Ethane	30.07	0	0	0	0	0	0	0	0
	Ethene	28.05	0	0	0	0	1	7	5	2
			100	100	100	100	100	100	100	100
P-05	PCE	165.83	85	83	82	80	79	77	82	83
	TCE	131.39	8	9	8	9	7	10	7	7
	cis-1,2-DCE	96.94	6	7	10	11	12	9	6	9
	VC	62.50	2	1	0	1	1	3	4	1
	Ethane	30.07	0	0	0	0	0	0	0	0
	Ethene	28.05	0	0	0	0	0	0	0	0
			100	100	100	100	100	100	100	100
P-06	PCE	165.83	66	1	2	3	2	3	3	1
	TCE	131.39	15	1	2	5	5	13	5	4
	cis-1,2-DCE	96.94	10	87	80	80	78	72	58	47
	VC	62.50	8	10	17	12	14	11	31	21
	Ethane	30.07	0	0	0	0	0	0	0	0
	Ethene	28.05	0	0	0	0	0	1	3	27
			100	100	100	100	100	100	100	100

Table 8 : Summary of Molar Percentage Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date:		9/28/99							
	Sampling Date		09/27/99	10/26/99	11/30/99	12/22/99	1/25/00	3/27/00	5/23/00	9/26/00
			-1	28	63	85	119	181	238	364
Site ID	**Parameter**	**mol. Wt. (g/mol)**	**% of Total Moles**							
P-07	PCE	165.83	73	3	1	1	1	1	1	2
	TCE	131.39	12	1	2	1	2	7	8	3
	cis-1,2-DCE	96.94	11	91	90	92	87	84	70	78
	VC	62.50	5	5	7	5	10	6	17	10
	Ethane	30.07	0	0	0	0	0	0	0	0
	Ethene	28.05	0	0	0	0	0	2	3	7
			100	100	100	100	100	100	100	100
P-08	PCE	165.83	72	11	1	1	0	0	0	0
	TCE	131.39	13	2	2	0	0	0	2	3
	cis-1,2-DCE	96.94	12	79	76	77	72	45	43	59
	VC	62.50	4	8	21	22	24	30	26	16
	Ethane	30.07	0	0	0	0	0	0	0	0
	Ethene	28.05	0	0	0	0	4	24	29	21
			100	100	100	100	100	100	100	100
P-09	PCE	165.83	78	31	3	32	3	2	0	0
	TCE	131.39	16	9	2	8	4	2	2	0
	cis-1,2-DCE	96.94	5	54	66	34	30	27	23	8
	VC	62.50	0	6	28	15	22	21	23	6
	Ethane	30.07	0	0	0	0	0	0	0	0
	Ethene	28.05	0	0	0	10	41	48	51	86
			100	100	100	100	100	100	100	100

Table 8 : Summary of Molar Percentage Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date:		9/28/99							
	Sampling Date		09/27/99	10/26/99	11/30/99	12/22/99	1/25/00	3/27/00	5/23/00	9/26/00
			-1	28	63	85	119	181	238	364
Site ID	**Parameter**	**mol. Wt. (g/mol)**	**% of Total Moles**							
P-10	PCE	165.83	92	89	70	88	86	91	85	75
	TCE	131.39	4	5	10	6	7	5	8	13
	cis-1,2-DCE	96.94	4	6	19	7	7	4	8	12
	VC	62.50	0	0	1	0	0	0	0	0
	Ethane	30.07	0	0	0	0	0	0	0	0
	Ethene	28.05	0	0	0	0	0	0	0	0
			100	100	100	100	100	100	100	100

PCE	Tetrachloroethene
TCE	Trichloroethene
cis-1,2-DCE	cis-1,2-Dichloroethene
VC	Vinyl chloride
g/mol	Grams per mole
mol. Wt.	Molecular weight

a. For those results less than the laboratory reporting limit, numeric zeros were listed as results and were used for graphing purposes. Detection limits are subject to variation due to sample matrix interference and sample dilution.

Table 9: Summary of Laboratory Inorganic Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date:	9/28/99							
	Collection Date	9/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
	Days Since Injection	-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**Results[b]**							
P-02	Alkalinity (as CaCO3)	532	725	778	390	748	1200	836	1200
	Chloride	38.6	31.1	37.3	45.3	48.2	52.5	50	54.5
	DOC	5	147	215	45	156	842	327	322
	Manganese	3.36	4.66	6.99	5.33	6.11	14.9	8.12	8.88
	Nitrate (as N)	<0.1	<0.1	<0.1	0.126	<0.1	<0.1	<0.1	<0.1
	Nitrite (as N)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Sulfate	66.7	38.4	12.5	21.8	9	5.79	21.8	4.05
	Sulfide	<0.05	0.29	0.57	<0.05	<0.05	0.28	<0.05	<0.05
P-05	Alkalinity (as CaCO3)	479	436	420	427	440	499	517	472
	Chloride	34.1	25.8	28.9	30.6	34.5	42	36.6	32.2
	DOC	5	5	137	6	5	3.64	3.39	4.29
	Manganese	3.19	3.0	3.33	3.2	3.18	3.69	3.66	2.84
	Nitrate (as N)	<0.1	0.24	0.12	<0.1	<0.1	0.141	0.322	<0.1
	Nitrite (as N)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Sulfate	50.9	42.5	37	37.4	44	46.6	53.4	45
	Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
P-06	Alkalinity (as CaCO3)	494	794	946	914	921	697	743	1160
	Chloride	38.5	37.1	31.4	71.2	46.5	50.8	47.1	45.8
	DOC	4	275	583	726	884	2.26	661	944
	Manganese	3.47	10.2	18.1	24.1	28.8	0.244	22.7	44.6
	Nitrate (as N)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.18	<0.1
	Nitrite (as N)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Sulfate	63.8	16.67	0.71	4.92	2	5.15	2.35	1.5
	Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table 9: Summary of Laboratory Inorganic Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date:	9/28/99							
	Collection Date	9/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
	Days Since Injection	-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**Results[b]**							
P-07	Alkalinity (as CaCO3)	563	570	892	1182	861	695	834	1070
	Chloride	36.8	37.1	40.4	57.4	25.8	36.8	38.4	23.7
	DOC	4	6816	3664	2199	2642	1650	3250	5090
	Manganese	3.28	24.4	39.6	39.8	38.7	31.6	38.3	54.1
	Nitrate (as N)	0.123	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Nitrite (as N)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Sulfate	62.6	36.15	10.60	5.77	4	9.49	4.73	3.75
	Sulfide	<0.05	<0.05	0.062	<0.05	<0.05	<0.05	<0.05	<0.05
P-08	Alkalinity (as CaCO3)	463	717	977	1150	636	1160	1260	1620
	Chloride	34.6	34.2	38.1	62.8	39.6	52.5	55.1	51
	DOC	4	101	386	865	970	609	1040	1120
	Manganese	2.84	7.27	15.5	25.8	33.4	24.8	32.1	38.3
	Nitrate (as N)	0.103	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Nitrite (as N)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Sulfate	61.7	20.1	6.4	5.95	<1	1.98	<1	2.3
	Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
P-09	Alkalinity (as CaCO3)	465	554	591	680	447	879	717	1210
	Chloride	31.1	25.0	34.1	25.4	31	33.3	46.5	57.9
	DOC	4	19	224	29	65	37.8	209	570
	Manganese	1.04	3.06	6.4	4.14	6.95	9.34	14	15.1
	Nitrate (as N)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Nitrite (as N)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Sulfate	74.5	50.2	45.1	41.2	19	9.05	2.85	1.59
	Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Table 9: Summary of Laboratory Inorganic Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date:	9/28/99							
	Collection Date	9/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
	Days Since Injection	-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**Results[b]**							
P-10	Alkalinity (as CaCO3)	353	503	439	400	519	406	483	574
	Chloride	32.9	38.9	37.8	34.9	37.9	33.3	34.9	33.9
	DOC	3	4	140	3	3	474	2.29	1.06
	Manganese	0.35	0.44	0.479	0.126	0.656	16.8	1.11	0.245
	Nitrate (as N)	0.40	0.12	<0.1	0.162	<0.1	0.31	0.174	0.178
	Nitrite (as N)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Sulfate	56.6	57.7	53.4	59.1	46	53.5	63.7	82.5
	Sulfide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

DOC Dissolved organic carbon
N Nitrogen
CaCO3 Calcium carbonate

< Not detected at the indicated concentration
a. Samples are collected on two consecutive days. The first day of sampling is used for the sampling date on this table and for the dates plotted on the attached figures.
b. Units are in milligrams per liter

Table 10: Summary of Volatile Acids Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date	9/28/99							
	Collection Date[a]	9/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
	Days Since Injection	-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**Results[b]**							
P-02	Acetic Acid	<1	81	53	83	102	330	43	94
	Butyric Acid	<1	<1	<1	7	18	130	32	11
	Lactic Acid	<1	20	<1	<1	<1	58	4	<1
	Propionic Acid	<1	199	36	125	249	1200	345	358
	Pyruvic Acid	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4
P-05	Acetic Acid	<1	<1	<1	<1	<1	<1	<1	<1
	Butyric Acid	<1	<1	<1	<1	<1	<1	<1	<1
	Lactic Acid	<1	<1	<1	<1	<1	<1	<1	<1
	Propionic Acid	<1	<1	<1	<1	<1	<1	<1	<1
	Pyruvic Acid	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
P-06	Acetic Acid	<1	125	238	275	258	177	129	384
	Butyric Acid	<1	<1	77	86	86	64	72	107
	Lactic Acid	<1	48	47	104	162	221	174	112
	Propionic Acid	<1	337	623	872	1100	520	569	1190
	Pyruvic Acid	<0.1	0.4	0.3	0.7	<0.1	0.4	<0.1	0.6
P-07	Acetic Acid	<1	838	379	413	397	354	<1	724
	Butyric Acid	<1	557	651	452	381	212	411	1050
	Lactic Acid	<1	1620	1120	970	1070	1220	2557	4590
	Propionic Acid	<1	375	824	1140	1050	708	1220	1810
	Pyruvic Acid	<0.1	3.5	0.6	1.1	<0.1	1.3	<0.1	8.7

Table 10: Summary of Volatile Acids Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date	9/28/99							
	Collection Date[a]	9/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
	Days Since Injection	-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**Results[b]**							
P-08	Acetic Acid	<1	76	119	297	339	352	189	403
	Butyric Acid	<1	<1	24	99	125	85	103	225
	Lactic Acid	<1	<1	<1	<1	<1	54	43	<1
	Propionic Acid	<1	129	263	837	1060	1080	1060	1370
	Pyruvic Acid	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.5
P-09	Acetic Acid	<1	29	50	28	114	70	59	430
	Butyric Acid	<1	<1	<1	<1	<1	<1	<1	21
	Lactic Acid	<1	<1	<1	<1	<1	<1	<1	<1
	Propionic Acid	<1	14	96	31	160	82	156	648
	Pyruvic Acid	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3
P-10	Acetic Acid	<1	<1	22	<1	<1	<1	<1	<1
	Butyric Acid	<1	<1	<1	<1	<1	<1	<1	<1
	Lactic Acid	<1	<1	<1	<1	<1	<1	<1	<1
	Propionic Acid	<1	<1	<1	<1	<1	<1	<1	<1
	Pyruvic Acid	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

< Not detected at the indicated concentration

a. Samples are collected on two consecutive days. The first day of sampling is used for the sampling date on this table and for the dates plotted on the attached figures.

b. Units are in milligrams per liter.

Table 11: Summary of Field Parameter Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date	9/28/99							
	Collection Date	9/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
	Day	-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**Results**							
P-02	Final pH	6.66	6.59	6.80	6.39	6.41	6.00	6.27	6.33
	Final Conductivity (uS)	1185	1321	1339	1320	1420	2387	1431	1612
	Final Temperature (C)	16.7	17.4	15.7	14.3	13.3	13.5	16.0	17.6
	Final Dissolved Oxygen (mg/l)	0.91	0.77	0.66	1.62	1.48	2.51	0.96	1.97
	Final ORP (mvolts)	-36	570*	-275	-201	-198	-195	-116	-429
	Total Iron (mg/l)	3.65	4.2	11.0	5.0	NS	49	5	12
	Ferrous (Fe2+) Iron (mg/l)	NS	NS	3.0	2.0	2.8	2.5	3	1.2
	Total Volume Purged (gallons)	11.5	6.0	8.3	6	5	9	9	5
	Comments		B	C					
P-05	Final pH	7.71	6.74	6.93	6.52	6.92	6.71	6.83	6.65
	Final Conductivity (uS)	1023	895	898	873	895	1005	923	871
	Final Temperature (C)	22.4	16.1	17.4	14.0	12.6	15.2	17.6	18.7
	Final Dissolved Oxygen (mg/l)	0.75	1.51	2.46	1.73	2.12	1.31	1.16	3.42
	Final ORP (mvolts)	207	NR	98	332	166	174	59	-313
	Total Iron (mg/l)	2.0	0.0	0.4	0.2	0.8	0.6	0.1	0.8
	Ferrous (Fe2+) Iron (mg/l)	NS	NS	0.4	0.2	0.6	0	0.2	0.2
	Total Volume Purged (gallons)	5.4	3.5	3.25	3	2.5	3.5	4.5	2.5
	Comments		B	C					
P-06	Final pH	6.81	6.47	6.28	5.50	5.82	6.72	6.28	5.78
	Final Conductivity (uS)	1144	1493	2024	2088	2099	1340	1502	2440
	Final Temperature (C)	17.5	16.8	16.5	13.0	11.5	15	17.1	19.2
	Final Dissolved Oxygen (mg/l)	0.85	0.81	0.76	1.24	1.48	0.8	1.3	1.58
	Final ORP (mvolts)	-6	720*	-296	-210	-181	-270	-72	-335
	Total Iron (mg/l)	1	10	39.0	45	26.0	46	50	50
	Ferrous (Fe2+) Iron (mg/l)	NS	NS	5.6	2.5	3.2	2	3.4	3.8
	Total Volume Purged (gallons)	6.7	3.0	3	3	3	3.5	3.5	3
	Comments		A, B	C					

Table 11: Summary of Field Parameter Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date	9/28/99							
	Collection Date	9/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
	Day	-1	27	62	84	118	181	238	364
Site ID	Parameter	Results							
P-07	Final pH	6.79	5.19	5.59	5.19	5.40	5.85	5.37	4.72
	Final Conductivity (uS)	1077	2113	2072	2480	2130	1666	2588	3305
	Final Temperature (C)	17.9	20.6	16.0	14.4	10.7	13.0	18.8	18.8
	Final Dissolved Oxygen (mg/l)	1.06	1.06	0.82	1.24	5.72	2.49	1.53	0.74
	Final ORP (mvolts)	88	NR	-193	-153	-147	-140	-54	-297
	Total Iron (mg/l)	1.35	10.0	29.0	29.0	30	25	45	140
	Ferrous (Fe2+) Iron (mg/l)	NS	NS	3.0	2.8	3.5	3.8	2.0	8
	Total Volume Purged (gallons)	7.9	3.0	3	3	2.5	5	3	3.25
	Comments		B	C					
P-08	Final pH	6.35	6.73	6.72	6.16	6.10	6.53	5.9	5.77
	Final Conductivity (uS)	1065	1235	1542	2088	2484	1758	2415	2580
	Final Temperature (C)	18.0	18.9	17.1	14.1	14.0	13.0	15.8	18.9
	Final Dissolved Oxygen (mg/l)	1.62	0.98	0.83	1.27	1.64	0.65	0.96	1.56
	Final ORP (mvolts)	-25.0	NR	-154	-196	-114	-145	-87	-330
	Total Iron (mg/l)	1.0	10.0	35.0	24	28	45	100	160
	Ferrous (Fe2+) Iron (mg/l)	NS	NS	3.8	3.8	2.8	2.6	2.0	2.5
	Total Volume Purged (gallons)	7.2	3.0	3	3	2.5	4	4	3.5
	Comments	A	B,D	C					
P-09	Final pH	5.98	6.84	6.98	6.55	6.67	6.91	6.52	6.42
	Final Conductivity (uS)	1052	1138	1402	1391	2000	1234	1715	2368
	Final Temperature (C)	18.4	19.8	15.8	14.0	12.9	12.2	15.7	19.6
	Final Dissolved Oxygen (mg/l)	1.55	0.87	0.85	2.35	1.87	0.86	1.75	1.18
	Final ORP (mvolts)	223	NR	-146	-115	-109	-117	-110	-313
	Total Iron (mg/l)	0.80	10	11.0	9.0	39	20	45	120
	Ferrous (Fe2+) Iron (mg/l)	NS	NS	3.0	3.4	2.2	3	3.8	2.5
	Total Volume Purged (gallons)	6.5	3.0	3	3	2.5	4.5	3	2.5
	Comments		B	C					

Table 11: Summary of Field Parameter Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

	Injection Date	9/28/99							
	Collection Date	9/27/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/23/00	9/26/00
	Day	-1	27	62	84	118	181	238	364
Site ID	**Parameter**	**Results**							
P-10	Final pH	7.72	6.82	7.05	6.53	6.66	6.75	6.87	6.65
	Final Conductivity (uS)	952	895	935	860	958	848	950	1010
	Final Temperature (C)	23.5	20.4	17.1	13.8	12.9	15.3	17.8	18.6
	Final Dissolved Oxygen (mg/l)	2.68	0.90	2.84	2.82	2.8	3.59	1.67	3.13
	Final ORP (mvolts)	269	>2000	28	379	265	335	88	158
	Total Iron (mg/l)	0.0	0.0	0.0	0.0	0	0	0	0
	Ferrous (Fe2+) Iron (mg/l)	NS	NS	0.0	0.0	0	0	0	0
	Total Volume Purged (gallons)	5.7	3.0	2.5	3	2.5	3.5	4	3.5
	Comments		B	C					

Comments

A	Duplicate collected
B	ORP meter malfunctioned
C	Iron samples analyzed from water collected on 12/3/99.
D	Iron samples analyzed from water collected from wells P-06, P-07, P-08, and P-09 had total soluble iron concentrations greater than 10 mg/l but for graphing purposes the value is presented as equal to 10 mg/l
>	Reading was higher than the range of detection.
*	ORP meter was malfunctioning, and this value is very suspect and should be ignored.
C	Degrees Celsius
uS	microsiemens
mg/l	milligrams per liter
mvolts	millivolts
NS	Not sampled
ORP	Oxidation/Reduction Potential

Table 12: Summary of Groundwater Elevation Data
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Site ID		Elevation of MP	Date Measured / Days since Injection	9/29/99 1	10/25/99 27	11/29/99 62	12/21/99 84	1/24/00 118	3/27/00 181	5/22/00 237	9/25/00 363
Date of Injection (Day 0 of Test):	9/28/99										
P-01											
	Elevation of TOC (feet Above MSL):	1347.90									
			Depth to WL from TOC (feet)	6.69	8.49	9.49	7.32	8.74	4.50	7.88	10.40
			Elevation of Groundwater (feet Above MSL)	1341.21	1339.41	1338.41	1340.58	1339.16	1343.40	1340.02	1337.50
			Depth to TD from TOC (feet)	22.55	22.55	22.51	22.50	22.50	22.82	22.50	22.5
P-02											
	Elevation of TOC (feet Above MSL):	1347.66									
			Depth to WL from TOC (feet)	6.72	8.71	9.73	7.57	9.01	4.30	8.00	11.05
			Elevation of Groundwater (feet Above MSL)	1340.94	1338.95	1337.93	1340.09	1338.65	1343.36	1339.66	1336.61
			Depth to TD from TOC (feet)	23.00	22.75	22.73	22.75	22.75	23.10	22.75	22.75
P-05											
	Elevation of TOC (feet Above MSL):	1349.15									
			Depth to WL from TOC (feet)	7.99	9.91	10.93	8.60	10.17	5.49	9.26	12.26
			Elevation of Groundwater (feet Above MSL)	1341.16	1339.24	1338.22	1340.55	1338.98	1343.66	1339.89	1336.89
			Depth to TD from TOC (feet)	16.55	16.24	16.20	16.20	16.20	16.59	16.20	16.20

Table 12: Summary of Groundwater Elevation Data
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Site ID		Elevation of MP	Date Measured / Days since Injection	9/29/99 / 1	10/25/99 / 27	11/29/99 / 62	12/21/99 / 84	1/24/00 / 118	3/27/00 / 181	5/22/00 / 237	9/25/00 / 363
Date of Injection (Day 0 of Test):	9/28/99										
P-06											
	Elevation of TOC (feet Above MSL):	1348.88									
			Depth to WL from TOC (feet)	7.83	9.80	10.83	8.48	10.10	5.34	9.13	12.14
			Elevation of Groundwater (feet Above MSL)	1341.05	1339.08	1338.05	1340.40	1338.78	1343.54	1339.75	1336.74
			Depth to TD from TOC (feet)	16.32	16.08	16.03	16.03	16.03	16.35	16.03	16.03
P-07											
	Elevation of TOC (feet Above MSL):	1348.88									
			Depth to WL from TOC (feet)	7.90	9.89	10.98	8.65	10.22	5.52	9.26	12.3
			Elevation of Groundwater (feet Above MSL)	1340.98	1338.99	1337.90	1340.23	1338.66	1343.36	1339.62	1336.58
			Depth to TD from TOC (feet)	16.55	16.14	16.23	16.20	16.20	16.55	16.20	16.20
P-08											
	Elevation of TOC (feet Above MSL):	1348.86									
			Depth to WL from TOC (feet)	7.92	9.70	11.00	8.62	10.26	5.55	9.31	12.33
			Elevation of Groundwater (feet Above MSL)	1340.94	1339.16	1337.86	1340.24	1338.60	1343.31	1339.55	1336.53
			Depth to TD from TOC (feet)	16.53	16.21	16.19	16.20	16.20	16.50	16.20	16.20

Table 12: Summary of Groundwater Elevation Data
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Site ID		Elevation of MP	Date Measured / Days since Injection	9/29/99 / 1	10/25/99 / 27	11/29/99 / 62	12/21/99 / 84	1/24/00 / 118	3/27/00 / 181	5/22/00 / 237	9/25/00 / 363
Date of Injection (Day 0 of Test):	9/28/99										
P-09											
	Elevation of TOC (feet Above MSL):	1349.07									
			Depth to WL from TOC (feet)	8.17	10.15	11.27	8.93	10.40	5.80	9.57	12.62
			Elevation of Groundwater (feet Above MSL)	1340.90	1338.92	1337.80	1340.14	1338.67	1343.27	1339.50	1336.45
			Depth to TD from TOC (feet)	16.60	16.31	16.28	16.20	16.20	16.60	16.20	16.20
P-10											
	Elevation of TOC (feet Above MSL):	1349.07									
			Depth to WL from TOC (feet)	8.07	10.02	11.09	8.79	10.35	5.78	9.41	12.42
			Elevation of Groundwater (feet Above MSL)	1341.00	1339.05	1337.98	1340.28	1338.72	1343.29	1339.66	1336.65
			Depth to TD from TOC (feet)	16.65	16.34	16.30	16.30	16.30	16.65	16.30	16.30
MW-1S											
	Elevation of TOC (feet Above MSL):	1347.44									
			Depth to WL from TOC (feet)	NM	6.67	7.31	6.30	6.48	1.74	5.82	8.48
			Elevation of Groundwater (feet Above MSL)	NM	1340.77	1340.13	1341.14	1340.96	1345.70	1341.62	1338.96
			Depth to TD from TOC (feet)	NM	19.96	19.93	19.92	19.92	NM	19.92	19.92

Table 12: Summary of Groundwater Elevation Data
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Date of Injection (Day 0 of Test):	9/28/99		Date Measured	9/29/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/22/00	9/25/00
			Days since Injection	1	27	62	84	118	181	237	363
Site ID		Elevation of MP									
MW-1D											
	Elevation of TOC (feet Above MSL):	1347.54									
			Depth to WL from TOC (feet)	NM	6.75	7.67	5.26	6.94	1.71	6.00	9.08
			Elevation of Groundwater (feet Above MSL)	NM	1340.79	1339.87	1342.28	1340.60	1345.83	1341.54	1338.46
			Depth to TD from TOC (feet)	NM	28.50	28.46	28.45	28.45	28.85	28.45	28.45
MW-2											
	Elevation of TOC (feet Above MSL):	1348.21									
			Depth to WL from TOC (feet)	7.65	9.42	9.82	8.47	9.70	5.63	8.91	11.60
			Elevation of Groundwater (feet Above MSL)	1340.56	1338.79	1338.39	1339.74	1338.51	1342.58	1339.30	1336.61
			Depth to TD from TOC (feet)	NM	23.01	22.98	22.95	22.95	23.32	22.95	22.95
MW-4											
	Elevation of TOC (feet Above MSL):	1347.95									
			Depth to WL from TOC (feet)	NM	7.92	9.50	8.93	9.82	6.01	8.91	10.48
			Elevation of Groundwater (feet Above MSL)	NM	1340.03	1338.45	1339.02	1338.13	1341.94	1339.04	1337.47
			Depth to TD from TOC (feet)	NM	19.14	19.10	19.10	19.10	19.44	19.10	19.10

Table 12: Summary of Groundwater Elevation Data
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Site ID		Elevation of MP									
Date of Injection (Day 0 of Test):		9/28/99		**Date Measured**	9/29/99	10/25/99	11/29/99	12/21/99	1/24/00	3/27/00	5/22/00	9/25/00
				Days since Injection	1	27	62	84	118	181	237	363
MW-6												
	Elevation of TOC (feet Above MSL):	1349.04										
				Depth to WL from TOC (feet)	NM	9.37	10.19	7.85	9.41	7.84	8.91	11.56
				Elevation of Groundwater (feet Above MSL)	NM	1339.67	1338.85	1341.19	1339.63	1341.20	1340.13	1337.48
				Depth to TD from TOC (feet)	NM	27.97	27.98	27.90	27.90	28.25	27.90	27.90

MP	Measuring point
MSL	Mean sea level
NM	Not measured
TOC	Top of casing
TD	Total depth
WL	Water-level

Notes:

1) Total Depth measurements for wells P-02,P-05 through P-10 for the September event were obtained during sampling and are recorded on the sampling logs.

2) Total Depth measurements for wells P-01, MW-1S, MW-1D, MW-2, MW-4, and MW-6 for the September event were not measured. Depths were taken from the October event and used for the September event.

Table 13: Summary of VOC Quality Control Results for the Pilot Test Sampling Former Unocal Chemicals Distribution Facility Wichita, Kansas

Well No.	Lab	Date	Sample Type	ACT	2-BUT[d]	CA	CS2	CCl4	1,1-DCA	1,1-DCE	1,2-DCA	cis-1,2-DCE	trans-1,2-DCE	4-M,2-P[c]	MeCl2	STY	PCE	TCE	VC	1,1,1-TCA	1,1,2-TCA	B	T	E	X	Nap
P-06	SPL	10/26/99	INV	<100	210	<5.0	<5.0	<5.0	17	28	<5.0	5,200	<5.0	<5.0	<5.0	<5.0	150	120	380	6.9	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	10/26/99	DUP	<100	200	<5.0	<5.0	<5.0	17	24	<5.0	5,100	<5.0	<5.0	<5.0	<5.0	210	160	370	6.6	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	03/27/00	INV	<2,000	740	<25	<100	<25	<25	89	<25	21,000	<25	<100	<25	<25	1700	5200	2100	45	<25	<25	<25	<25	<25	<25
	SPL	03/27/00	SPLT	<20	<5.0	<2.0	<5.0	<1.0	17	110	3.0	14,000	<200	<5.0	<1.0	<1.0	990	2800	2000	54	6.0	1.0	1.0	1.0	12	20
P-07	SPL	12/22/99	INV	<500	1,300	<5.0	<100	<5.0	12	31	<5.0	10,000	17	<100	<5.0	<5.0	180	200	360	12	<5.0	<5.0	<5.0	<5.0	NA	<5.0
	SPL	12/22/99	DUP	<500	1,700	2.7	<100	<1.0	16	50	2.1	11,000	24	<100	<1.0	<1.0	150	130	340	19	2.0	1.3	1.4	1.2	4.6	6.0
	SPL	03/28/00	INV	<2,000	480	<25	<100	<25	<25	36	<25	12,000	<25	<100	<25	<25	270	1,300	540	<25	<25	<25	<25	<25	<25	<25
	SPL	03/28/00	SPLT	<200	1,100	<20	<50	<10	17	66	<10	13,000	<200	<50	<10	<10	380	2,100	1,600	<10	<10	<10	<10	<10	<10	<10
P-08	SPL	09/27/99	INV	<500	<100	<100	<100	<100	<100	<100	<100	860	<100	<100	<100	<100	9,000	1,300	170	<100	<100	<100	<100	<100	<100	<100
	SPL	09/27/99	DUP	<500	<100	<100	<100	<100	<100	<100	<100	650	<100	<100	<100	<100	7,500	1,000	110	<100	<100	<100	<100	<100	<100	<100
	SPL	03/28/00	INV	<2,000	3,000	<25	<100	<25	<25	<25	<25	5,600	<25	<100	<25	<25	35	60	2,400	<25	<25	<25	<25	<25	<25	<25
	SPL	03/28/00	DUP	<2,000	3,100	<5.0	<100	<5.0	20	24	<5.0	5,900	21	<100	<5.0	<5.0	34	67	2,300	15	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	SPL	03/28/00	SPLT	160	2,800	<2.0	<5.0	<1.0	19	24	2.0	4,100	<50	<5.0	<1.0	<1.0	32	73	2,600	18	2.0	1.0	1.0	1.0	<1.0	11
TRIP BLANK	SPL	09/27/99	TRIP	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	09/29/99	TRIP	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	10/26/99	TRIP	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	10/27/99	TRIP	<20	<4.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	11/29/99	TRIP	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	11/30/99	TRIP	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	12/21/99	TRIP	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	12/22/99	TRIP	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	01/24/00	TRIP	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	01/25/00	TRIP	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	03/27/00	TRIP	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	03/28/00	TRIP	<20	<5.0	<2.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	05/24/00	TRIP	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	SPL	09/27/00	TRIP	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Table 13 (continued)

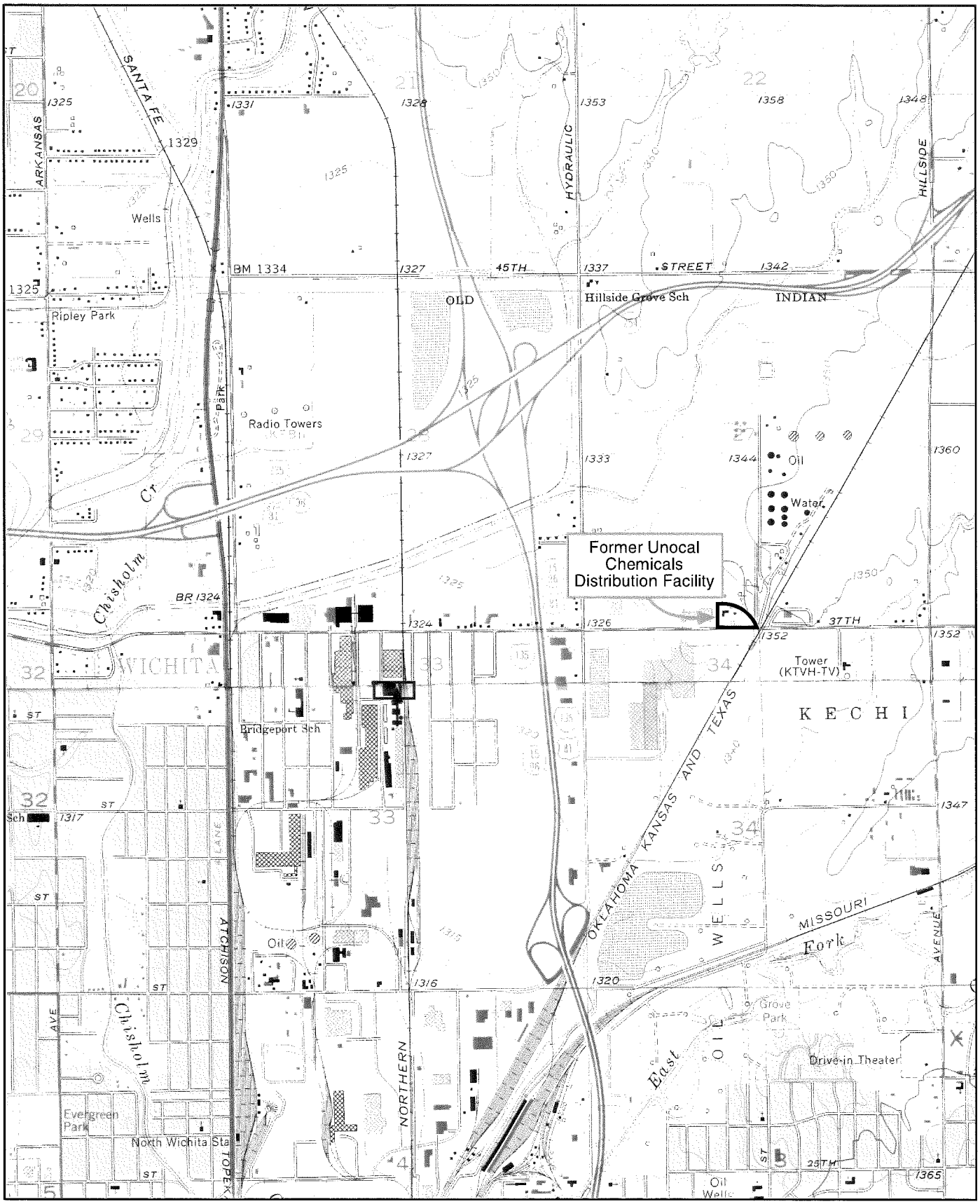
DUP	Duplicate sample
J	Reported concentration is below detection limit
M	Matrix effect present
NA	Not Analyzed
VOC	Volatile Organic Compounds
SPL	Southern Petroleum Laboratory
SPLT	Split samples were analyzed using EPA Method 8260B.
Notes:	1. Results are rounded to a maximum of two significant figures.
	2. Split samples were analyzed using EPA Method 8260B.
<	Not detected above indicated value
a.	Groundwater samples analyzed for VOCs by SPL were analyzed using EPA method 8021B.
b.	Groundwater results are in micrograms per liter.
c.	The analyte 4-Methyl-2-Pentanone is referred to as Methyl Isobutyl Ketone in SPL reports.
d.	The analyte 2-Butanone is referred to as Methyl Ethyl Ketone in SPL reports.

Abbreviation	Analyte	Abbreviation	Analyte
1,1,1-TCA	1,1,1-Trichloroethane	CS2	Carbon Disulfide
1,1,2-TCA	1,1,2-Trichloroethane	E	Ethylbenzene
1,1-DCA	1,1-Dichloroethane	IPB	Isopropylbenzene
1,1-DCE	1,1-Dichloroethene	MeCl2	Methylene Chloride
1,2,4-TMB	1,2,4-Trimethylbenzene	N-BB	N-Butylbenzene
1,2-DCA	1,2-Dichloroethane	Nap	Naphthalene
2-BUT	2-Butanone	PCE	Tetrachloroethene
4-M,2-P	4-Methyl-2-Pentanone	STY	Styrene
ACT	Acetone	T	Toluene
B	Benzene	TCE	Trichloroethene
CA	Chloroethane	trans-1,2-DCE	Trans-1,2-Dichloroethene
CCl4	Carbon Tetrachloride	VC	Vinyl Chloride
cis-1,2-DCE	Cis-1,2-Dichloroethene	X	Xylene

Table 14: Summary of Inorganic Quality Control Sample Data for the Pilot Test Sampling
Former Unocal Chemicals Distribution Facility, Wichita, Kansas

Well No.	Date	Sample Type	Lab	Alkalinity	Chloride	Dissolved Organic Carbon	Manganese	Nitrate	Nitrite	Sulfate	Sulfide	Ethane	Ethene	Methane	Acetic Acid	Butyric Acid	Lactic Acid	Propionic Acid	Pyruvic Acid
P-06	10/26/99	INV	KEY	NA	NA	NA	NA	NA	NA	NA	NA	<0.030	<0.030	0.045	130	<1.0	48	340	0.40
	10/26/99	DUP	KEY	NA	NA	NA	NA	NA	NA	NA	NA	<0.010	<0.010	<0.0070	120	<1.0	46	340	0.40
	10/26/99	INV	SPL	790	35	280	10	<0.10	<0.10	17	<0.050	NA	NA	NA	NA	NA	NA	NA	NA
	10/26/99	DUP	SPL	740	38	260	10	<0.10	<0.10	23	<0.050	NA	NA	NA	NA	NA	NA	NA	NA
P-07	12/22/99	INV	KEY	NA	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020	0.017	410	450	970	1,100	1.1
	12/22/99	DUP	KEY	NA	NA	NA	NA	NA	NA	NA	NA	<0.020	<0.020	0.019	540	450	950	1,300	1.6
	12/22/99	INV	SPL	1,200	57	2,200	40	<0.10	<0.10	5.8	<0.050	NA	NA	NA	NA	NA	NA	NA	NA
	12/22/99	DUP	SPL	1,100	56	1,700	40	<0.10	<0.10	4.9	<0.050	NA	NA	NA	NA	NA	NA	NA	NA
P-08	09/27/99	INV	KEY	NA	NA	NA	NA	NA	NA	NA	NA	<0.010	<0.010	<0.0070	<1.0	<1.0	<1.0	<1.0	<0.10
	09/27/99	DUP	KEY	NA	NA	NA	NA	NA	NA	NA	NA	<0.010	<0.010	<0.0070	<1.0	<1.0	<1.0	<1.0	<0.10
	09/27/99	INV	SPL	460	35	4.0	2.3	0.10	<0.10	61	<0.050	NA	NA	NA	NA	NA	NA	NA	NA
	09/27/99	DUP	SPL	460	34	4.0	2.8	<0.10	<0.10	62	<0.050	NA	NA	NA	NA	NA	NA	NA	NA

KEY Keystone Laboratories, Inc.
SPL Southern Petroleum Laboratory
NA Not Analyzed
INV Investigative Sample
DUP Duplicate Sample
< Not detected above indicated value.
Notes: 1. Groundwater results are in milligrams per liter.
2. Results are rounded to a maximum of two significant figures.



UNO_9q 2/26/01

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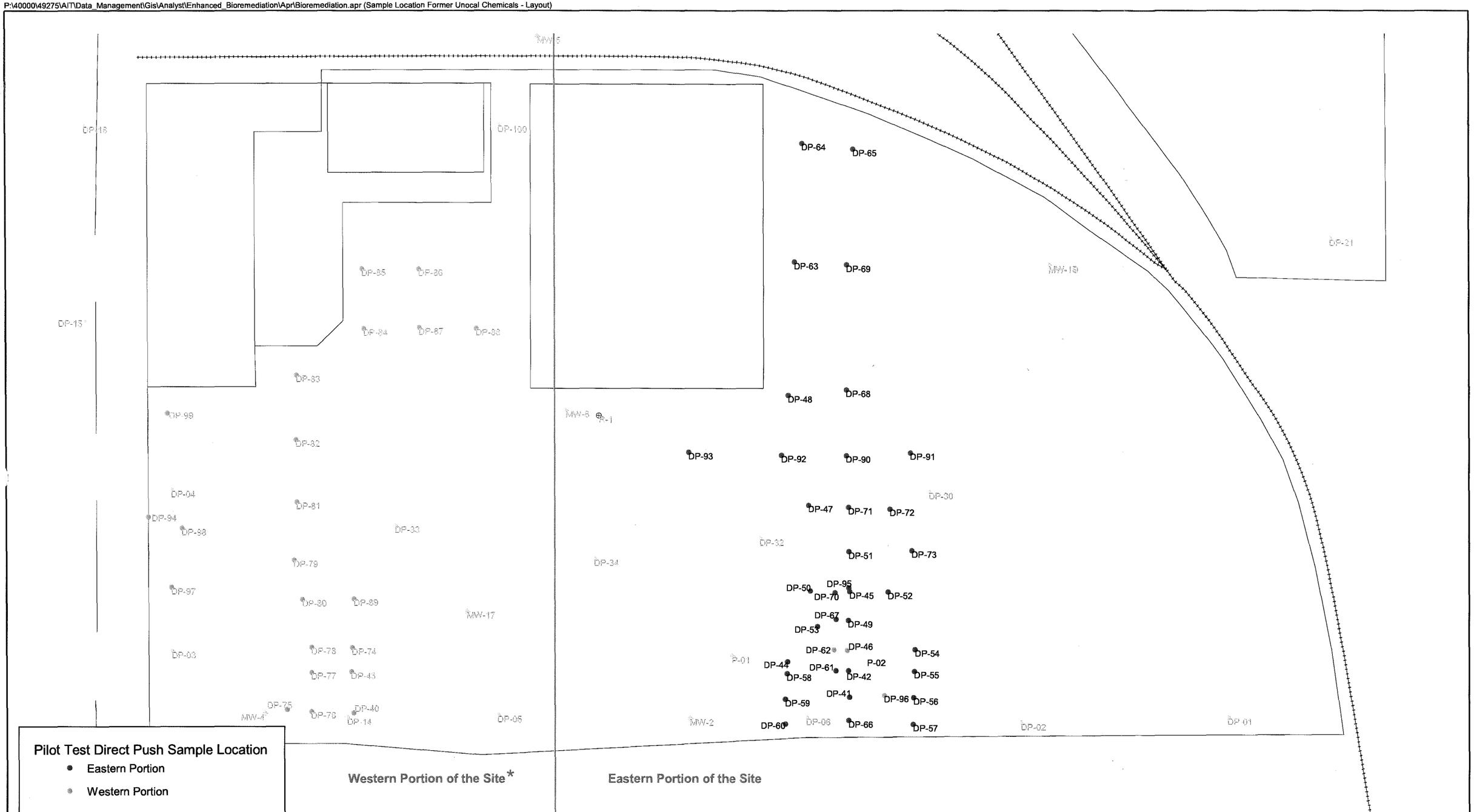
Site Location Map
Former Unocal Chemicals Distribution Facility

Wichita, Kansas

FIGURE
1

JOB NUMBER	DATE
49275,0505	2/01

P:\40000\49275\AIT\Data_Management\Gis\Analyst\Enhanced_Bioremediation\Apr\Bioremediation.apr (Sample Location Former Unocal Chemicals - Layout)



Pilot Test Direct Push Sample Location

- Eastern Portion
- Western Portion

Previously Collected Direct Push Sample Location (Phase III)

Monitoring Well Location

Recovery Well Location

*Results from the sample locations on the Western portion of the Site are presented in the report entitled "Direct-push Sampling Results Collected in September 1999 at the Western Portion of the Former Unocal Chemicals Distribution Facility" submitted to KDHE on February 2, 2000.

N

40 0 40 Feet

Scale 1:430
1 Inch = 40 Feet

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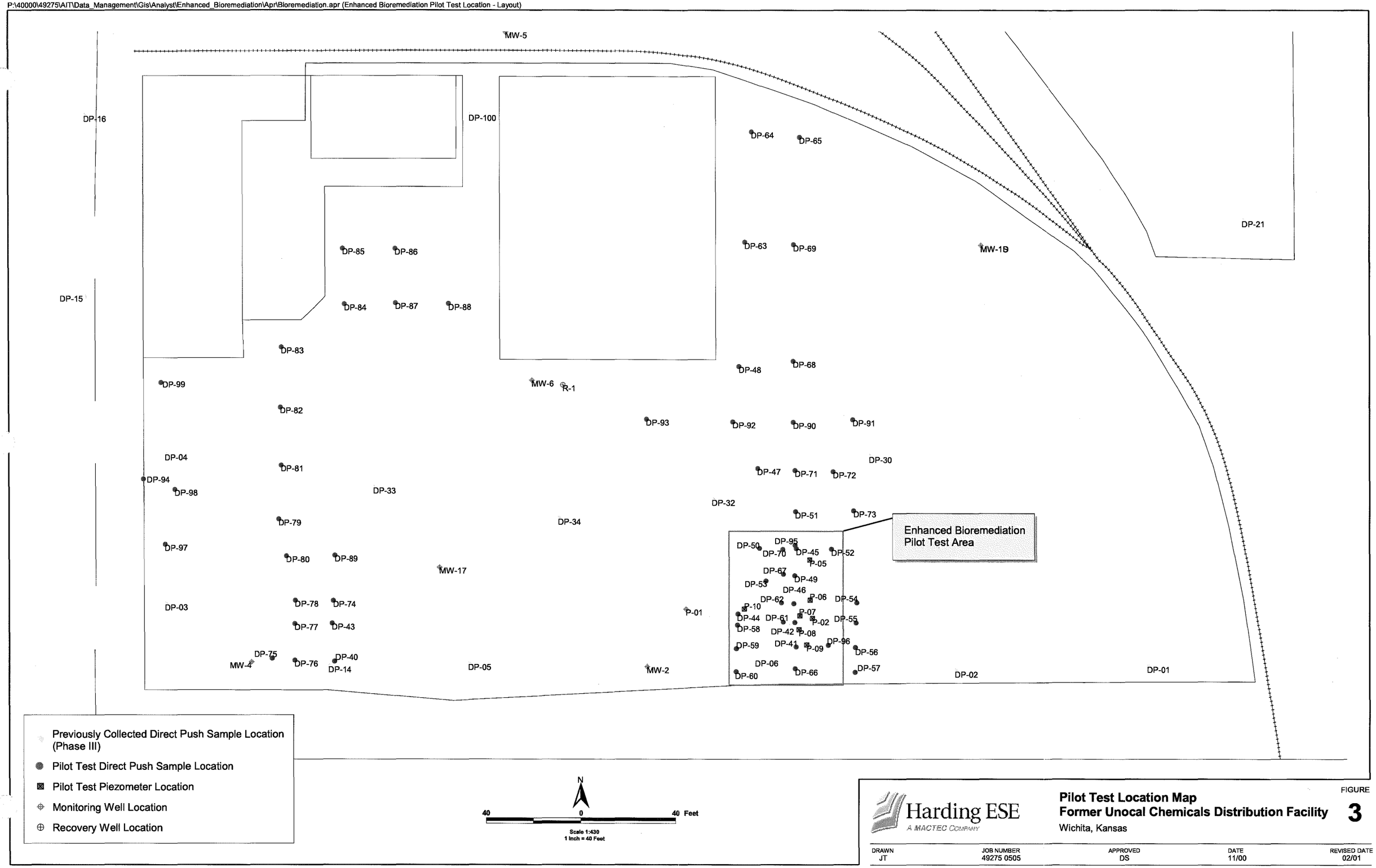
Sample Location Map
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

FIGURE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
JT	49275 0505	DS	11/00	02/01

P:\40000\49275\AIT\Data_Management\Gis\Analyst\Enhanced_Bioremediation\Apr\Bioremediation.apr (Enhanced Bioremediation Pilot Test Location - Layout)



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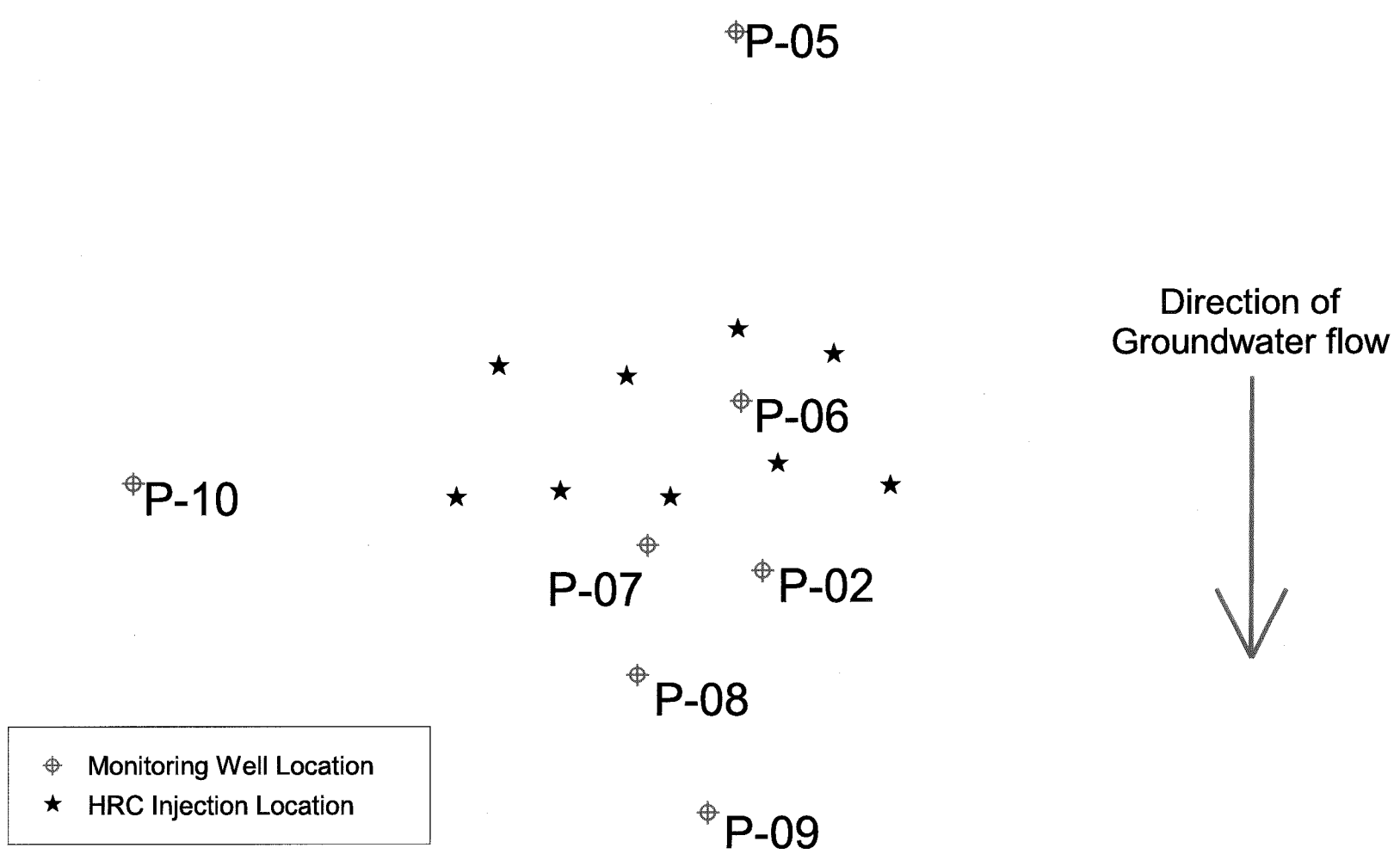
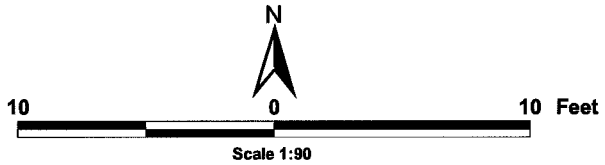
Pilot Test Location Map
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

FIGURE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
JT	49275 0505	DS	11/00	02/01





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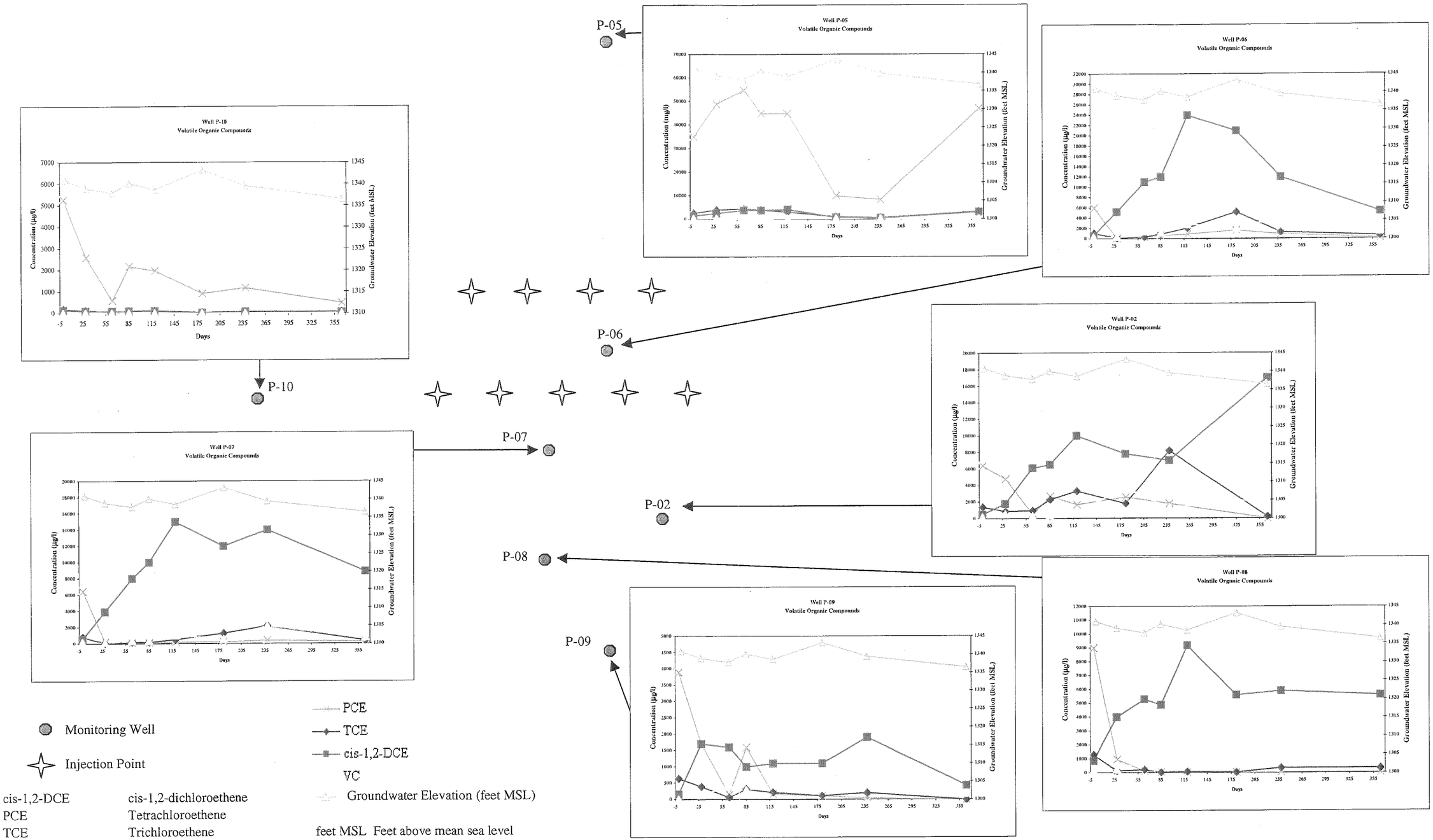
Enhanced Bioremediation Pilot Test Configuration Map
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

FIGURE **4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
JT	49275 0505	DS	11/00	02/01



cis-1,2-DCE	cis-1,2-dichloroethene
PCE	Tetrachloroethene
TCE	Trichloroethene
VC	Vinyl chloride

feet MSL Feet above mean sea level
Units are in micrograms per liter (ug/l)

Figure 5: Summary of Pilot Test VOC Data
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Harding ESE

HRC_VOC data.xls Figure 5 VOC Map

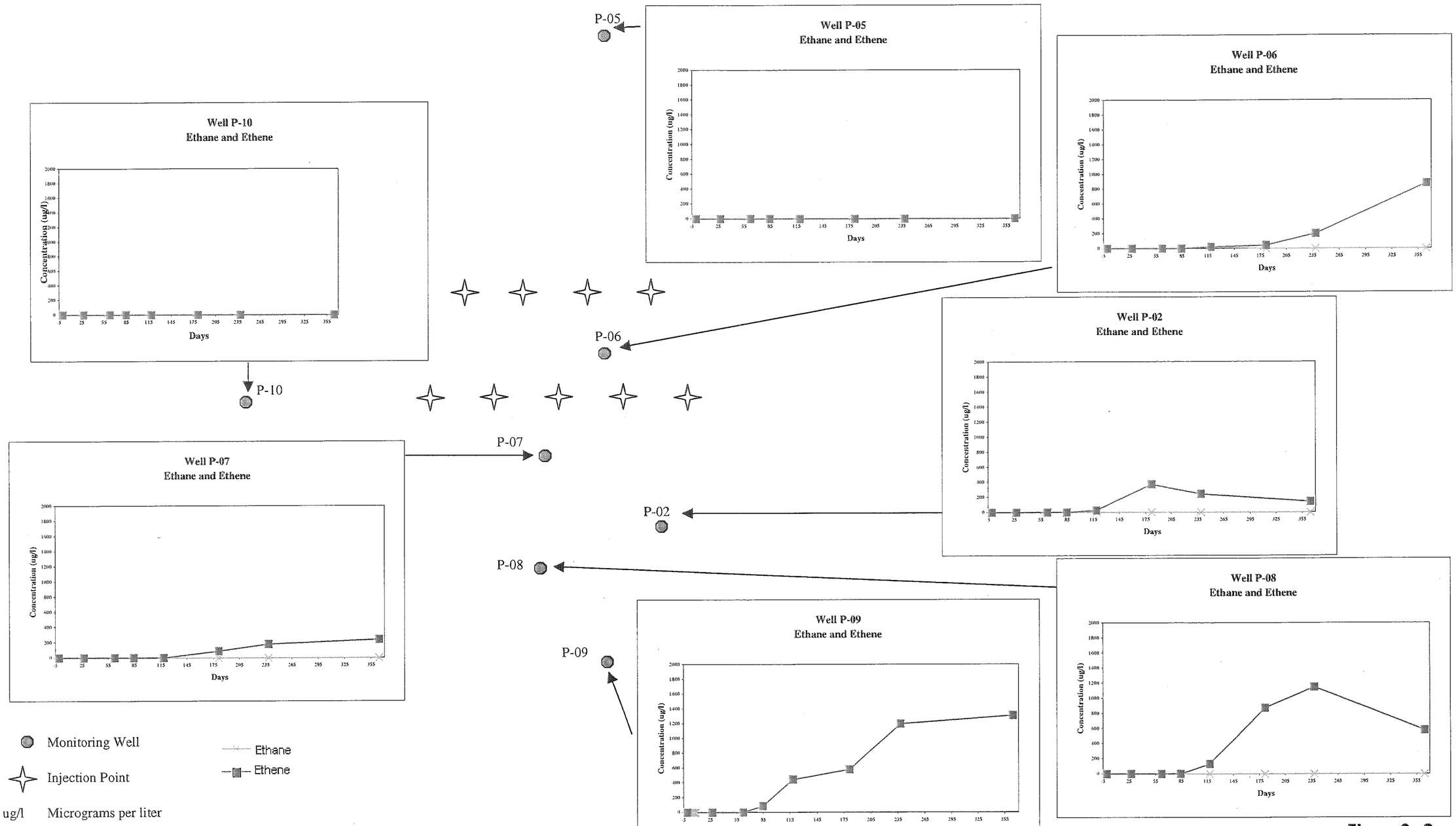


Figure 6 : Summary of Pilot Test Ethane and Ethene Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Harding ESE

HRC_Acid_gas_data.xls Figure 6 gas

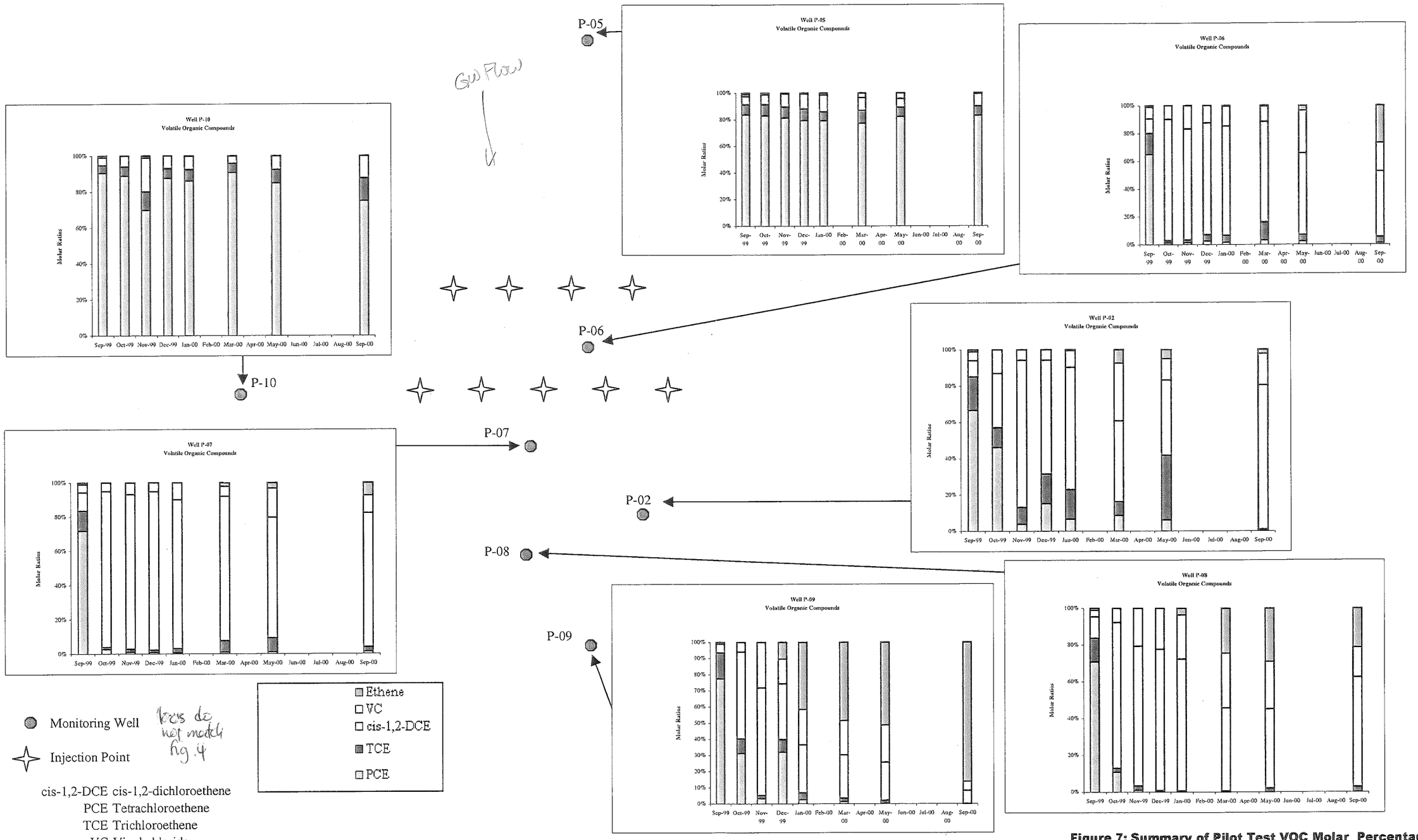


Figure 7: Summary of Pilot Test VOC Molar Percentage Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas

Harding ESE

HRC_VOC data.xls Figure 7 Molar Percentage

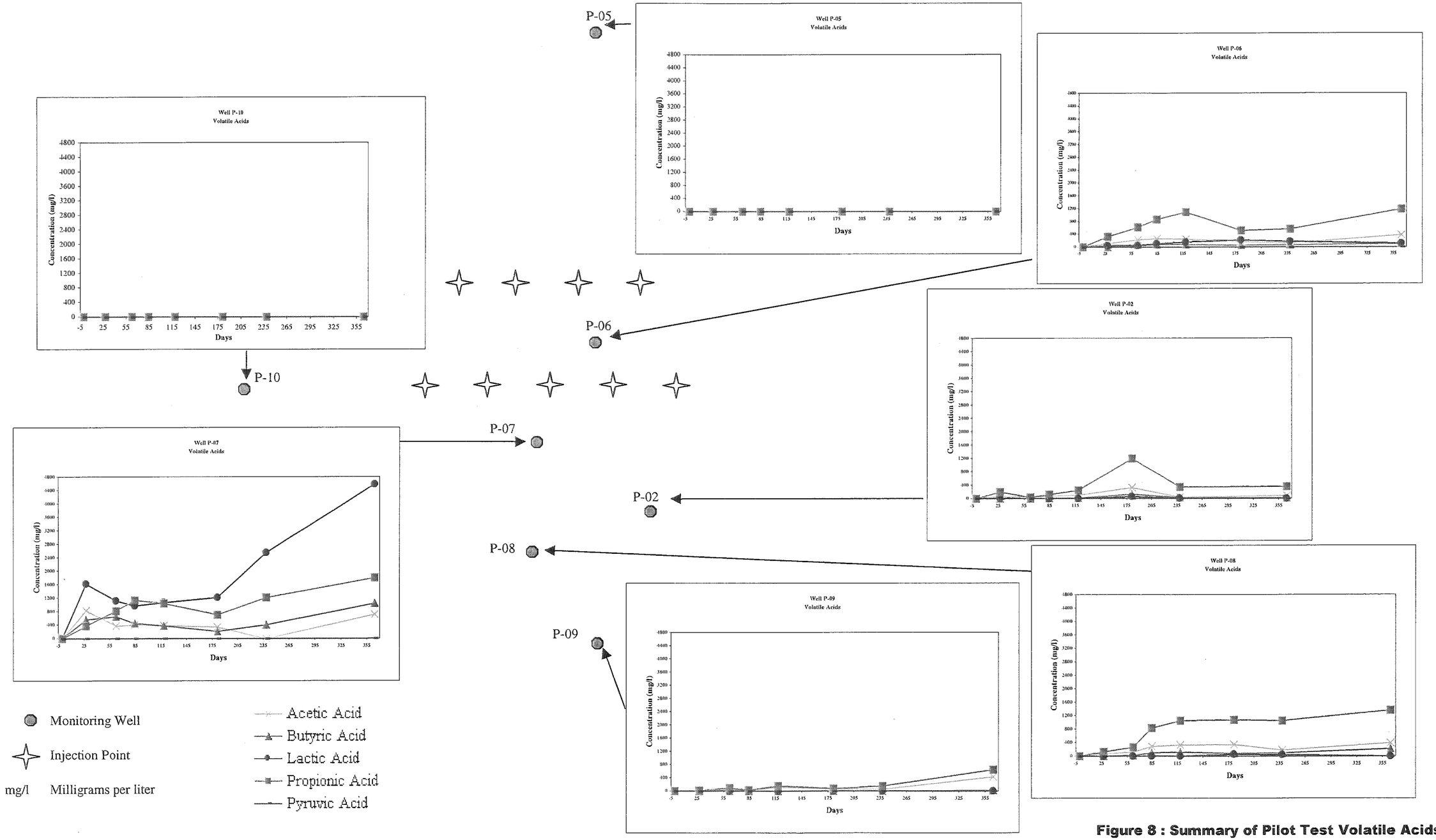


Figure 8 : Summary of Pilot Test Volatile Acids Data
Enhanced Bioremediation Pilot Test
Former Unocal Chemicals Distribution Facility
Wichita, Kansas