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ANL/EVS/AGEM/TR-08-18

Progress Report and Technical Evaluation of the ISCR Pilot Test Conducted at the Former CCC/USDA Grain Storage Facility in Centralia, Kansas

Environmental Science Division

USDA United States Department of Agriculture

Work sponsored by Commodity Credit Corporation,
United States Department of Agriculture

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by
Applied Geosciences and Environmental Management Section
Environmental Science Division, Argonne National Laboratory

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United States Department of Agriculture

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Notation

AGEM	Applied Geosciences and Environmental Management
BER	Bureau of Environmental Remediation (KDHE)
BGL	below ground level
BOW	Bureau of Water (KDHE)
Br^-	bromide
°C	degree(s) Celsius
CCC	Commodity Credit Corporation
CD	compact disc
COC	chain of custody
CPT	cone penetrometer
DO	dissolved oxygen
EDB	ethylene dibromide
EPA	U.S. Environmental Protection Agency
ft	foot (feet)
gal	gallon(s)
IM	Interim Measure
in.	inch(es)
ISCR	*in situ* chemical reduction
KBr	potassium bromide
KDHE	Kansas Department of Health and Environment
lb	pound(s)
µg/kg	microgram(s) per kilogram
mg/kg	milligram(s) per kilogram
µg/L	microgram(s) per liter
mg/L	milligram(s) per liter
MNA	monitored natural attenuation
mV	millivolt(s)
ND	not detected
ORP	oxidation-reduction potential
psi	pound(s) per square inch
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RBSL	Risk-Based Screening Level

RWD	Rural Water District
μS/cm	microsiemen(s) per centimeter
TOC	total organic carbon
UIC	Underground Injection Control
USDA	U.S. Department of Agriculture
VOC	volatile organic compound

Progress Report and Technical Evaluation of the ISCR Pilot Test Conducted at the Former CCC/USDA Grain Storage Facility in Centralia, Kansas

1 Introduction and Background

In October, 2007, the Commodity Credit Corporation of the U.S. Department of Agriculture (CCC/USDA) presented the document *Interim Measure Conceptual Design* (Argonne 2007a) to the Kansas Department of Health and Environment, Bureau of Environmental Remediation (KDHE/BER), for a proposed non-emergency Interim Measure (IM) at the site of the former CCC/USDA grain storage facility in Centralia, Kansas (Figure 1.1). The IM was recommended to mitigate existing levels of carbon tetrachloride contamination identified in the vadose zone soils beneath the former facility and in the groundwater beneath and in the vicinity of the former facility, as well as to moderate or decrease the potential future concentrations of carbon tetrachloride in the groundwater. The *Interim Measure Conceptual Design* (Argonne 2007a) was developed in accordance with the KDHE/BER Policy #BER-RS-029, *Policy and Scope of Work: Interim Measures* (KDHE 1996).

The hydrogeologic, geochemical, and contaminant distribution characteristics of the Centralia site, as identified by the CCC/USDA, factored into the development of the non-emergency IM proposal. These characteristics were summarized in the *Interim Measure Conceptual Design* (Argonne 2007a) and were discussed in detail in previous Argonne reports (Argonne 2002a, 2003, 2004, 2005a,b,c, 2006a,b, 2007b). The identified remedial goals of the proposed IM were as follows:

- To reduce the existing concentrations of carbon tetrachloride in groundwater in three “hot spot” areas identified at the site (at SB01, SB05, and SB12-MW02; Figure 1.2) to levels acceptable to the KDHE.

- To reduce carbon tetrachloride concentrations in the soils near the location of former soil boring SB12 and existing monitoring well MW02 (Figure 1.2) to levels below the KDHE Tier 2 Risk-Based Screening Level (RBSL) of 200 μg/kg for this contaminant.

To address these goals, the potential application of an *in situ* chemical reduction (ISCR) treatment technology, employing the use of the EHC® treatment materials marketed by Adventus Americas, Inc. (Freeport, Illinois), was recommended. The EHC materials are proprietary mixtures of food-grade organic carbon and zero-valent iron that are injected into the subsurface as a slurry (EHC) or in dissolved form (EHC-A) and subsequently released slowly into the formation. The materials are designed to create highly reducing geochemical conditions in the vadose and saturated zones that foster both thermodynamic and biological reductive dechlorination of carbon tetrachloride.

As a precursor to implementation of the full IM, however, the CCC/USDA recommended an initial short-term, field-scale pilot test of the Adventus materials in one of the hot-spot areas, near monitoring well MW02 and former soil boring SB12 (Figure 1.2). The SB12-MW02 hot spot was chosen for testing because of the presence of elevated carbon tetrachloride concentrations in both the vadose and saturated zones at this location, coupled with subsurface lithologic conditions that appeared more favorable for the injection process than those underlying the remaining two groundwater-only hot-spot areas (at SB01 and SB05; Figure 1.2).

The technical and logistic objectives of the pilot test were as follows:

- To operationally test and critically evaluate the viability of ISCR, and specifically the Adventus materials, as a remedial approach for restoration of the subsurface soils and groundwater at Centralia, as well as potentially at other former CCC/USDA investigation sites in Kansas that might have similar hydrogeologic characteristics, geochemical features, and remedial requirements.

- To gain practical technical and logistic experience in implementation of the ISCR approach and thus facilitate the development of optimal methods and techniques for the potential application of this technology at Centralia and other CCC/USDA investigation sites where the approach might be applicable.

- To critically evaluate the ability of the ISCR technology to achieve the remedial goals outlined above in a cost- and time-effective manner.

The technical specifications for the proposed Centralia ISCR pilot test were jointly developed by the CCC/USDA and Argonne National Laboratory in consultation with Adventus representatives. These specifications and are summarized in Section 4 of the *Interim Measure*

Conceptual Design (Argonne 2007a). The primary elements of the pilot testing program included the following:

- Pre-treatment soil and groundwater sampling in and near the targeted hot-spot area, to provide baseline data for evaluation of the ISCR process.

- Injection of the EHC materials on a grid pattern within the targeted treatment area.

- Initial post-injection soil coring to investigate the subsurface distribution of the materials resulting from the injection process, along with groundwater sampling and analyses to identify possible short-term ISCR effects on the groundwater geochemistry and contaminant levels.

- Extended groundwater sampling and analyses, with follow-up vadose zone soil sampling and analyses, to evaluate the longer-term effectiveness of the ISCR treatment.

The recommended testing activities were discussed by representatives of the KDHE/BER, CCC/USDA, and Argonne in a teleconference on November 8, 2007. On November 9, 2007, the KDHE/BER (KDHE 2007a) approved the pilot ISCR testing program as outlined in the *Interim Measure Conceptual Design* (Argonne 2007a), with minor revisions.

With the approval of the CCC/USDA and KDHE/BER project managers, the pilot testing program was implemented at Centralia as follows:

- Pre-treatment baseline sampling associated with the ISCR pilot test was conducted on November 12-16, 2007.

- Injection of the EHC materials was performed on November 26-December 5, 2007.

- Post-injection soil coring was initiated on December 5, 2007, and completed on December 17, 2007.

- The installation of permanent groundwater monitoring points at locations approved by the KDHE and initial post-injection groundwater sampling were conducted on January 8-10, 2008.

- Extended monitoring of the groundwater in the pilot test area was initiated on January 24, 2008, and continued approximately monthly through September 2008.

- Vadose zone soil sampling for analyses of volatile organic compounds (VOCs) was conducted as part of the extended monitoring effort on August 21, 2008.

This report documents and provides a technical evaluation of the results of the Centralia ISCR pilot test that had been obtained as of September 2008. These results were discussed with representatives of the CCC/USDA and the KDHE/BER in a web-based conference conducted on September 25, 2008. This section provides a brief background and chronological history of the pilot testing program. Section 2 presents an overview of the planned injection program as originally approved by the CCC/USDA and KDHE/BER project managers (on November 9, 2007), along with the related pre-treatment baseline sampling studies. Section 3 summarizes modifications to the planned injection program that were made with the approval of the CCC/USDA and KDHE/BER project managers as a result of the pre-treatment characterization studies, and it also presents an overview of the injection field activities. In Section 4, the results of the initial post-injection characterization studies and the extended groundwater and vadose zone monitoring program are summarized. The conclusions drawn from the pilot testing studies to date and preliminary recommendations for further action at the Centralia site based on these results are presented in Section 5.

All of the soil and groundwater collection, sample analysis, and monitoring point/piezometer installation activities conducted in conjunction with the Centralia ISCR pilot test and described in this report were performed in accord with the detailed methodologies and procedures in the KDHE-approved *Master Work Plan* for environmental investigations in Kansas (Argonne 2002b). The site-specific quality control measures employed during sample collection, handling, and analysis and for the handling and disposal of investigation-derived wastes generated throughout the pilot testing program are summarized in Supplement 1, which is on the compact disc (CD) inside the back cover of this report.

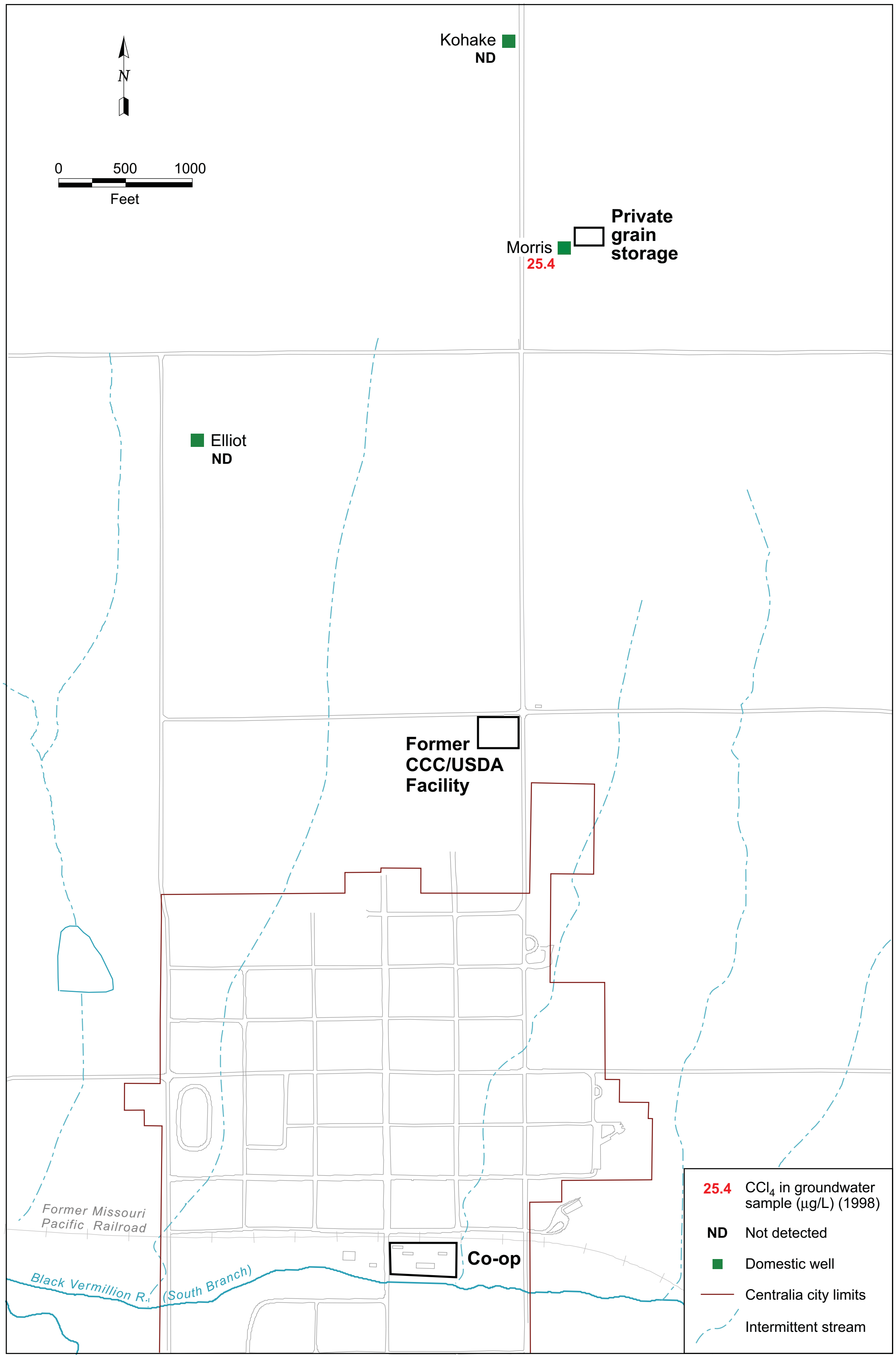

FIGURE 1.1 Locations of the former CCC/USDA facility and the contaminated private well.

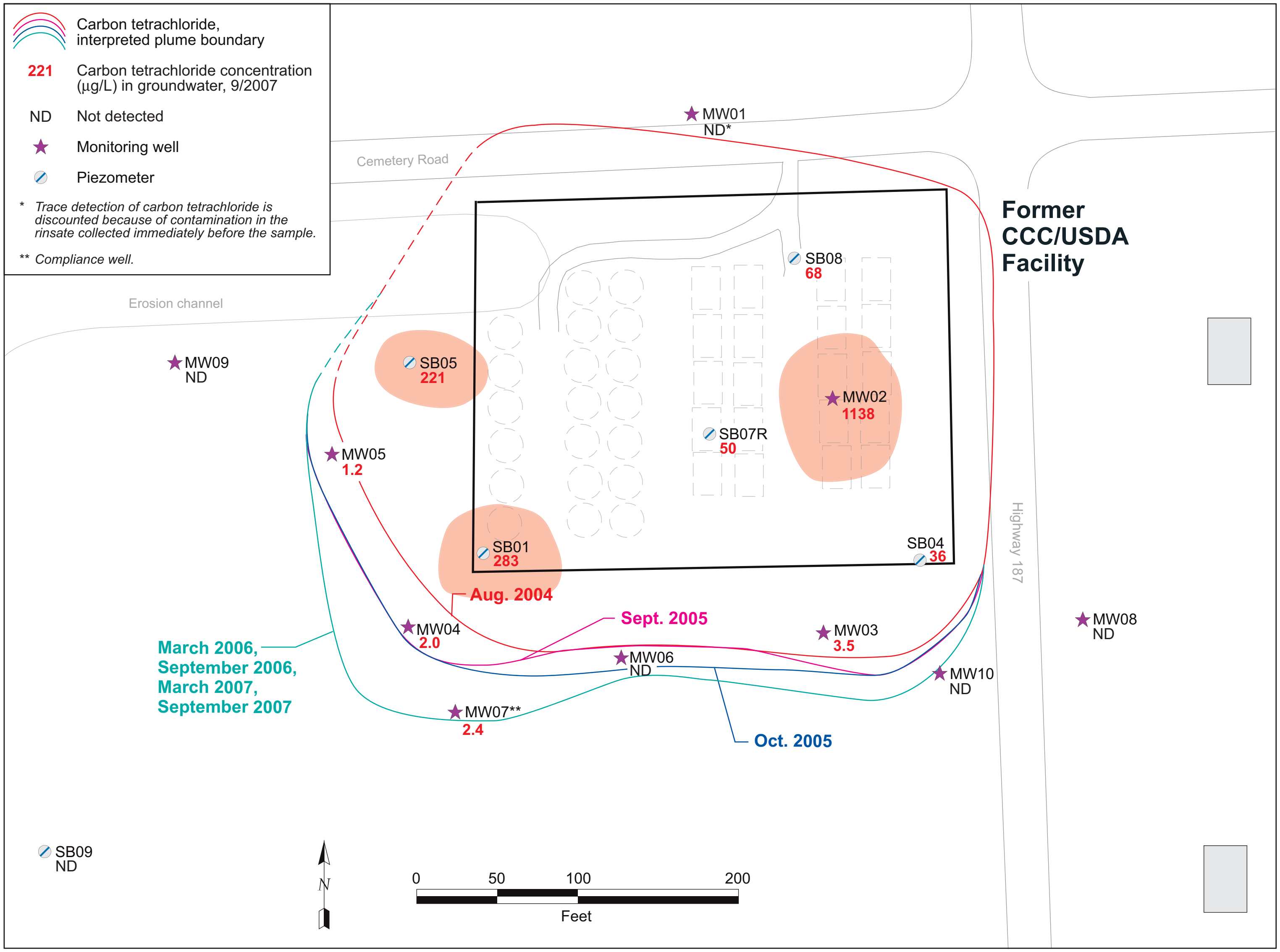

FIGURE 1.2 Analytical results for carbon tetrachloride in groundwater samples collected in September 2007, with interpreted plume boundaries in August 2004, September 2005, March and September 2006, and March and September 2007, and persistent contaminant hot spots identified at SB01, SB05, and MW02.

2 Pre-Treatment Baseline Characterization Studies

Figure 2.1 illustrates the area targeted for ISCR treatment (using the Adventus EHC materials) in the Centralia pilot test, as approved by the CCC/USDA and KDHE/BER project managers in November 2007. The area, approximately 45 ft wide by 75 ft long, was selected to encompass the locations of existing monitoring well MW02 and former investigative boring SB12; these two borings have consistently exhibited the highest concentrations of carbon tetrachloride identified in both the vadose zone soils and groundwater at the Centralia investigation site (Argonne 2007a). In Figure 2.2, the proposed distribution of EHC injection points (PT1-PT15) is shown. As outlined in the approved *Interim Measure Conceptual Design* (Argonne 2007a), the ten injection points nearest former boring location SB12 were targeted for injection of the soluble EHC-A material in the vadose zone soils from 20 ft to 40 ft below ground level (BGL) and EHC slurry in the deeper soils and aquifer materials from 40 ft to 60 ft BGL. At the remaining five injection points, EHC slurry was to be used only over the depth interval at 40-60 ft BGL.

With the approval of the CCC/USDA and KDHE/BER project managers, 15 locations (Figure 2.2) were selected for pre-treatment sampling to provide baseline data on the detailed distribution of carbon tetrachloride in the vadose zone soils in the injection area (PSB1-PSB4) and on the carbon tetrachloride levels and inorganic geochemical characteristics of the groundwater in (PSB1-PSB4 and MW02) and near (PSB5-PSB9, SB04, SB07R, SB08, and MW03) the proposed injection field. The results of the baseline sampling studies are discussed below.

2.1 Pre-Injection Baseline Characterization of Groundwater in the Pilot Test Area

2.1.1 Pre-Injection Groundwater Sampling and Analysis Methods

Groundwater sampling for baseline analyses of VOCs and selected geochemical parameters was performed at 9 locations (PSB1-PSB9; Figure 2.2) by using the Argonne 20-ton track-mounted cone penetrometer (CPT) vehicle. At each location, groundwater samples were obtained at depths of approximately 50-55 ft BGL and 55-60 ft BGL within the previously identified aquifer interval (Argonne 2007a) by advancing a temporary, 0.5-in.-diameter polyvinyl chloride (PVC) screen and riser to the desired sampling depth through the CPT rods.

Attempts to recover groundwater from shallower depths in the sediment profile at several locations (40-45 ft BGL and 45-50 ft BGL at PSB1; 45-50 ft BGL at PSB3; Figure 2.2) were unsuccessful.

Sample aliquots for laboratory analyses of VOCs, total organic carbon, and methane were collected by using a stainless steel bailer. Sample aliquots for laboratory analyses of inorganic geochemical parameters (described below) were recovered by using an inertial pumping assembly (disposable, small-diameter tubing and foot valve). The sequence of activities during the baseline sampling event is in Appendix A.

At the request of the KDHE/BER, a sample of the water to be used for mixing of the pilot test injection fluids (obtained from the Centralia municipal water system, which is supplied by Nemaha County Rural Water District 3 [RWD 3]) was also collected for geochemical analysis as part of the pre-injection sampling event.

With the approval of the CCC/USDA and KDHE/BER project managers, analytical parameter data for groundwater samples collected by Argonne in September 2007 at permanent monitoring points SB04, SB07R, SB08, MW02, and MW03 (Figure 2.2) are included in the baseline data set. The September 2007 analyses (Argonne 2008a) were obtained as part of ongoing sampling of the complete Centralia monitoring well network that is performed twice yearly at the request of the KDHE/BER. These monitoring points are screened over the full aquifer thickness (at approximately 50-60 ft BGL) at each location.

Measurements of temperature, pH, conductivity, carbon dioxide, iron(II), dissolved oxygen (DO) and oxidation-reduction potential (ORP) were made for all samples by using calibrated field instruments and appropriate field test kits in accord with the manufacturers' instructions and the *Master Work Plan* (Argonne 2002b). Groundwater samples designated for VOCs analyses were collected in appropriate laboratory containers, labeled, packaged, and chilled to 4°C by placement in ice-filled coolers. The samples were shipped by overnight delivery service to the Applied Geosciences and Environmental Management (AGEM) Laboratory at Argonne for VOCs analyses with U.S. Environmental Protection Agency (EPA) Method 524.2 (EPA 1995). Aliquots of selected samples (chosen in the field) were also shipped to Envirosystems, Inc., Columbia, Maryland, for verification analyses.

Samples designated for geochemical analyses were collected in appropriate laboratory containers, labeled, packaged, preserved (as required for the parameter of interest, in accord with the *Master Work Plan* [Argonne 2002b]), and shipped to TestAmerica Laboratories, Inc., in Burlington, Vermont, and Chicago, Illinois. The analyses included dissolved chloride, bromide, sulfate, nitrate, and phosphate concentrations by EPA Method 300; total alkalinity by EPA Method 310.1; nitrate-nitrite nitrogen by EPA Method 353.2; nitrite nitrogen by EPA Method 354.1; sulfide by EPA Method 376.2; total organic carbon by EPA Method 415.1; and dissolved metals (calcium, magnesium, manganese, potassium, silicon, and sodium) by EPA Method 6010 (EPA 1998). Analyses for methane were conducted with Method RSK-175 (Kampbell and Vandegrift 1998).

2.1.2 Results of the Pre-Injection Baseline Groundwater Analyses

The complete results of the baseline groundwater analyses are on CD, in Supplement 2.

2.1.2.1 Baseline VOCs Analysis Results for Groundwater

The results of the VOCs analyses of baseline groundwater samples are summarized in Table 2.1 and are illustrated in Figures 2.3-2.4.

Figure 2.3 demonstrates that the carbon tetrachloride distribution in groundwater in the pilot test investigation area was highly heterogeneous, with concentrations varying by as much as two orders of magnitude and more over relatively short vertical (approximately 5 ft) and lateral (≤ 50 ft) distances. Carbon tetrachloride levels in the upper portion of the aquifer interval (50-55 ft BGL) ranged from non-detectable (at an analytical method detection limit of 0.1 μg/L) to 2,646 μg/L. Carbon tetrachloride concentrations in the lower aquifer interval (55-60 ft BGL) ranged from 1.4 μg/L to 2,029 μg/L. Concentrations in the lower aquifer interval were generally slightly lower than the corresponding values in the shallower aquifer interval.

The results of the baseline analyses confirmed the continuing presence of a hot spot in the groundwater carbon tetrachloride concentrations in the vicinity of monitoring well MW02, as previously identified (Argonne 2007a). The results indicated, however, that elevated contaminant levels (> 100 μg/L) associated with the hot spot extended laterally to the northeast, south, and southwest, beyond the limits of the proposed ISCR injection field. The highest carbon tetrachloride concentrations in groundwater detected during the baseline characterization (2,029 μg/L and 2,646 μg/L; Figure 2.3) were identified at sampling location PSB8, outside the southwestern margin of the proposed injection area.

Figure 2.4 shows the baseline distributions of chloroform in the aquifer intervals at 50-55 ft BGL and 55-60 ft BGL, respectively. Chloroform concentrations varied from < 1 μg/L to 103 μg/L, with relatively greater values (> 10 μg/L) identified in association with high levels of carbon tetrachloride (Figure 2.3). Trace levels of methylene chloride were also detected at several locations (PSB5, PSB7, and PSB8; Table 2.1) in conjunction with the higher carbon tetrachloride values. The observed detections of chloroform and methylene chloride in association with carbon tetrachloride are consistent with previous monitoring results (Argonne 2005, 2006a, 2006b, 2007b), which suggested that natural biodegradation of carbon tetrachloride might locally occur, to a limited degree, within the Centralia aquifer.

2.1.2.2 Baseline Geochemical Analysis Results for Groundwater

A compilation of the complete inorganic geochemical and field parameter data set obtained during the pre-injection groundwater sampling event is on CD, in Supplement 2. The results of selected geochemical parameter analyses of particular concern to the implementation and evaluation of the ISCR pilot testing program are discussed below.

As noted in Section 1, the Adventus EHC materials recommended for the pilot injection program at Centralia are formulated to generate a highly reducing (low ORP), oxygen-depleted environment within the subsurface that is amenable to both thermodynamic and anaerobic biological reductive dechlorination of carbon tetrachloride. Figures 2.5-2.7 summarize the pre-injection DO and ORP values in groundwater that were determined as baseline data for the pilot test area. The DO levels ranged from approximately 2.9 mg/L to 8.3 mg/L (Figures 2.5 and 2.6), and ORP values generally (with only two exceptions) were more positive than -70 mV (Figures 2.5 and 2.7). The observed results indicate that the ambient groundwater conditions in the testing area are generally aerobic and therefore are not conducive to the widespread natural occurrence of reductive dechlorination. Values for ORP more negative than -300 mV were detected at two locations (Figure 2.7): PSB5 (-311 mV, at 55-60 ft BGL) and PSB7 (-343 mV, at 50-55 ft BGL); however, these results appear inconsistent with the DO levels observed at these points (3.9 mg/L and 3.7 mg/L, respectively; Figure 2.5).

At the request of the KDHE/BER (KDHE 2007a), bromide (Br^-) was identified as a conservative species (under the anticipated conditions of the ISCR pilot test) for possible use as a geochemical tracer, to assist in tracking the subsurface distribution and movement of the injected fluids during the Centralia pilot test. To determine suitable Br^- concentrations for potential use in the recommended tracer studies (see Section 3.1), ambient levels of Br^- were determined for the baseline groundwater samples collected at points PSB1-PSB9 (Figure 2.2) and for a sample of the water (obtained from the Centralia municipal system and supplied by RWD 3) to be used in mixing of the EHC injection fluids. The results of the analyses are in Table 2.2. Bromide levels in the Centralia formation waters varied by approximately one order of magnitude, from 0.14 mg/L to 2.0 mg/L, with the highest concentrations occurring at PSB5 (0.95-2.0 mg/L) and PSB8 (0.78-1.0 mg/L), to the northeast and southwest, respectively, of the proposed injection field (Figure 2.2). An average Br^- concentration of 0.52 mg/L was calculated for all groundwater samples; an average of 0.30 mg/L was calculated for the sampling points (PSB1-PSB4) in the proposed injection field. The Br^- concentration (0.29 mg/L) in the sample of water from the Centralia municipal system was comparable to the levels identified in groundwater in the pilot test area.

2.2 Pre-Injection Baseline Characterization of Vadose Zone Soils in the Pilot Test Area

2.2.1 Soil Sampling and Analysis Methods

At the request of the KDHE/BER, continuous soil cores were collected from ground surface to a depth of 40 ft BGL at locations PSB1-PSB4 (Figure 2.2) by using the Argonne 20-ton track-mounted CPT vehicle, to facilitate vertical-profile soil sampling for VOCs analyses. Soil samples for VOCs analyses were recovered from the cores at 4-ft intervals, from 4 ft to 40 ft BGL. The samples were immediately placed in appropriate laboratory containers, labeled, preserved on dry ice, and shipped by an overnight delivery service to the AGEM Laboratory for sample preparation and VOCs analyses with modified EPA Methods 5030B and 8260B. The sequence of activities during the baseline soil sampling is in Appendix A. The complete baseline analytical results are on CD, in Supplement 2.

2.2.2 Pre-Injection Baseline Results for VOCs in Soil

The results of the VOCs analyses on baseline soil samples are summarized in Table 2.3 and are illustrated in Figures 2.8 and 2.9. Carbon tetrachloride was detected (at an analytical method detection limit of 1.0 μg/kg) in the vadose zone soils at all of the locations sampled, with quantifiable levels of the contaminant (at a method quantitation limit of 10 μg/kg) most commonly occurring at depths of approximately 24 ft BGL or greater. Carbon tetrachloride levels greater than 100 μg/kg were identified at borings PSB1 and PSB2 only (at depths ranging from 24 ft to 36 ft BGL; Figure 2.8), in the northern portion of the targeted injection area. The lowest carbon tetrachloride concentrations in soils (ranging from non-detectable to 20 μg/kg) were identified at PSB3, in the southwestern portion of the test area (Figure 2.9).

Sampling point PSB1 was located to coincide with earlier Argonne investigative boring SB12 (Argonne 2004, 2007a). Soil samples collected at this location had previously exhibited carbon tetrachloride levels exceeding the KDHE Tier 2 RBSL (200 μg/kg) for this contaminant in soils (Figures 2.2 and 2.10). Maximum carbon tetrachloride concentrations identified were 219 μg/kg in boring PSB1 and 173 μg/kg at PSB2; these levels are comparable to the maximum carbon tetrachloride concentrations identified at SB12 (202–219 μg/kg), confirming the continued presence of a localized contamination hot spot in the vadose zone soils near the SB12-PSB1 location. The net extent and levels of carbon tetrachloride contamination in the vadose zone soils at PSB1 and PSB2 were somewhat less, however, than those previously detected at SB12 (Figures 2.8 and 2.10). The observed variations in contaminant levels might reflect natural mobilization and limited degradation of the carbon tetrachloride in the vadose zone soils over time (April 2003 to November 2007), as well as inherent localized heterogeneity in the contaminant distribution in soils.

2.3 Summary of Pre-Injection Baseline Studies

The key findings of the pre-injection baseline sampling studies are as follows:

- The distribution of carbon tetrachloride contamination in groundwater in the area targeted for the ISCR pilot test is heterogeneous, with identified levels varying by more than two orders of magnitude over relatively short vertical and lateral distances (see Figure 2.3).

- The previously identified contaminant hot spot in the groundwater in the vicinity of monitoring well MW02 was confirmed; carbon tetrachloride concentrations up to 1,285 μg/L were detected at sampling points PSB1-PSB4 and MW02, within the proposed injection test area.

- Carbon tetrachloride concentrations in groundwater ranging from 114 μg/L to 2,646 μg/L were also identified at sampling points (PSB5-PSB8) adjacent to the proposed injection area to the northeast, south, and southwest of MW02. The maximum pre-injection values (2,029-2,646 μg/L) were identified at PSB8, to the southwest of MW02. The concentrations detected at PSB8 represent the highest levels of carbon tetrachloride identified in groundwater at Centralia to date.

- Observed DO levels of approximately 2.9-8.3 mg/L and ORP values generally more positive than -70 mV indicated that the ambient groundwater in the proposed testing area is aerobic and that the aquifer conditions in the proposed test area are not conducive to the widespread natural occurrence of reductive dechlorination.

- The compound potassium bromide (KBr) was identified for possible use as a tracer to monitor the movement of injected fluids during the ISCR pilot test. Relatively low ambient Br^- levels (0.14-2.0 mg/L) were detected in the Centralia formation waters. Average Br^- concentrations calculated were 0.52 mg/L for all groundwater samples and 0.30 mg/L for groundwater samples collected within the proposed injection field (PSB1-PSB4). The Br^- concentration in a sample of water from the Centralia municipal system (0.29 mg/L) was comparable to the levels identified in groundwater in the pilot test area.

- Baseline carbon tetrachloride concentrations exceeding 100 μg/kg were identified in the vadose zone soils at locations PSB1 and PSB2 in the northern portion of the proposed injection field, confirming the hot spot previously identified at former investigative boring SB12.

- A carbon tetrachloride concentration (219 μg/kg) exceeding the KDHE/BER Tier 2 RBSL (200 μg/kg) for this contaminant in vadose zone soils was detected in one sample only, collected at 24 ft BGL in PSB1. This identified maximum level was comparable to the maximum concentration in soils previously identified at investigative boring SB12.

TABLE 2.1 Results of organic analyses at the AGEM Laboratory for groundwater samples collected during the ISCR pilot study baseline sampling event.

				Concentration (μg/L)		
Location	Sample	Sample Date	Depth (ft BGL)	Carbon Tetrachloride	Chloroform	Methylene Chloride
PSB1	CNPSB1-W-16245	11/12/07	50-55	782	27	ND[a]
PSB1	CNPSB1-W-16246	11/13/07	55-60	309	11	ND
PSB2	CNPSB2-W-16247	11/13/07	50-55	405	3.4	ND
PSB2	CNPSB2-W-16248	11/13/07	55-60	16	2.2	ND
PSB3	CNPSB3-W-16249	11/13/07	50-55	987	50	ND
PSB3	CNPSB3-W-16250	11/14/07	55-60	1285	30	ND
PSB4	CNPSB4-W-16251	11/14/07	50-55	908	17	ND
PSB4	CNPSB4-W-16252	11/14/07	55-60	830	25	ND
PSB5	CNPSB5-W-16255	11/14/07	50-55	770	16	ND
PSB5	CNPSB5-W-16256	11/14/07	55-60	460	80	0.6 J[b]
PSB6	CNPSB6-W-16253	11/14/07	50-55	114	2.5	ND
PSB6	CNPSB6-W-16254	11/14/07	55-60	116	5.2	ND
PSB7	CNPSB7-W-16258	11/15/07	50-55	326	82	0.7 J
PSB7	CNPSB7-W-16257	11/15/07	55-60	148	6.6	ND
PSB8	CNPSB8-W-26060	11/15/07	50-55	2646	103	2.5
PSB8	CNPSB8-W-26061	11/15/07	55-60	2029	18	ND
PSB9	CNPSB9-W-26063	11/15/07	50-55	ND	0.2 J	ND
PSB9	CNPSB9-W-26064	11/15/07	55-60	1.4	0.2 J	ND
MW02[c]	CNMW02-W-16227	9/26/07	49.5-59.5	1138	18	ND
MW03[c]	CNMW03-W-16223	9/25/07	50.5-60.5	3.5	ND	ND
SB04[c]	CNSB04-W-16230	9/26/07	51-61	36	0.4 J	ND
SB07R[c]	CNSB07R-W-16225	9/25/07	45-60	50	2.4	ND
SB08[c]	CNSB08-W-16229	9/26/07	52-62	68	1.8	ND

[a] ND, not detected at an instrument detection limit of 0.1 μg/L.

[b] Qualifier J indicates as estimated concentration below the purge-and-trap method quantitation limit of 1.0 μg/L.

[c] Results from the September 2007 well sampling were accepted as baseline values.

TABLE 2.2 Results of bromide analyses for groundwater samples collected during the ISCR pilot study baseline sampling event.

Location	Sample	Sample Date	Depth (ft BGL)	Bromide (mg/L)
PSB1	CNPSB1-W-16245	11/12/07	50-55	0.24
PSB1	CNPSB1-W-16246	11/13/07	55-60	0.14
PSB2	CNPSB2-W-16247	11/13/07	50-55	0.19
PSB2	CNPSB2-W-16248	11/13/07	55-60	0.40
PSB3	CNPSB3-W-16249	11/13/07	50-55	0.49
PSB3	CNPSB3-W-16250	11/14/07	55-60	0.49
PSB4	CNPSB4-W-16251	11/14/07	50-55	0.16
PSB4	CNPSB4-W-16252	11/14/07	55-60	0.31
PSB5	CNPSB5-W-16255	11/14/07	50-55	0.95
PSB5	CNPSB5-W-16256	11/14/07	55-60	2.0
PSB6	CNPSB6-W-16253	11/14/07	50-55	0.72
PSB6	CNPSB6-W-16254	11/14/07	55-60	0.26
PSB7	CNPSB7-W-16258	11/15/07	50-55	0.49
PSB7	CNPSB7-W-16257	11/15/07	55-60	0.43
PSB8	CNPSB8-W-26060	11/15/07	50-55	1.0
PSB8	CNPSB8-W-26061	11/15/07	55-60	0.78
PSB9	CNPSB9-W-26063	11/15/07	50-55	0.15
PSB9	CNPSB9-W-26064	11/15/07	55-60	0.15

TABLE 2.3 Results of purge-and-trap organic analyses at the AGEM Laboratory for soil samples collected during the ISCR pilot study baseline sampling event.

				Concentration (μg/kg)		
Location	Sample	Sample Date	Depth (ft BGL)	Carbon Tetrachloride	Chloroform	Methylene Chloride
PSB1	CNPSB1-S-16338	11/12/07	4	ND[a]	ND	ND
	CNPSB1-S-16339	11/12/07	8	1.7 J[b]	1.2 J	ND
	CNPSB1-S-16340	11/12/07	12	4.4 J	3 J	ND
	CNPSB1-S-16341	11/12/07	16	42	6.4 J	ND
	CNPSB1-S-16342	11/12/07	20	84	14	ND
	CNPSB1-S-16343	11/12/07	24	219	3.7 J	ND
	CNPSB1-S-16344	11/12/07	28	112	11	ND
	CNPSB1-S-16345	11/12/07	32	91	8.3 J	ND
	CNPSB1-S-16346	11/12/07	36	122	3 J	ND
	CNPSB1-S-19946	11/12/07	40	44	4.6 J	ND
PSB2	CNPSB2-S-19949	11/13/07	3.8	ND	ND	ND
	CNPSB2-S-19950	11/13/07	8	ND	ND	ND
	CNPSB2-S-19951	11/13/07	12	ND	ND	ND
	CNPSB2-S-19952	11/13/07	16	ND	ND	ND
	CNPSB2-S-19953	11/13/07	20	9 J	3.5 J	ND
	CNPSB2-S-19954	11/13/07	24	103	6.1 J	ND
	CNPSB2-S-19955	11/13/07	28	66	8.8 J	ND
	CNPSB2-S-19956	11/13/07	32	152	5.3 J	ND
	CNPSB2-S-19957	11/13/07	36	173	3.5 J	ND
	CNPSB2-S-19958	11/13/07	40	62	2.9 J	ND
PSB3	CNPSB3-S-25970	11/16/07	4	ND	ND	ND
	CNPSB3-S-25961	11/16/07	8	ND	ND	ND
	CNPSB3-S-25962	11/16/07	12	ND	ND	ND
	CNPSB3-S-25963	11/16/07	16	ND	ND	ND
	CNPSB3-S-25964	11/16/07	20	ND	ND	ND
	CNPSB3-S-25965	11/16/07	24	1.2 J	ND	ND
	CNPSB3-S-25966	11/16/07	28	2.7 J	1.2 J	ND
	CNPSB3-S-25967	11/16/07	32	13	1.7 J	ND
	CNPSB3-S-25968	11/16/07	36	20	2.4 J	ND
	CNPSB3-S-25969	11/16/07	40	15	4.3 J	ND
PSB4	CNPSB4-S-19966	11/16/07	4	ND	ND	ND
	CNPSB4-S-19967	11/16/07	8	ND	ND	ND
	CNPSB4-S-19968	11/16/07	12	ND	ND	ND
	CNPSB4-S-19970	11/16/07	16	ND	ND	ND
	CNPSB4-S-19971	11/16/07	20	ND	ND	ND
	CNPSB4-S-19972	11/16/07	24	1.4 J	1.4 J	ND
	CNPSB4-S-19973	11/16/07	28	24	4.7 J	ND
	CNPSB4-S-19974	11/16/07	32	89	7.8 J	ND
	CNPSB4-S-19975	11/16/07	36	58	6 J	ND
	CNPSB4-S-25960	11/16/07	40	57	9.7 J	ND

[a] ND, not detected at an instrument detection limit of 1.0 μg/kg.

[b] Qualifier J indicates an estimated concentration below the purge-and-trap method quantitation limit of 10 μg/kg.

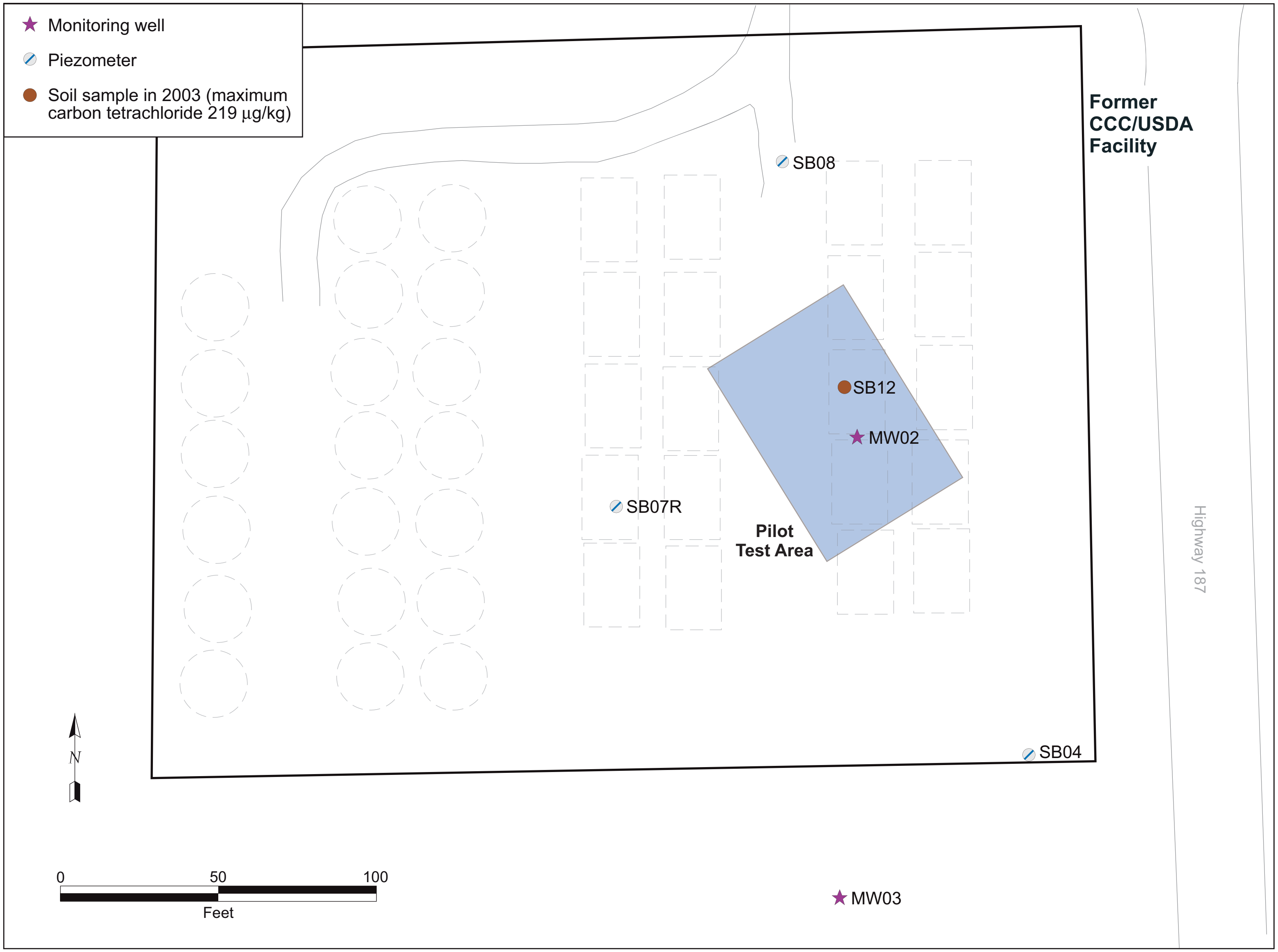

FIGURE 2.1 Proposed (November 2007) pilot test area, with locations of soil boring SB12 and MW02 (which define the hot spot area to be treated in the pilot test) and nearby existing monitoring points.

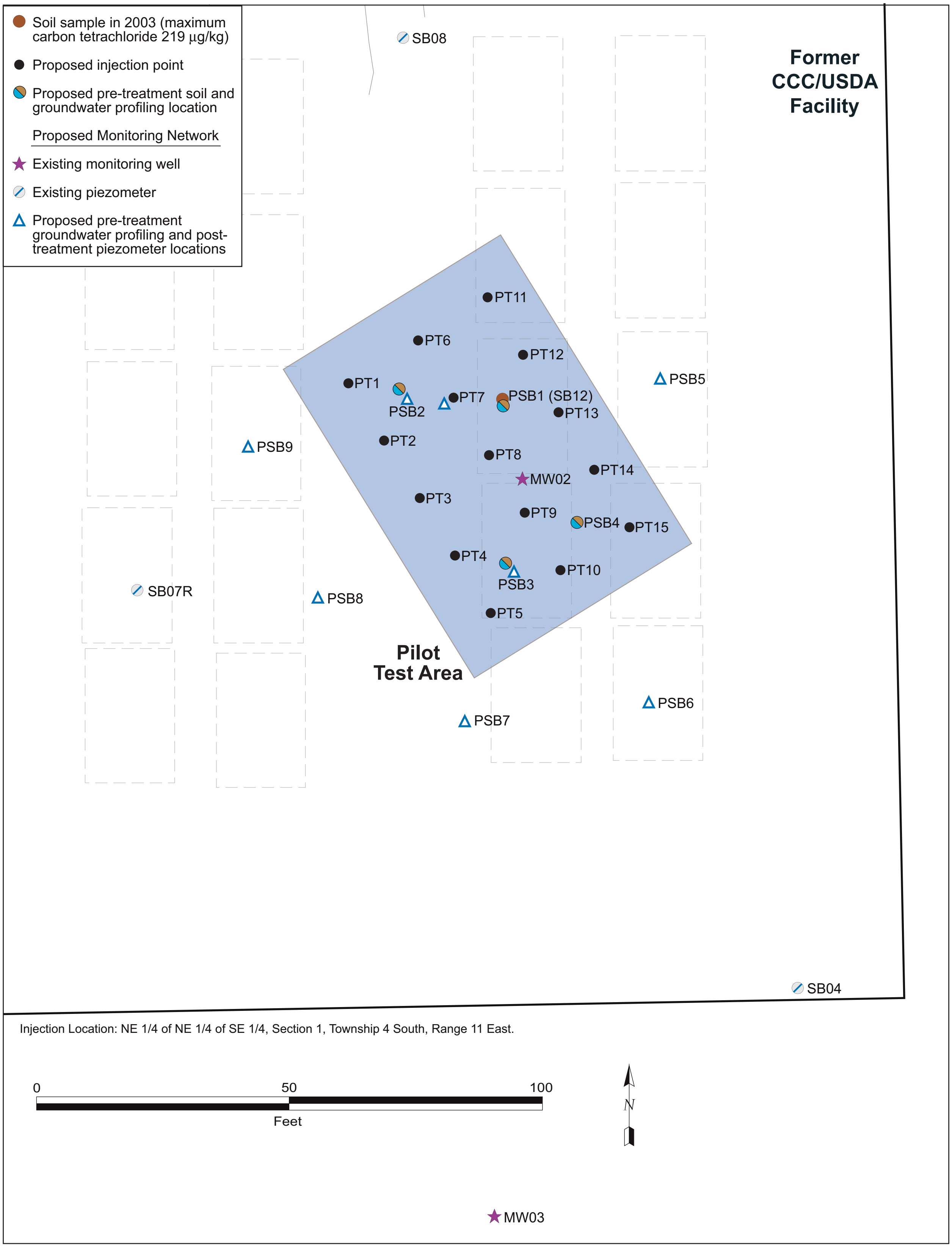

FIGURE 2.2 Proposed (November 2007) pilot test area, with locations of injection points and existing and new monitoring points.

FIGURE 2.3 Carbon tetrachloride concentrations in groundwater samples collected at 50-55 ft BGL and at 55-60 ft BGL during the pre-injection baseline sampling event.

FIGURE 2.4 Chloroform concentrations in groundwater samples collected at 50-55 ft BGL and at 55-60 ft BGL during the pre-injection baseline sampling event.

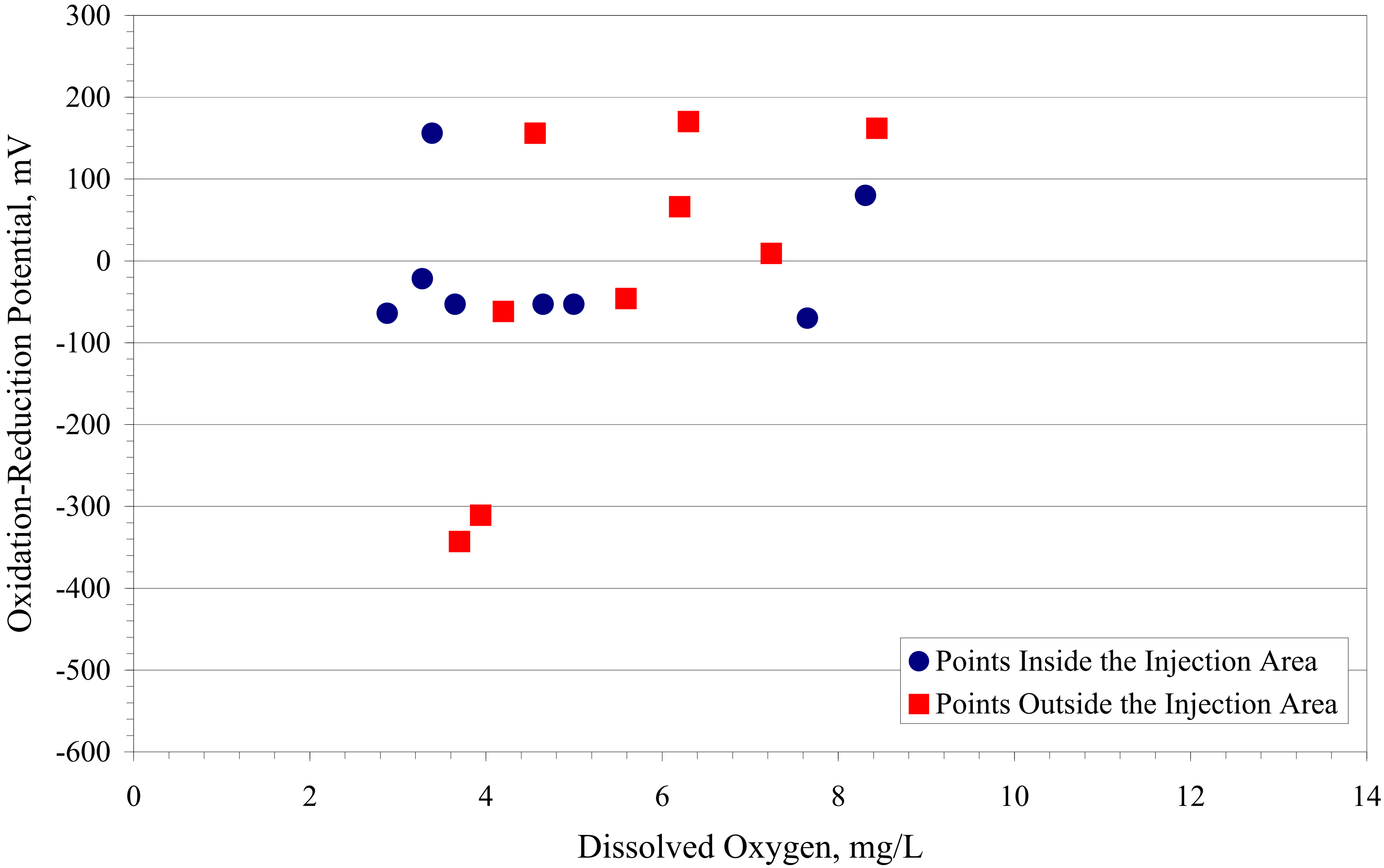

FIGURE 2.5 Dissolved oxygen concentrations and oxidation-reduction potential levels in groundwater samples collected at 50-55 ft and 55-60 ft BGL during the pre-injection baseline sampling event.

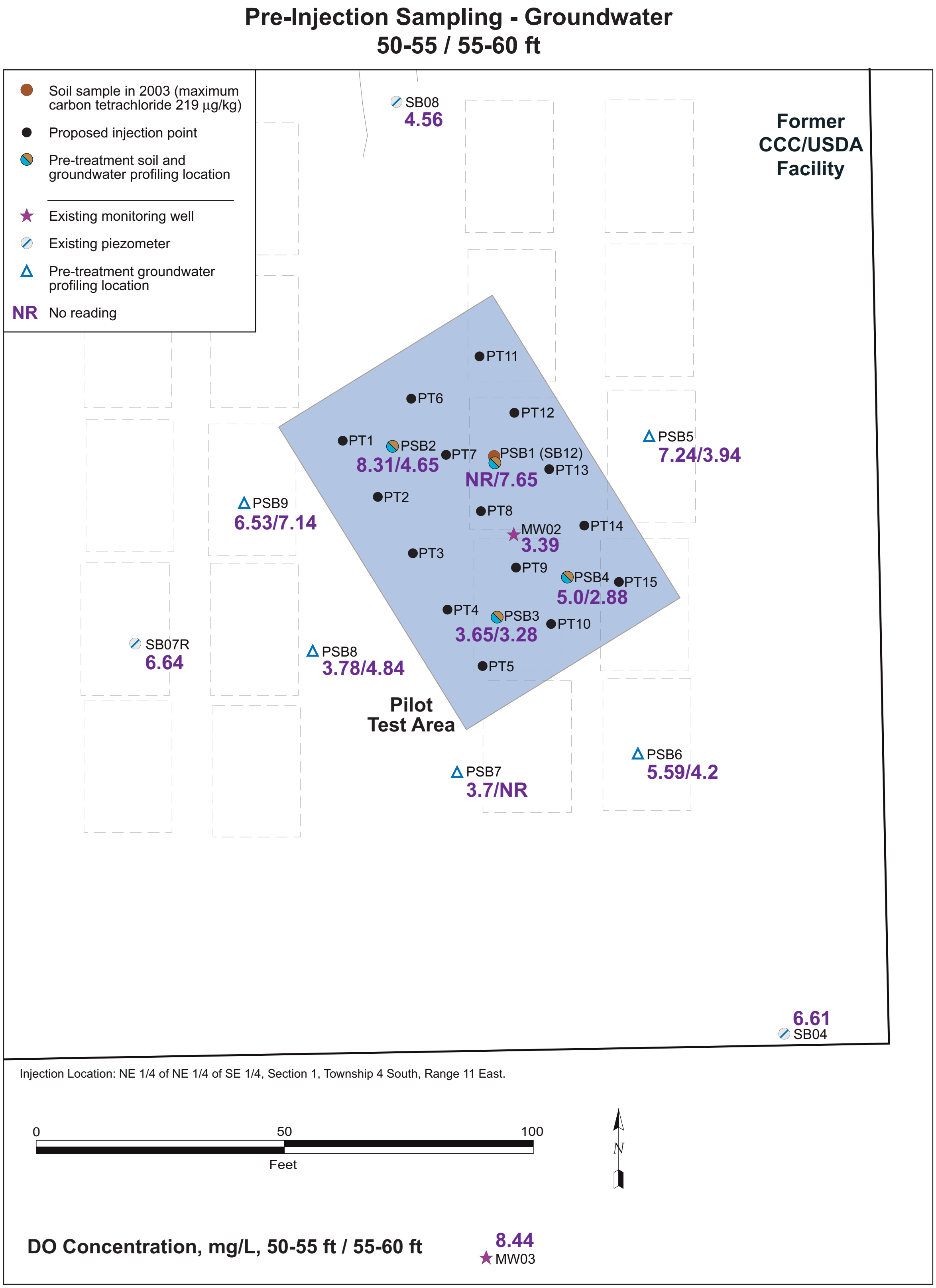

FIGURE 2.6 Dissolved oxygen concentrations in groundwater samples collected at 50-55 ft and 55-60 ft BGL during the pre-injection baseline sampling event.

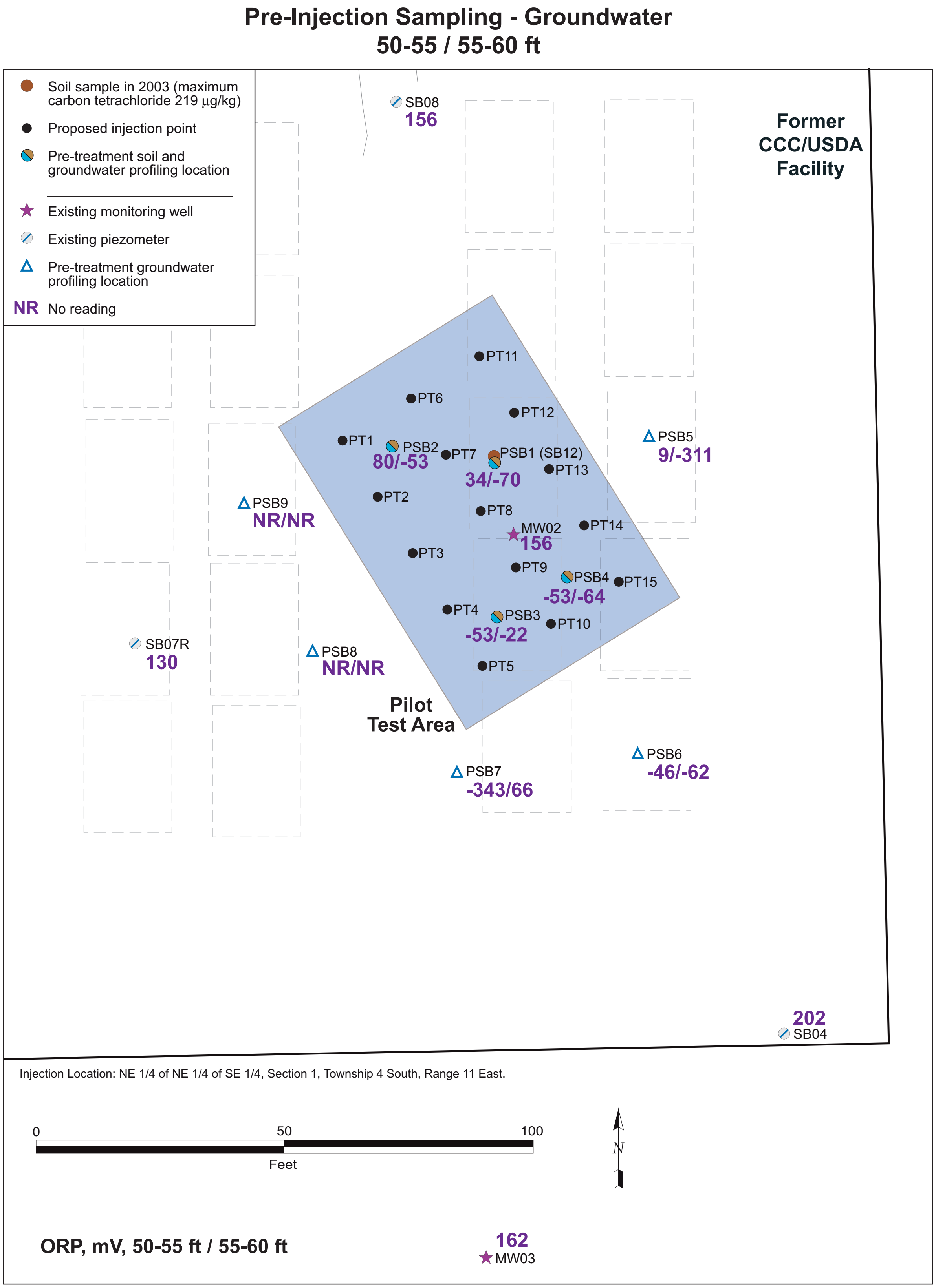

FIGURE 2.7 Oxidation-reduction potential levels in groundwater samples collected at 50-55 ft and 55-60 ft BGL during the pre-injection baseline sampling event.

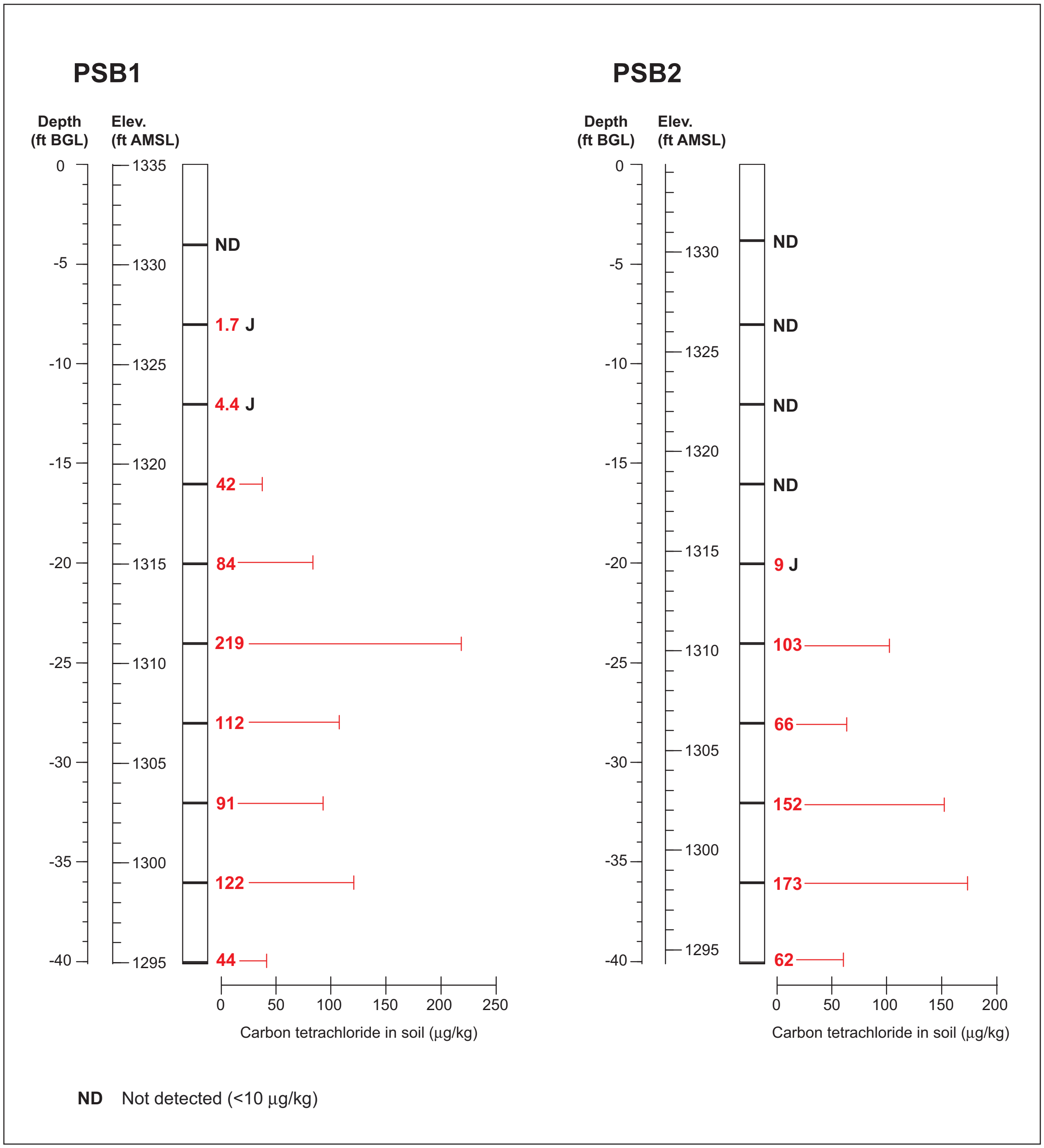

FIGURE 2.8 Vertical distribution of carbon tetrachloride identified in the vadose zone soils at pre-injection baseline sampling locations PSB1 and PSB2.

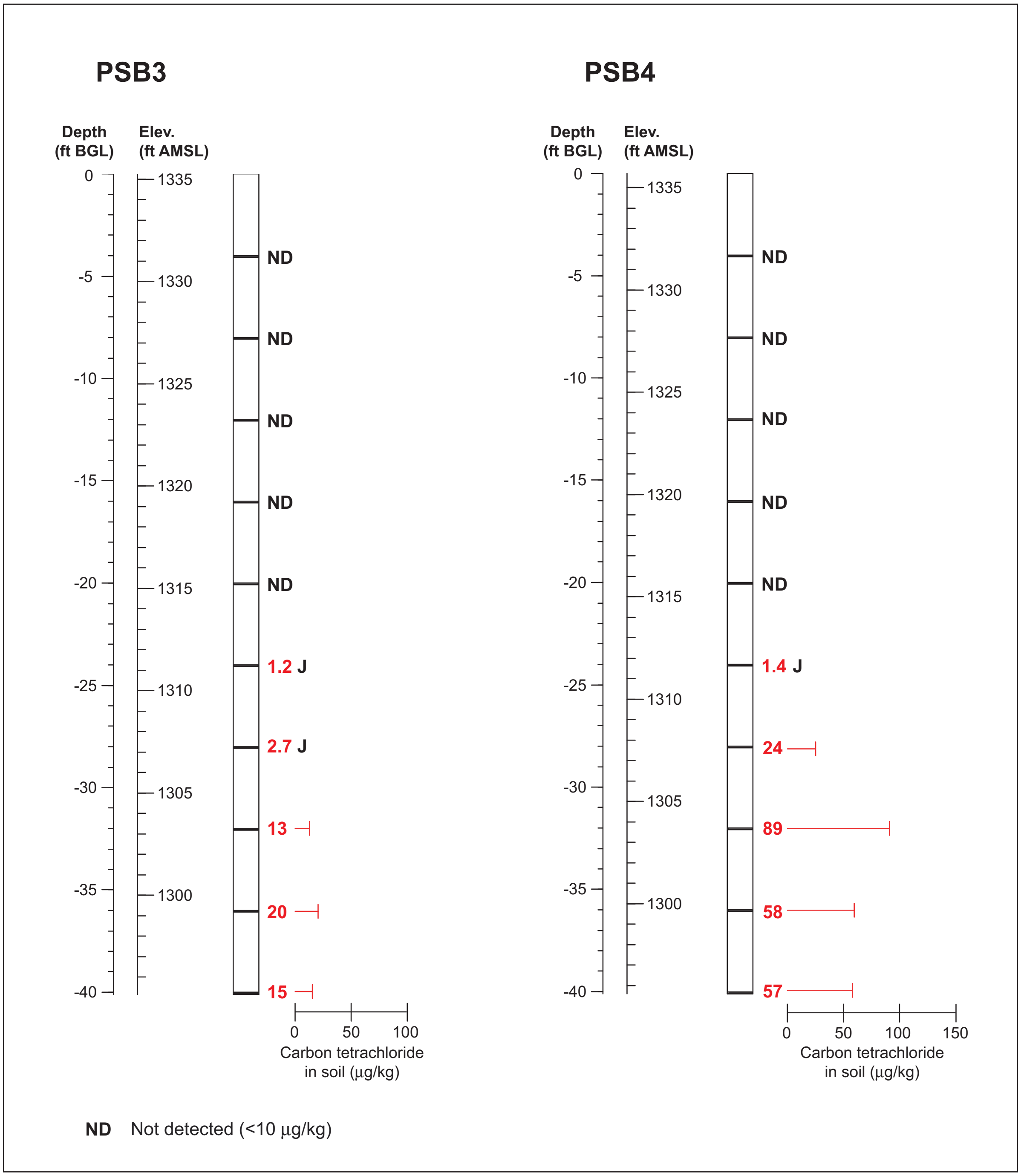

FIGURE 2.9 Vertical distribution of carbon tetrachloride identified in the vadose zone soils at pre-injection baseline sampling locations PSB3 and PSB4.

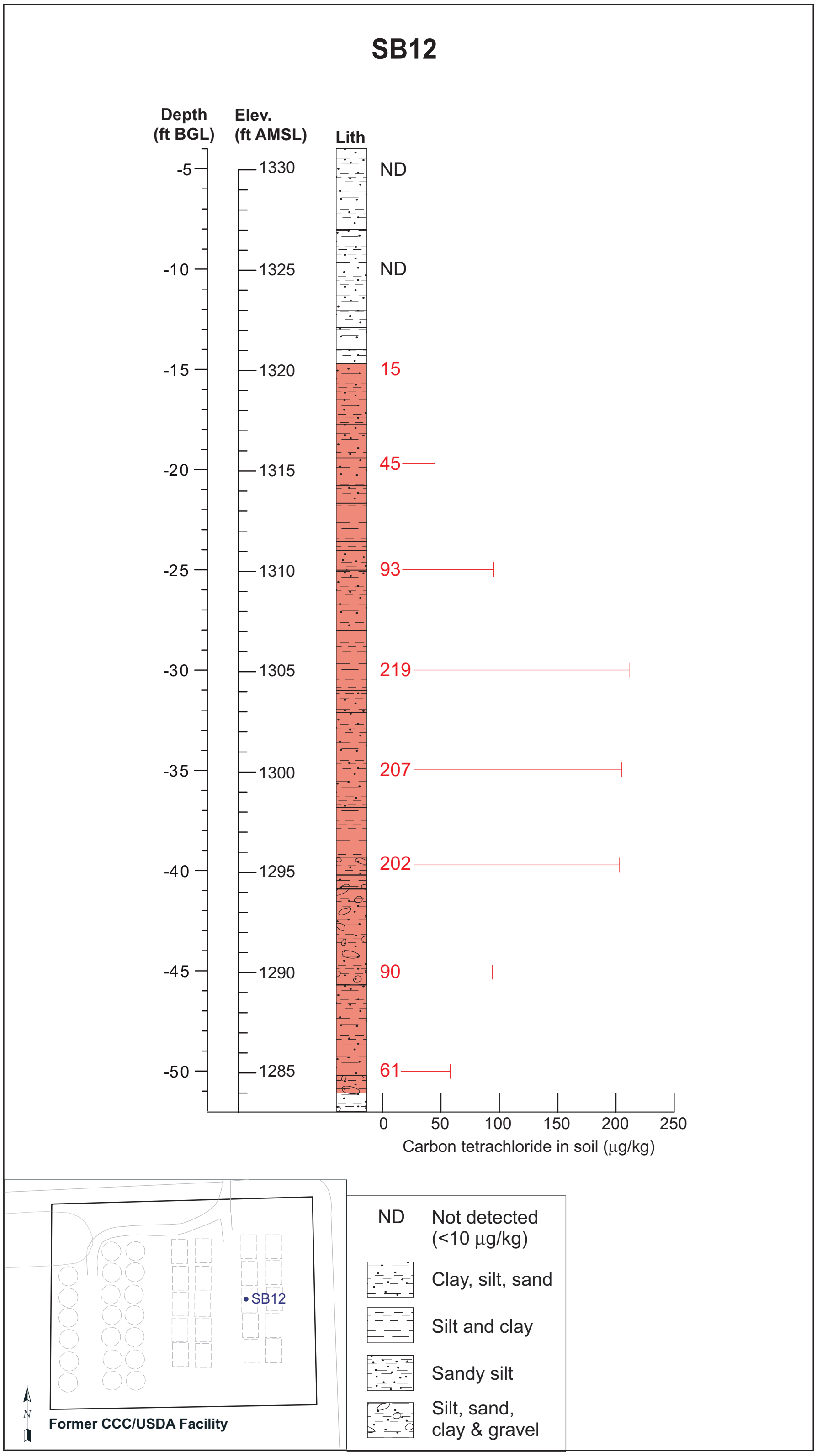

FIGURE 2.10 Vertical distribution of carbon tetrachloride identified in the vadose zone soils at 2002-2004 sampling location SB12.

3 Review of the ISCR Injection Process

3.1 Overview of the Field Injection Program

The results of the pre-injection baseline characterization studies presented in Section 2 were discussed with the KDHE/BER and CCC/USDA project managers and with technical representatives from Adventus prior to field implementation of the injection program at Centralia, and continuing technical dialogue took place among these agencies as the injection activities progressed. On the basis of these discussions, and with the approval of the KDHE/BER and CCC/USDA project managers, several modifications were made to the original injection plan (Argonne 2007a) to more effectively address the distribution of carbon tetrachloride contamination identified at the pilot test site and the field conditions encountered during the injection efforts. The distribution of injection points as originally planned and the injection program as implemented are illustrated in Figures 2.2 and 3.1, respectively. The revisions made include the following:

- Relocation of three injection points (PT1, PT6, and PT11) planned along the northwestern edge of the injection field (Figure 2.2) to the vicinity of pre-injection sampling point PSB8 (Figure 3.1) to address the high carbon tetrachloride concentrations identified in baseline groundwater samples from location PSB8 (Figure 2.3).

- Injection into both the vadose and saturated zones at 7 locations near pre-injection sampling points PSB1 and PSB8, instead of at 10 locations near PSB1 only.

- Injection of EHC-A at 20-40 ft BGL and a thin slurry of EHC at 40-50 ft BGL into the vadose zone soils, in lieu of EHC-A only, to provide additional EHC mass near the top of the saturated zone.

- Injection of EHC into the saturated zone only at 7 locations, in lieu of the originally proposed 5 locations.

- Elimination of injection point PT8 and relocation of injection point PT9 (Figure 2.2) to reduce the potential for invasion of injected fluid at monitoring well MW02 (see below).

- Use of reagent-grade KBr as a geochemical tracer compound, at the request of the KDHE/BER (KDHE 2007a). The KBr tracer was added at a rate of 84.3 g per 100 gal of water used for mixing of the EHC slurry and EHC-A fluids, to yield an initial dissolved Br^- concentration of 150 mg/L in the tagged injection water.

The injections at Centralia were performed by Redox Tech, LLC (Cary, North Carolina), under the supervision of representatives from the KDHE/BER, the KDHE Bureau of Water (KDHE/BOW) Underground Injection Control (UIC) program, the CCC/USDA, Adventus, and Argonne. The program was conducted under authorization received from the KDHE/BOW (KDHE 2007b) by using a direct-push (GeoProbe) technique to inject the EHC-A and EHC amendments from the top down, at the request of the KDHE/BER (KDHE 2007a).

Documentation summarizing the injection field program, including discussion of the field methods employed; a chronology of the daily activities at the site during this phase of the pilot study; and data on the fluid types, quantities, injection depths, and injection pressures employed at each injection location, was provided by Adventus (2008a). The Adventus report was submitted to the KDHE/BOW in compliance with the UIC program authorization for the site (Argonne 2008b), and is on CD in the present report as Supplement 3.

The quantities of EHC and EHC-A employed at each injection location are summarized in Table 3.1. Totals of 3,650 lb of EHC-A and 1,300 lb of EHC were injected into the vadose zone soils (20-50 ft BGL) at locations PT1, PT2, PT6, PT7, and PT11-PT13 (Figure 3.1). In all, 5,300 lb of EHC material was injected into the saturated zone at the 14 locations shown in Figure 3.1 (PT1-PT7 and PT9-PT15). Approximately 8,650 gal of (Br^--tagged) water was used to make up the EHC and EHC-A injection fluids and for limited additional (subsurface) flushing of the downhole injection tool in conjunction with the placement of the EHC materials, as described in Supplement 3. Calculations provided by Adventus (2008a) (Tables 9 and 10 in Supplement 3) indicate that the combined volumes of flush water, EHC slurry, and EHC-A solution injected into the subsurface at Centralia represented approximately 3-6% of the total estimated pore space in the saturated and vadose zones targeted for treatment in the pilot test injection area.

3.2 Evaluation of the Injection Process and Subsurface Fluid Distribution

Field observations during the injection program and subsequent testing conducted with the approval of the KDHE/BER suggested that the heterogeneous subsurface conditions present at Centralia significantly affected both the injection process and the ultimate distribution of the ISCR amendments in the vadose zone and saturated zone soils, in a complex and unpredictable manner.

3.2.1 Leakage of the ISCR Injection Fluids to the Surface

Adventus indicated prior to the injection program that pre-existing boreholes within and near the injection field could provide possible conduits for the leakage of injected fluids to the surface. In light of this, monitoring well MW02 (within the injection field) was pre-loaded with uncontaminated (by carbon tetrachloride) water above the screened interval, and the casing headspace was slightly pressurized, to deter possible invasion of the casing by injection fluids. At the request of Adventus, all pre-injection investigative (CPT) borings were plugged with a proprietary, Bentonite-based material (Adventus HoleBlok+™). Each injection point was also immediately plugged (with HoleBlok+) upon completion of the injections at that location, with methods approved by the KDHE/BOW (Adventus [2008a]; Supplement 3).

The field logs included in the Adventus (2008a) report (Supplement 3) document numerous instances of EHC-A and EHC fluids leaking to the ground surface ("daylighting") as the injections occurred, indicating probable movement of the fluids along preferred vertical and lateral migration pathways within the subsurface. The occurrences of daylighting showed no consistent relationship to the identified surface or subsurface conditions at the site, however, or to the operational parameters or fluid types employed in the injection procedure. The measures used to control the loss of fluids at the daylighting locations were described by Adventus (2008a) (Supplement 3).

Figure 3.2 presents a schematic representation, based on determinations by Argonne staff, of the approximate lateral direction(s) and distance(s) at which daylighting occurred in response to the introduction of fluids at the various injection points. Daylighting was noted at distances ranging from less than 1 ft to more than 25 ft from the source injection points. Daylighting occurred at various depth intervals (one or more at each location), as follows:

- During injection of EHC-A solution into the vadose zone at PT1, PT6, PT7, and PT11 (20-40 ft BGL)

- During injection of thin EHC slurry into the vadose zone at PT7, PT12, and PT13 (40-50 ft BGL)

- During injection of standard EHC slurry into the saturated zone at PT2, PT10, PT14, and PT15 (50-60 ft BGL)

The KDHE/BOW initially authorized the use of injection pressures (measured at the outlet of the injection pump) of up to 300 psi during the injection program (KDHE 2007b). Injection pressures exceeding 300 psi were required, however, to achieve placement of the required EHC fluids at multiple locations and depths in the saturated zone sediments. These pressures were permitted upon notification of the KDHE/BOW as the injection program progressed (Adventus [2008a]; Supplement 3). Injection pressures associated with the instances of daylighting ranged from < 100 psi to 300 psi during injection into vadose zone soils and from approximately 200 psi to 600 psi during injection into the saturated zone. The observed pressures are comparable to those recorded for corresponding subsurface intervals at other locations from which no daylighting occurred.

Figures 3.2 and 3.3 (top) illustrate that fluids from multiple injection points (PT7, PT13, PT14) daylighted outside the well casing at MW02. Daylighting outside the casing at monitoring well SB07R occurred in response to injection at point PT6 (approximately 27 ft northwest of SB07R) (Figure 3.2). Daylighting was also observed (from injection points PT10 and PT14) along pathways roughly intersecting the locations of (plugged) pre-injection investigative borings PSB3 and PSB4 and at (plugged) injection point PT13 (from injection points PT7 and PT12), apparently confirming the influence of the pre-existing borings on the subsurface movement of the injected fluids. Daylighting occurred through previously undisturbed ground, however, in response to the injections at points PT2 (Figure 3.3, bottom) and PT15, suggesting that the surfacing of fluids at Centralia is not uniquely controlled by the presence of earlier borings.

3.2.2 Post-Injection Coring Studies

To obtain further insight into the subsurface movement and distribution of the injected fluids, soil cores were collected at three radial distances from one of the injection points for visual identification of injection fluid, per Adventus recommendations (Argonne 2007a). Injection point PT7 was selected, in consultation with the KDHE/BER project manager, as the focus for this investigation, in light of the multiple daylighting events that occurred in association with injections at this location. Continuous soils cores were collected from 2 ft to 60 ft BGL by using the Argonne CPT in accord with procedures outlined in the *Master Work Plan* (Argonne 2002b), at distances of 11 ft, 5 ft, and 3 ft (PSB10-PSB12, respectively) from point PT7, along the approximate pathway of daylighting observed from this injection point toward pre-injection sampling point PSB1 and injection point PT13 (Figure 3.4). The coring at locations PSB10 and PSB11 (11-ft and 5-ft distances) was performed within two days of completion of the injection program. Because of weather and logistic limitations, the coring at PSB12 (3-ft distance) was completed approximately two weeks after the injection program ended. Photographs of the recovered cores are in Appendix B.

No indications of vertically or laterally pervasive invasion of the vadose zone or aquifer soils were observed in the soil cores collected near PT7. No clear evidence of the presence of injection fluid was identified in the vadose zone soils at the 11-ft distance (PSB10; see Appendix B). One possible thin (approximately 2-in.) horizon of the dark gray EHC material was noted near the top of the aquifer interval at PSB10, at approximately 52 ft BGL; however, no saturation of the associated soils was apparent.

Isolated zones of increased soil moisture were identified at approximately 26 ft, 34 ft, 42 ft, and 50 ft BGL in the vadose zone soils recovered at the 5-ft distance (PSB11; see Appendix B), and slight residual pressures were detected in the CPT rods during the recovery of these cores. Sufficient saturated soil (approximately 1 ft) was retrieved from the coring barrel at the 26-ft depth interval at PSB11 to permit limited geochemical analyses of the associated fluid. Negative ORP levels (< -140 mV) and detection of the Br^- tracer in this sample at an elevated concentration (86 mg/L; Supplement 4 [on CD]) confirmed the presence of the EHC-A solution at this horizon. A small sample of free water was retrieved from the PSB11 core barrel at 54-58 ft BGL, within the previously identified aquifer zone. The Br^- tracer was detected in this sample at 0.55 mg/L (approximately the ambient concentration for groundwater), and the ORP value was positive (+ 50 mV) (Supplement 4).

In contrast to the 5-ft distance (PSB11) from PT7, at the 3-ft distance (PSB12) little evidence of the injected EHC-A fluid was again identified in the vadose zone soils (see Appendix B). Dark gray EHC material observed along a vertical fracture through the soil core recovered at 34-36 ft BGL, however, suggested migration of EHC materials injected deeper (> 40 ft BGL) in the stratigraphic section into the overlying vadose zone soils at this location. A negative ORP measurement (- 71 mV) obtained for a small sample of free water also recovered from the aquifer core at 54-58 ft BGL at PSB12 suggested the possible influence of the EHC material. The Br^- tracer was again identified, however, at an apparently ambient groundwater concentration (0.15 mg/L).

Additional soil coring was conducted from the ground surface to 40 ft BGL at a fourth location (PSB13), approximately nine months after completion of the injection program, for the purposes of follow-up soil VOCs analyses, as discussed in Section 4.3. Boring PSB13 was located approximately 2 ft southeast of pre-injection sampling point PSB1, roughly equidistant from injection points PT7, PT12, and PT13 (Figure 3.4). Examination of the PSB13 cores identified apparent traces of the dark gray EHC material along isolated, small vertical fractures in the soils at 21 ft, 25 ft, and 27.5 ft BGL (Figure 3.5).

3.3 Injection Summary

Detailed, three-dimensional characterization of the subsurface distribution of the ISCR amendments achieved by the injection program at Centralia is beyond both the defined scope and the intent of the current pilot study (Argonne 2007a). The information outlined in this section, however, supports the hypothesis that under the heterogeneous lithologic conditions present at this site, the pilot injection program resulted in a highly non-uniform distribution of the EHC and EHC-A materials. The daylighting observations and coring results together strongly suggest that movement of the injected fluids in both the vadose zone and aquifer soils occurred primarily along complex, preferred migration pathways, the locations and orientations of which cannot be predicted on the basis of available subsurface lithologic controls or the operational parameters of the injection procedures employed. Under these conditions, no effective “average” radius of influence in the stratigraphic section at Centralia can be estimated for use of the present ISCR injection technology (or for other potential treatment alternatives that might require the subsurface injection of materials).

TABLE 3.1 Summary of ISCR amendments injected at the Centralia pilot test site.[a]

	Weight (lb)				
	Vadose Zone		Saturated Zone	Totals	
Location	EHC-A	EHC	EHC	EHC-A	EHC
PT1	500	150	350	500	500
PT2	500	150	250	500	400
PT3	–	–	500	–	500
PT4	–	–	500	–	500
PT5	–	–	500	–	500
PT6	500	150	300	500	450
PT7	500	150	350	500	500
PT9	–	–	500	–	500
PT10	–	–	300	–	300
PT11	650	300	350	650	650
PT12	500	150	350	500	500
PT13	500	150	50	500	200
PT14	–	100	500	–	600
PT15	–	–	500	–	500
Totals	3,650	1,300	5,300	3,650	6,600

[a] Approximately 8,650 gal of water was used for the injection program.

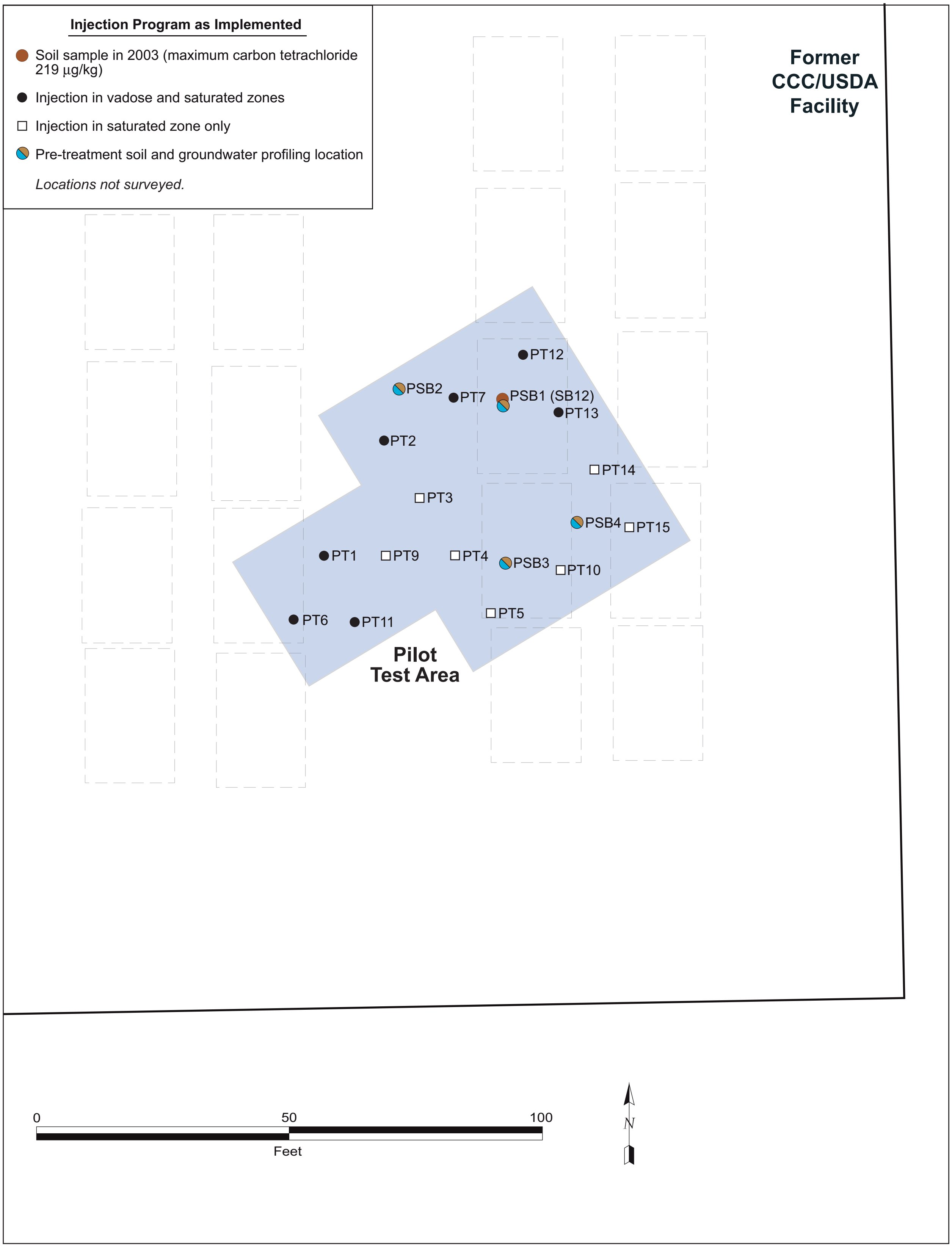

FIGURE 3.1 Pilot test area, with the revised locations of injection points as implemented.

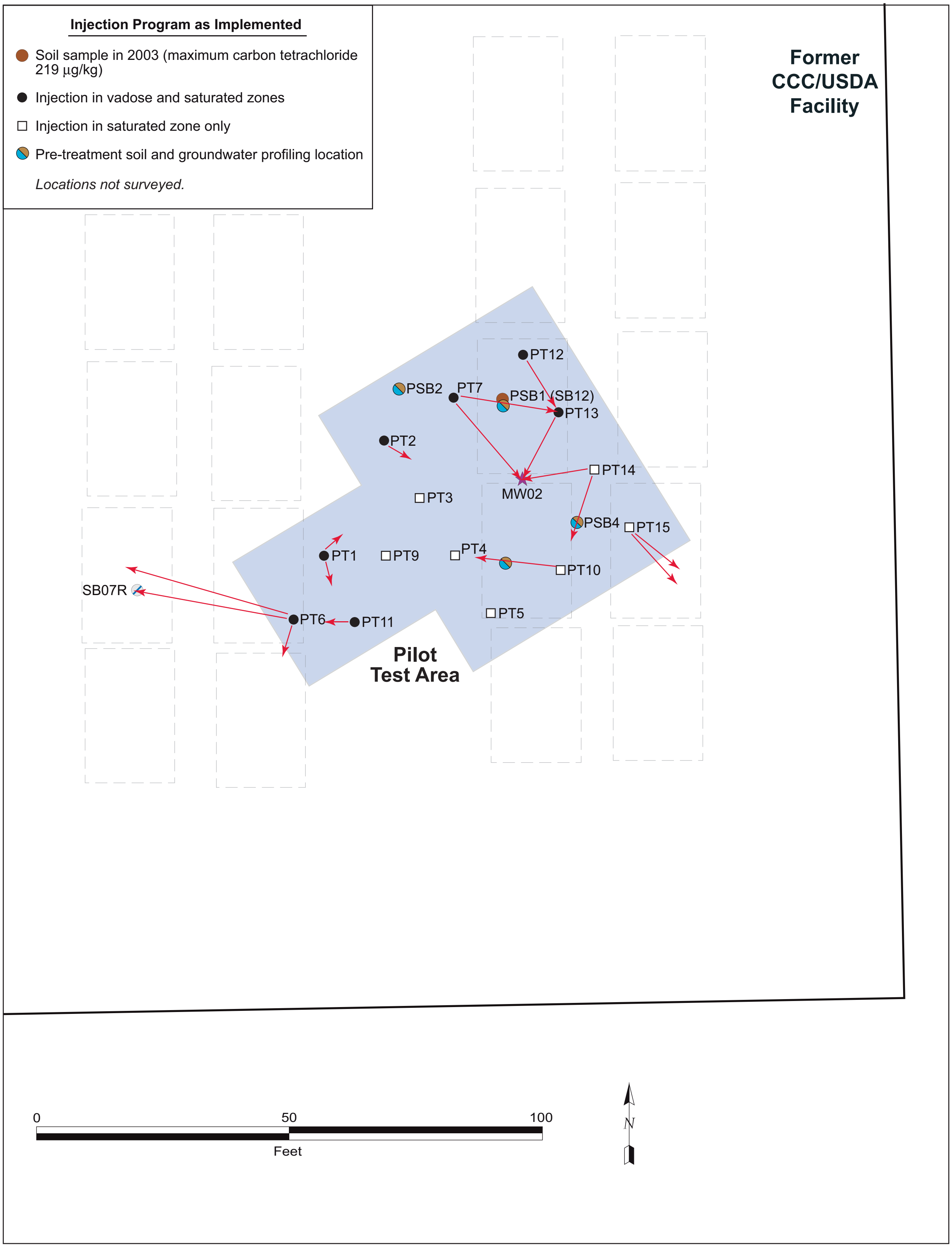

FIGURE 3.2 Schematic representation of the locations where daylighting of EHC-A and EHC was observed in response to the injection of these amendments, with apparent migration directions.

Daylighting of EHC-A solution observed at monitorng well MW02.

Daylighting of EHC slurry observed in open ground near injection point PT2.

FIGURE 3.3 Daylighting of (top) of EHC-A material outside the well casing at monitoring well MW02 and (bottom) EHC slurry in open ground near injection point PT2.

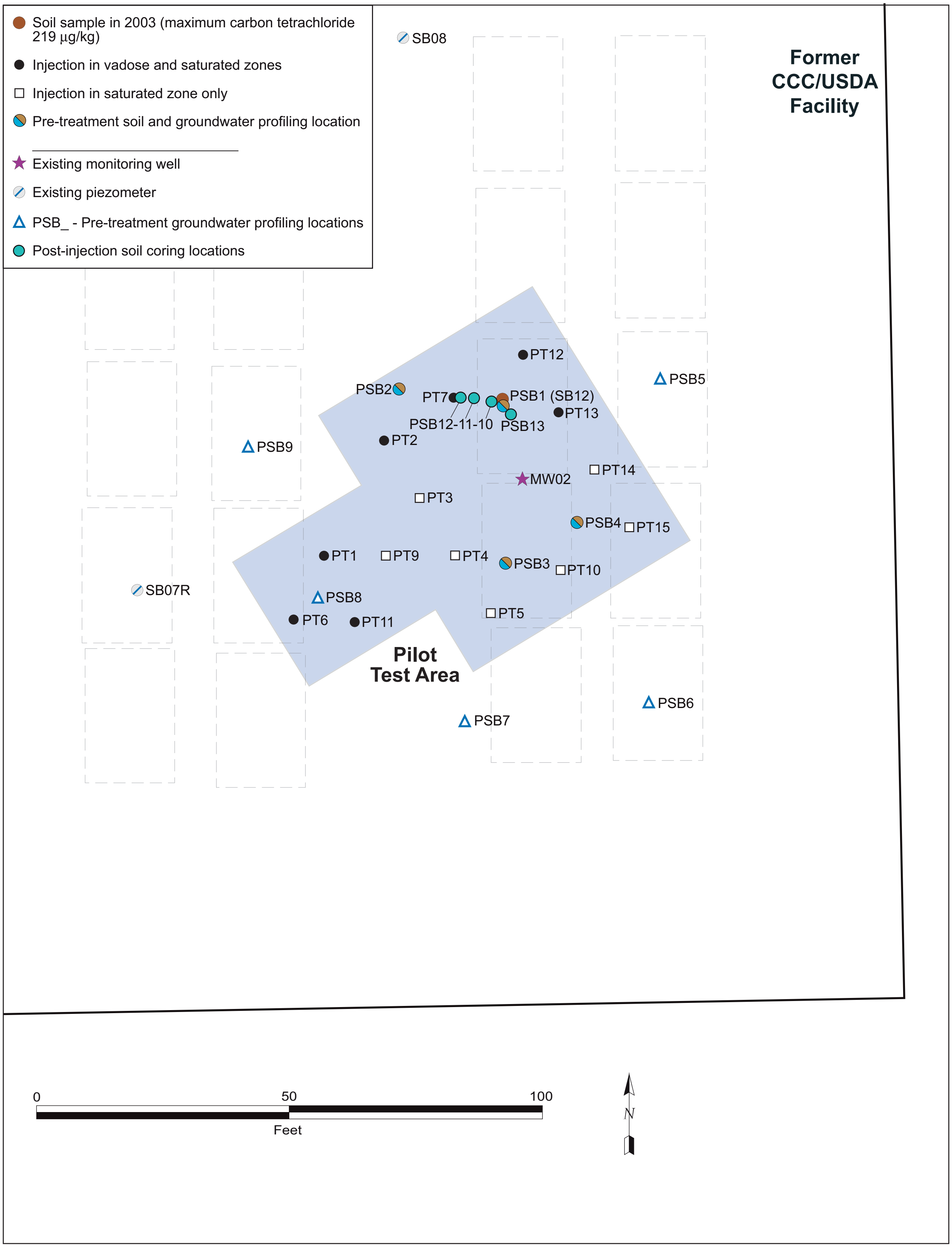

FIGURE 3.4 Locations of the pre-injection groundwater sampling points PSB1-PSB9, monitoring wells SB07R and MW02, injection points, and post-injection soil coring locations PSB10-PSB13.

FIGURE 3.5 Appearance of EHC material along small, isolated fractures in the soil core recovered at 21 ft BGL at post-injection soil coring and sampling location PSB13.

4 Preliminary Evaluation of the ISCR Pilot Test Results

With the approval of the CCC/USDA and KDHE/BER project managers, Argonne initiated an extended program of sampling and analyses at the Centralia pilot test site to monitor the potential impacts of the ISCR treatment technology on the VOCs contaminant levels and the associated geochemical characteristics of the groundwater and vadose zone soils in and near the injection area. The results of the monitoring program to date are presented and reviewed below, with emphasis on examining the parameters that appear most diagnostic of the effects of ISCR treatment technology.

4.1 Establishment of the Pilot Test Monitoring Well Network

To facilitate monitoring of the ISCR pilot test, nine new permanent monitoring wells (PMP1-PMP9) were installed to supplement the five pre-existing monitoring points (SB04, SB07R, SB08, MW02, MW03) in the testing area (Figure 4.1).

Wells PMP1-PMP9 were installed by using the direct-push capabilities of the Argonne CPT in accord with KDHE regulations and procedures in the *Master Work Plan* (Argonne 2002b). With the approval of the KDHE/BER project manager, wells PMP1-PMP9 were constructed with a single 10-ft screen across the previously identified aquifer interval at each location (50-60 ft BGL at PMP1-PMP3 and PMP5-PMP9; 48.75-58.75 ft BGL at PMP4), in keeping with the construction of pre-existing monitoring points SB04, SB07R, SB08, MW02, and MW03. Wells PMP1-PMP9 were completed flush with the ground surface with the approval of the KDHE/BOW (KDHE 2008a); the surface completion variance and Kansas water well completion registrations (WWC-5 records) are in Appendix C.

As outlined in the approved *Interim Measure Conceptual Design* (Argonne 2007a), four new monitoring points (PMP1-PMP3 and PMP8, Figure 4.1) were installed within the pilot test injection field. Monitoring well PMP1 was constructed as a 3-ft offset from injection point PT7, and well PMP2 was installed as a 7.5-ft offset from injection point PT7, near the northern margin of the injection field. (PMP2 is also offset by 7.5 ft from injection point PT2 and pre-injection sampling point PSB2.) Wells PMP3 and PMP8 were installed to coincide with pre-injection groundwater sampling points PSB3 and PSB8, respectively (Figures 2.2 and 4.1).

Monitoring points PMP4-PMP7 and PMP9 were installed near the inferred upgradient and downgradient margins of the injection area. Wells PMP5-PMP7 and PMP9 were constructed at the locations of corresponding pre-injection sampling points PSB5-PSB7 and PSB9, respectively. Well PMP4 was installed, at the request of the KDHE/BER project manager, at a new location southwest of the injection field and the groundwater contamination hot spot identified at PSB8 (Figures 2.2 and 4.1).

4.2 Post-Injection Groundwater Data

4.2.1 Post-Injection Groundwater Sampling and Analysis Methods

The installation of monitoring wells PMP1-PMP9 and initial sampling of the complete pilot test monitoring network was delayed until January 8-10, 2008, approximately five weeks after the injection program was completed, because of weather-imposed limitations and logistic concerns at the site. A second groundwater sampling event was conducted approximately two weeks later, on January 24, 2008. Groundwater sampling was subsequently performed approximately monthly from February through September 2008 (in lieu of quarterly sampling after the initial six months, as originally proposed; Argonne 2007a). With the approval of the KDHE/BER, sampling in January 2008 was performed without purging to address concerns regarding potential remobilization of the injected ISCR fluids in the immediate vicinity of the monitoring wells if they were pumped. All subsequent sampling events were performed by using a low-flow purging and sampling technique, at the request of the KDHE/BER project manager, in accord with technical guidance recommended by the KDHE (Puls and Barcelona 1996). Groundwater samples were collected for VOCs analyses during each sampling event. Sample aliquots for analyses of the Br^- tracer were collected during the initial post-injection monitoring event (January 8-10, 2008) and in February, April, and August 2008. Aliquots were also collected for selected inorganic geochemical analyses in the February and August 2008 sampling events. All sampling and analyses were performed in accord with the procedures outlined in Section 2.1.1.

The complete results of the post-injection groundwater analyses are on CD, in Supplement 4. The results of the VOCs, DO, and ORP analyses are illustrated over time for each sampling location in Appendix D.

4.2.2 Post-Injection Data for Bromide Tracer in Groundwater

The tracer compound KBr was added to all water used for formulation of the injected EHC-A solution and EHC slurry, as well as for subsurface flushing of the GeoProbe injection tool, at a Br^- concentration of 150 mg/L. The tracer was employed to address two primary technical concerns identified prior to implementation of the injection program:

- To facilitate the detection of potential mixing, and hence dilution, of the groundwater sampled for VOCs and geochemical analyses subsequent to completion of the injection program, by a component of injected water.

- To permit tracking of the potential movement of the injected water into and through the Centralia aquifer zone over time.

As noted in Section 2.1.2.2, Br^- levels in the untreated (pre-injection) groundwater in the pilot test area varied by approximately an order of magnitude, ranging from 0.14 mg/L to 2.0 mg/L. The maximum concentrations (0.78-1.0 mg/L and 0.95-2.0 mg/L, respectively) were detected at sampling points PSB8 and PSB5. The Br^- concentration in a sample of water from the Centralia municipal system used for mixing of the injection fluids was 0.29 mg/L.

The results of Br^- analyses for the groundwater samples collected from the monitoring wells in January, February, April, and August 2008 are summarized in Table 4.1. With the exception of one location (MW02), measured Br^- values for the post-injection samples ranged from < 0.1 mg/L to 32 mg/L (at PMP3, during the January sampling event). Bromide concentrations exceeding 1.0 mg/L have thus far been detected only in groundwater samples collected within the injection field (MW02, PMP2, PMP3, and PMP8; Table 4.1). Bromide concentrations detected at well PMP3 have declined steadily during the monitoring period, from 32 mg/L in January to 1.1 mg/L in August 2008, while Br^- levels at PMP8 have shown a net increase (from 4.7 mg/L to 9.7 mg/L) over the same time period, suggesting possible localized redistribution of the injected fluids within the injection field in the vicinity of these monitoring wells. The observed Br^- concentrations at PMP2 have shown no significant changes.

Table 4.1 indicates that erratic Br^- results were obtained for groundwater samples recovered from monitoring well MW02 during the January, February, April, and August 2008 sampling events, as well as in additional samples collected for verification of the Br^- analyses at this location in June and July 2008. Apparent Br^- levels exceeding the maximum Br^- concentration (150 mg/L) originally present in the tagged injection water were reported by TestAmerica (Chicago, Illinois) for the samples collected in April, June, and August 2008, while no detectable Br^- was reported in the sample from MW02 in February 2008. TestAmerica has indicated that the anomalous MW02 values indicated for Br^- (and several other inorganic constituents; Supplement 4) were influenced by an unresolved interference in the response of the analytical instrument for these samples; hence, the reliability of these values for interpretive purposes is questionable.

The post-injection Br^- results have been used to estimate the potential fraction of injection-derived water that might be represented in each of the groundwater samples collected during the January, February, April, and August 2008 sampling events, *under the highly conservative assumption that the minimum* Br^- *concentration identified in the pre-treatment groundwater at the site (0.14 mg/L; Table 2.3) is representative of the ambient groundwater conditions throughout the pilot study area*. The results of these calculations, included in Table 4.1, suggest *maximum* estimated fractions of water derived from the injected fluids of approximately 18-21% for groundwater samples collected at PMP3 (in the injection field) during the January and February 2008 sampling events and 6-7% for groundwater samples collected at PMP8 (in the injection field) in April and August 2008. For all other samples, an estimated injection-derived component of ≤ 3% is indicated. The Br^- tracer analyses therefore suggest that little dilution of the groundwater sampled for VOCs analysis at the Centralia pilot site has occurred as a result of direct mixing of the native groundwater with the (uncontaminated) injected water. This interpretation is qualitatively consistent with the relatively low volume of injected water (approximately 3-6% of the estimated total pore volume targeted for treatment within the injection field; see Section 3.1) employed for the ISCR pilot investigation. The Br^- tracer analyses also demonstrate that the injected fluids are not being preferentially extracted from the subsurface in response to the low-flow purging and sampling technique used for the pilot test monitoring program.

Bromide concentrations at all monitoring locations outside the injection field (PMP4-PMP7, PMP9, SB04, SB07R, SB08, MW03) have been ≤ 0.6 mg/L throughout the period of record, values comparable to or less than the corresponding pre-treatment Br^- levels at these locations. Calculations based on the conservative assumption outlined above yield estimated factors for dilution by uncontaminated injection water of < 1% for the groundwater samples from these monitoring points. The results, therefore, provide no evidence for migration of the (Br^--

tagged) injected water beyond the limits of the injection field as of August 2008. This observation is qualitatively consistent with the relatively slow movement of groundwater (and carbon tetrachloride contamination) at Centralia documented previously (Argonne 2005b, 2005c, 2006a,b, 2007b, 2008a).

4.2.3 Post-Injection Data for Dissolved Oxygen and Oxidation-Reduction Potential in Groundwater Samples

As noted in Section 1, the Adventus EHC and EHC-A materials are formulated to generate a highly reducing, anaerobic subsurface environment that will foster both thermodynamic and enhanced biological reductive dechlorination of carbon tetrachloride and its primary degradation products (chloroform and methylene chloride). Generally aerobic, relatively oxidizing conditions were identified in the groundwater in the pilot test area prior to the injection of the ISCR fluids (see Section 2.1.2.2 and Figure 2.5).

The DO and ORP levels in groundwater identified during the post-injection monitoring events are summarized in Table 4.2 and Figures 4.2-4.6.

Figures 4.2-4.4 illustrate that significant decreases in both DO and ORP levels were detected in the initial (January 8-10, 2008) post-injection monitoring event at all monitoring locations in and near the pilot test injection field (with the exception of locations SB04, SB07R, SB08, and MW03), in apparent response to the injection of the ISCR amendments. DO concentrations of 0.08-3.11 mg/L and ORP levels of -189 to -556 mV were detected, with the lowest values for these parameters (DO < 1 mg/L, ORP < -500 mV) occurring exclusively within the injection field. The minimum DO and ORP values noted above are consistent with experimental and field results previously reported by Adventus in response to application of the EHC product (Adventus 2006, 2008b-f). These values are conducive to both abiotic and enhanced biological reductive dechlorination of carbon tetrachloride.

The results of continued monitoring of DO and ORP in the pilot test area are illustrated as time series data plots for the individual monitoring points in Appendix D; combined data for the February to September 2008 sampling events are summarized in Figure 4.5. The trends in DO and ORP levels observed at the monitoring points since the initial post-injection sampling event (January 8-10, 2008; Figure 4.2) have varied in detail among the individual wells; however, the results for all monitoring points (with the exception of locations SB04, SB07R, SB08, and

MW03) show an increase in ORP from minimum levels generally achieved during the initial or second January sampling events. As shown in Figure 4.5, DO and ORP levels at monitoring points outside the injection field have returned to values similar to the pre-injection baseline levels (Figure 2.5). Maximum transient DO concentrations were recorded at most locations during the July or August 2008 sampling events. (See the time series plots in Appendix D.)

The ORP levels detected at wells SB04, SB07R, SB08, and MW03 have remained positive (> 50 mV) throughout the post-injection monitoring period, and no decrease in DO concentrations was detected at these locations during the initial post-injection monitoring event (January 8-10, 2008). The DO and ORP levels observed at these locations have fluctuated during the period of monitoring but have shown little net change, as of September 2008, relative to the corresponding pre-treatment baseline levels.

The data presented in Figures 4.6 and 4.7 for the September 2008 sampling event illustrate that measured DO and ORP levels at monitoring points in the injection field remain lower than both the pre-injection baseline levels at these locations and the contemporaneous concentrations at the surrounding monitoring wells outside the injection field. Since February 2008, the observed levels of DO (0.03-3.52 mg/L) and ORP (-192.6 mV to 44.7 mV) within the injection field have shown periodic fluctuations but have predominantly remained at levels that might locally support potential biological reductive dechlorination of carbon tetrachloride but are insufficient to promote the thermodynamic breakdown of this contaminant.

4.2.4 Post-Injection Supplemental Geochemical Data for Groundwater

Groundwater obtained from monitoring points within the injection field (particularly PMP3, PMP8, and MW02) under the reducing, oxygen-depleted conditions represented in Figures 4.6 and 4.7 is dark gray to black in color (Figure 4.8) and has a very strong, unpleasant, fetid odor. Groundwater samples obtained from the pilot test monitoring points outside the injection field (PMP4-PMP7, PMP9, SB04, SB07R, SB08, MW03) are generally clear and colorless to cloudy tan with some fine sediment, with no distinctive odor.

Analyses of selected anions (chloride, nitrate, and sulfate) were performed for the groundwater samples collected from the 14 pilot test monitoring wells in February 2008, and analyses of selected metals and anions were conducted for these wells in August 2008.

Comparison of these results (Supplement 4) to equivalent data for groundwater samples collected in September 2007 from the full suite of permanent monitoring wells at Centralia (Argonne 2008a) and for samples collected at pre-injection points PSB1-PSB9 in November 2007 (Supplement 2) suggests that the ISCR treatment has not significantly affected the major ion chemistry of the groundwater in and near the injection field. The August 2008 analyses suggest, however, that within the injection field, the post-injection concentrations of magnesium, manganese, and iron at monitoring points PMP3 and PMP8 and the post-injection iron and manganese concentrations at PMP1 and PMP2 are slightly elevated relative to the levels of these elements detected in the remaining pilot test wells sampled in August 2008 and in the Centralia wells sampled in 2007. The dissolved iron concentrations identified at monitoring wells PMP1, PMP3, and PMP8 in August 2008 (0.42-7.6 mg/L) exceeded the level for this contaminant (0.3 mg/L) recommended under the National Secondary Drinking Water Regulations (EPA 2008). Iron was not detected above this regulatory level in groundwater collected at these locations in the pre-injection baseline sampling event (see Table S4.3).

4.2.5 Post-Injection Data for VOCs in Groundwater

The results of the post-injection VOCs analyses of groundwater samples are summarized in Table 4.3 and Figures 4.9-4.12. The concentrations of carbon tetrachloride, chloroform, and methylene chloride detected at the individual groundwater monitoring points are illustrated as time series plots in Appendix D. Permanent monitoring wells PMP1 and PMP2 were installed as offsets from injection point PT7, and well PMP4 (Figure 4.1) was installed at a new location requested by the KDHE/BER project manager upon completion of the baseline study. Wells PMP1, PMP2, and PMP4 do not directly correspond to locations sampled during the baseline study (see Section 4.1). Comparisons of pre- and post-injection contaminant levels for PMP1 and PMP2 noted in this section are therefore based on the average of the baseline contaminant concentrations determined for nearby pre-injection sampling points PSB1 and PSB2 (Figure 4.1). No baseline sampling analog is available for the PMP4 well location. Comparisons of pre- and post-injection contaminant levels at PMP3 and PMP5-PMP9 are based on the average contaminant concentrations measured at corresponding pre-injection sampling points PSB3 and PSB5-PSB9 (see Figure 4.1 and Table 2.1).

With the exception of two locations (PMP2 and PMP9), carbon tetrachloride concentrations determined at all of the monitoring points showed a decrease during the initial post-injection sampling event (January 8-10, 2008; Figure 4.9) relative to corresponding pre-injection baseline values (Figure 2.3). The decreases in carbon tetrachloride concentrations at locations MW02, PMP3, and PMP8 in the injection field were the most dramatic (Figure 4.10), at approximately 1-2 orders of magnitude. The decreases in carbon tetrachloride observed at PMP3 and PMP8 were accompanied by significant increases in the concentrations of associated chloroform at these locations. Methylene chloride became detectable at MW02 and PMP3 and was present at enhanced levels at PMP8. These observations together provide evidence for the probable occurrence of reductive dechlorination of carbon tetrachloride at these locations.

Decreased levels of carbon tetrachloride were also identified at monitoring wells PMP1, PMP5-PMP7, SB04, SB07R, SB08, and MW03 during the initial post-injection (January 8-10, 2008) and/or second post-injection (January 24, 2008) sampling event (Figures 4.9 and 4.10). Increases in associated concentrations of both chloroform and methylene chloride were detected at monitoring wells PMP1, PMP5, and PMP6; increased chloroform (only) was identified at SB04; and increased methylene chloride (only) was observed at PMP7, in conjunction with a decreased chloroform concentration. These observations also suggest the possible effects of reductive dechlorination; however, as noted in Section 4.2.2, the results of Br^- tracer analyses do not support the direct presence of injected ISCR fluids at these locations. The results of the VOCs analyses at monitoring wells MW03, SB07R, and SB08 provide no evidence for reductive dechlorination as a possible mechanism for the initial (January 8-10, 2008) post-injection decreases in carbon tetrachloride observed at these locations.

Concentrations of carbon tetrachloride greater than the pre-injection baseline values were observed during the initial post-injection sampling event (January 8-10, 2008) at PMP9 and PMP2 (Figures 4.9 and 4.10). The absolute increase identified at PMP9 was small (results of “not detected” [ND] and 1.4 μg/L pre-injection, versus 1.9 μg/L post-injection). Levels of carbon tetrachloride (980 μg/L), chloroform (951 μg/L), and methylene chloride (4.2 μg/L) detected at PMP2, however, significantly exceed the average baseline levels of these contaminants at this location (estimated from results for nearby sampling points PSB1 and PSB2 at 378 μg/L, 10.9 μg/L, and ND, respectively, for carbon tetrachloride, chloroform, and methylene chloride). The analytical results for monitoring well PMP2 are discussed in greater detail below.

The results of extended monitoring of VOCs levels in the pilot test area are illustrated as time series data plots for the individual monitoring wells in Appendix D. Figures 4.11 and 4.12 present the concentrations of carbon tetrachloride and chloroform, respectively, identified in groundwater for the September 2008 sampling event.

The time series diagrams in Appendix D show that the detailed trends in VOCs concentrations during the period of record differ significantly among the individual monitoring points, with relatively few consistent patterns. Review of the complete data set, however, suggests the following preliminary observations concerning the progress of the pilot groundwater restoration effort to date, in the context of the Br^- tracer and inorganic geochemical observations presented in Sections 4.2.2-4.2.4.

- The carbon tetrachloride concentrations at all monitoring points have shown little or no further net decrease since the initial (January 8-10, 2008) post-injection sampling event.

- The dramatically lower carbon tetrachloride concentrations observed in the injection field at MW02, PMP3, and PMP8 increased somewhat during the monitoring period but remained near their initial post-injection levels, reflecting a persistent decrease of 96-99% relative to the baseline concentrations at these points.

- As of the September 2008 sampling event, the concentrations of carbon tetrachloride (18-1,854 μg/L) at all monitoring locations in the injection field (PMP1, PMP2, PMP3, PMP8, MW02) exceeded the KDHE Tier 2 RBSL and the EPA maximum contaminant level of 5.0 μg/L for this contaminant in groundwater.

- Increasing levels of chloroform and methylene chloride have been observed at well MW02, while chloroform levels have decreased slowly in the injection field at PMP2, PMP3 and PMP8. The chloroform and methylene chloride concentrations at MW02, PMP2, PMP3, and PMP8 remained above the respective baseline levels as of the September 2008 sampling event. The concentrations of chloroform identified at wells PMP2 and PMP8 (318 μg/L and 125 μg/L, respectively) in September 2008 exceeded the KDHE Tier 2 RBSL of 80 μg/L for this contaminant in groundwater.

- Measured carbon tetrachloride concentrations at monitoring wells PMP1 (at the northern margin of the injection field) and PMP4-PMP7 (to the northeast, south, and southwest of the injection field) reached a transient minimum in the monitoring events from January 24, 2008, to March 2008. The carbon tetrachloride concentrations at these locations have since returned to levels observed during the baseline or initial (January 8-10, 2008) post-injection sampling events.

- Chloroform concentrations at PMP1 and PMP4-PMP7 have decreased slightly relative to more elevated values identified in the initial (January 8-10, 2008) post-injection sampling, but they remain comparable to or slightly higher than the corresponding baseline concentrations at these locations.

- The carbon tetrachloride concentrations observed at monitoring wells SB04, SB07R, SB08, and MW03 have shown little increase or decrease from their initial (January 8-10, 2008) post-injection levels (see Appendix D, Figures D.12-D.14 and D.2). Only trace concentrations (< 2 μg/L) of chloroform or methylene chloride, comparable to baseline levels, have been detected at these locations.

Carbon tetrachloride and chloroform concentrations of 980 μg/L and 951 μg/L, respectively, were detected at monitoring point PMP2 during the initial (January 8-10, 2008) post-injection sampling event. As noted above, chloroform levels at PMP2 have decreased slowly with time; however, the observed concentrations of carbon tetrachloride have generally increased since the initial post-injection sampling event, reaching a transient maximum of 2,873 μg/L in June 2008 before decreasing to 1,315 μg/L in August, then rising to 1,854 μg/L in September 2008. With two apparent exceptions (for the January 24 and February 2008 monitoring events), carbon tetrachloride concentrations at well PMP1 have also consistently been > 100 μg/L and have shown no decreasing trend. The carbon tetrachloride concentrations at these two locations represent the highest values consistently observed in the injection field; they contrast markedly with the reduced concentrations that have been documented at nearby monitoring points MW02, PMP3, and PMP8.

Possible cause(s) of the persistent high contaminant levels at PMP1 and PMP2 have not been conclusively identified; however, postulated factors that might influence the effectiveness of the ISCR treatment process at these points include the following:

- Wells PMP1 and PMP2 are offset from the nearest pre-injection baseline sampling points (PSB1 and PSB2; Figure 4.1) by ≥ 7.5 ft. The observed carbon tetrachloride levels at PMP1 and PMP2 may therefore in part reflect highly localized, pre-existing heterogeneity in the original groundwater plume.

- With the KDHE's approval, three injection points (PT1, PT6, PT11) originally planned near PMP1 and PMP2 (Figure 2.2) were relocated (Figure 3.1), placing PMP1 and PMP2 along the northern margin of the injection field. In addition, a fourth injection point (PT8; Figure 2.2) originally planned near PMP1 and PMP2 was omitted to reduce the potential for daylighting at monitoring well MW02. Finally, significant daylighting of the ISCR fluids injected at point PT7 was observed toward the southeast and away from PMP1 and PMP2 (Section 3.2.1; Figure 3.2). These factors together might have limited the distribution of the ISCR amendments in the vicinity of PMP1 and PMP2, in comparison to the more central portions of the injection field.

- Injection of the ISCR amendments was performed in both vadose zone soils and the saturated zone at the injection points (PT2, PT7, PT12; Figure 3.1) nearest locations PMP1 and PMP2. Relatively low pre-injection levels of carbon tetrachloride were identified in the vadose zone soils near PMP1 and PMP2 (at PSB1 and PSB2; Section 2.2.2, Figure 2.8). The possibility that carbon tetrachloride was mobilized from these soils into the underlying groundwater as a result of the injection process cannot be ruled out, however, on the basis of presently available data. (See Section 4.3.)

4.3 Post-Injection Data for VOCs in Vadose Zone Soil

Vertical-profile soil coring and sampling for VOCs analyses were performed in conjunction with the August 2008 monitoring event, at a 3-ft offset (PSB13; Figure 3.4) from previously sampled locations PSB1 and SB12, to investigate the effects of the ISCR treatment in the vadose zone soils at this location. The soils were collected at 2-ft intervals, from 2 ft to 40 ft BGL. The results of these analyses (Table 4.4) are compared to the baseline analysis results for sampling point PSB1 in Figure 4.13. The carbon tetrachloride concentrations in the treated soils at PSB13 ranged from ND to 61 μg/kg, all below the KDHE Tier 2 RBSL of 200 μg/kg for this contaminant in soils. The highest levels of carbon tetrachloride detected (10-61 μg/kg) were observed in the samples collected at the greatest depth (34-40 ft BGL). Quantifiable levels of chloroform (13-17 μg/kg) were identified at multiple depths from 14 ft to 32 ft BGL, and methylene chloride was detected (11 μg/kg) in one soil sample collected at 18 ft BGL. The observed carbon tetrachloride levels in the treated soils at PSB13 showed an apparent decrease in concentration, at all depths, relative to the corresponding values identified in pre-treatment boring PSB1 (and earlier Argonne boring SB12; Figures 4.13 and 2.10).

As noted in Section 4.2.5, physical-chemical mobilization of contamination from the vadose zone soils (potentially into the underlying saturated zone soils and groundwater) in response to the injection of the ISCR fluids near borings PSB1, PSB12, and PSB13 cannot be ruled out as a possible mechanism affecting the carbon tetrachloride concentrations identified in the soils at PSB13. The increased (relative to baseline) levels of chloroform and the detection of methylene chloride at PSB13 suggest, however, that degradation of the carbon tetrachloride (by reductive dechlorination) in response to the ISCR amendments has also contributed to the reductions in carbon tetrachloride concentrations observed in the treated vadose zone soils.

4.4 Estimated Costs of the Pilot ISCR Investigation

The estimated costs for the pilot ISCR treatment study at Centralia, including materials, field operations, and required technical oversight, are as follows:

- Pre-injection baseline study $ 57,214
- Injection program $372,764
- Post-injection monitoring $216,550

The total cost for the pilot ISCR investigation, as of the end of August 2008, is $646,528.

The pre-injection baseline study costs include charges for field sampling activities and laboratory analyses related to the pilot investigation in September-November 2007. The estimated costs of the injection program include remedial implementation charges for materials and services provided by Adventus and Redox, as well as additional required support staff, administration and oversight of the field operations by Argonne personnel, outside laboratory analyses, and other field work costs. Post-injection monitoring costs include charges for field sampling activities and laboratory analyses of soil and groundwater samples beginning in December 2007 and continuing through August 2008. Reporting costs are not included in the breakdown provided.

TABLE 4.1 Results of bromide analyses for groundwater samples collected during the ISCR pilot study post-injection sampling events.

Location	Sample	Sample Date	Depth (ft BGL)	Bromide (mg/L)	Estimated Fraction[a] of Injected Fluid in Sample (%)
MW02	CNMW02-W-26074	1/9/08	49.5-59.5	4.9	3.2
	CNMW02-W-26099	2/23/08		5 U[b]	NC[c]
	CNMW02-W-26045	4/24/08		350[d]	NC
	CNMW02-W-26620	6/4/08		490[d]	NC
	CNMW02-W-26639	7/8/08		5 U	NC
	CNMW02-W-26658	8/6/08		250[d]	NC
MW03	CNMW03-W-26078	1/10/08	50.5-60.5	0.27	0.1
	CNMW03-W-26115	2/23/08		0.11	NC
	CNMW03-W-26046	4/23/08		0.27	0.1
	CNMW03-W-26659	8/6/08		0.27	0.1
PMP1	CNPMP1-W-26079	1/10/08	50-60	0.43	0.2
	CNPMP1-W-25985	2/24/08		0.32	0.1
	CNPMP1-W-26050	4/24/08		0.36	0.1
	CNPMP1-W-26663	8/6/08		0.52	0.3
PMP2	CNPMP2-W-26081	1/10/08	50-60	1.4	0.8
	CNPMP2-W-25986	2/24/08		1.1	0.6
	CNPMP2-W-26051	4/24/08		1.2	0.7
	CNPMP2-W-26664	8/6/08		0.84	0.5
PMP3	CNPMP3-W-26071	1/9/08	50-60	32	21.3
	CNPMP3-W-25990	2/25/08		27	17.9
	CNPMP3-W-26052	4/24/08		2.1	1.3
	CNPMP3-W-26665	8/6/08		1.1	0.6
PMP4	CNPMP4-W-26068	1/9/08	48.75-58.75	0.27	0.1
	CNPMP4-W-25992	2/25/08		0.30	0.1
	CNPMP4-W-26053	4/24/08		0.37	0.2
	CNPMP4-W-26666	8/6/08		0.36	0.1
PMP5	CNPMP5-W-26069	1/9/08	50-60	0.30	0.1
	CNPMP5-W-25997	2/25/08		0.40	0.2
	CNPMP5-W-26054	4/24/08		0.54	0.3
	CNPMP5-W-26667	8/6/08		0.61	0.3
PMP6	CNPMP6-W-26065	1/8/08	50-60	0.28	0.1
	CNPMP6-W-25993	2/25/08		0.17	0.0
	CNPMP6-W-26055	4/24/08		0.32	0.1
	CNPMP6-W-26668	8/6/08		0.28	0.1
PMP7	CNPMP7-W-26066	1/8/08	50-60	0.59	0.3
	CNPMP7-W-25996	2/25/08		0.49	0.2
	CNPMP7-W-26056	4/24/08		0.52	0.3
	CNPMP7-W-26669	8/6/08		0.55	0.3
PMP8	CNPMP8-W-26075	1/9/08	50-60	4.7	3.0
	CNPMP8-W-25994	2/25/08		1.3	0.8
	CNPMP8-W-26057	4/24/08		11	7.2
	CNPMP8-W-26670	8/6/08		9.7	6.4

TABLE 4.1 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Bromide (mg/L)	Estimated Fraction[a] of Injected Fluid in Sample (%)
PMP9	CNPMP9-W-26077	1/10/08	50-60	0.14	0.0
	CNPMP9-W-25989	2/24/08		0.1 U	NC
	CNPMP9-W-26058	4/24/08		0.1 U	NC
	CNPMP9-W-26671	8/6/08		0.13	0.0
SB04	CNSB04-W-26076	1/10/08	51-61	0.26	0.1
	CNSB04-W-26117	2/23/08		0.1 U	NC
	CNSB04-W-26047	4/24/08		0.1 U	NC
	CNSB04-W-26660	8/6/08		0.2 U	NC
SB07R	CNSB07R-W-26073	1/9/08	45-60	0.1 U	NC
	CNSB07R-W-25984	2/24/08		0.1 U	NC
	CNSB07R-W-26048	4/24/08		0.1 U	NC
	CNSB07R-W-26661	8/6/08		0.2 U	NC
SB08	CNSB08-W-26070	1/9/08	52-62	0.1 U	NC
	CNSB08-W-25978	2/24/08		0.1 U	NC
	CNSB08-W-26049	4/23/08		0.1 U	NC
	CNSB08-W-26662	8/6/08		0.2 U	NC

[a] Mass balance calculation assumed a bromide concentration of 0.14 mg/L in the natural formation water.

[b] U, not detected at indicated reporting limit.

[c] NC, no value calculated.

[d] Analytical interference was reported in determination of values by TestAmerica.

TABLE 4.2 Results of dissolved oxygen and oxidation-reduction potential analyses for groundwater samples collected during the ISCR pilot study post-injection sampling events.

Location	Sample	Sample Date	Depth (ft BGL)	Dissolved Oxygen (mg/L)	ORP (mV)
MW02	CNMW02-W-26074	1/9/08	49.5-59.5	0.17	-218
	CNMW02-W-26097	1/24/08		0.96	89.0
	CNMW02-W-26099	2/23/08		2.40	44.7
	CNMW02-W-26000	3/12/08		0.28	-41.5
	CNMW02-W-26045	4/24/08		0.11	-53.9
	CNMW02-W-26620	6/4/08		0.09	-118
	CNMW02-W-26639	7/8/08		1.63	-49.3
	CNMW02-W-26658	8/6/08		0.33	-74.7
	CNMW02-W-26674	9/8/08		0.40	-73.5
MW03	CNMW03-W-26078	1/10/08	50.5-60.5	10.31	113
	CNMW03-W-26115	2/23/08		7.19	246
	CNMW03-W-26001	3/12/08		7.90	88.5
	CNMW03-W-26046	4/23/08		5.46	177
	CNMW03-W-26621	6/4/08		5.61	123
	CNMW03-W-26640	7/7/08		6.23	148
	CNMW03-W-26659	8/6/08		1.98	208
	CNMW03-W-26675	9/9/08		9.60	66.0
PMP1	CNPMP1-W-26079	1/10/08	50-60	3.11	-222
	CNPMP1-W-26083	1/24/08		1.01	-357
	CNPMP1-W-25985	2/24/08		3.24	25.8
	CNPMP1-W-26005	3/13/08		–	–
	CNPMP1-W-26050	4/24/08		0.21	-95.1
	CNPMP1-W-26625	6/5/08		0.46	-112
	CNPMP1-W-26644	7/8/08		0.47	-53.1
	CNPMP1-W-26663	8/6/08		3.52	-48.2
	CNPMP1-W-26689	9/9/08		1.37	39.9
PMP2	CNPMP2-W-26081	1/10/08	50-60	0.18	-556
	CNPMP2-W-26084	1/24/08		1.40	-266
	CNPMP2-W-25986	2/24/08		2.05	-86.9
	CNPMP2-W-26006	3/13/08		–	–
	CNPMP2-W-26051	4/24/08		0.28	-97.9
	CNPMP2-W-26626	6/5/08		0.34	-101
	CNPMP2-W-26645	7/8/08		0.16	-65.7
	CNPMP2-W-26664	8/6/08		2.87	-66.2
	CNPMP2-W-26690	9/9/08		0.05	-41.1
PMP3	CNPMP3-W-26071	1/9/08	50-60	0.15	-550
	CNPMP3-W-26086	1/24/08		0.26	-344
	CNPMP3-W-25990	2/25/08		0.62	-17.4
	CNPMP3-W-26007	3/13/08		0.33	-88.3
	CNPMP3-W-26052	4/24/08		0.18	-176
	CNPMP3-W-26627	6/5/08		0.03	-193
	CNPMP3-W-26646	7/8/08		0.21	-119
	CNPMP3-W-26665	8/6/08		1.43	-138
	CNPMP3-W-26691	9/9/08		0.03	-150

TABLE 4.2 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Dissolved Oxygen (mg/L)	ORP (mV)
PMP4	CNPMP4-W-26068	1/9/08	48.75-58.75	2.01	-213
	CNPMP4-W-26087	1/24/08		2.35	-306
	CNPMP4-W-25992	2/25/08		2.36	-209
	CNPMP4-W-26008	3/13/08		–	–
	CNPMP4-W-26053	4/24/08		2.91	66.0
	CNPMP4-W-26628	6/5/08		3.82	12.0
	CNPMP4-W-26647	7/7/08		12.13	97.4
	CNPMP4-W-26666	8/6/08		11.61	65.9
	CNPMP4-W-26692	9/9/08		4.87	134
PMP5	CNPMP5-W-26069	1/9/08	50-60	2.45	-189
	CNPMP5-W-26088	1/24/08		2.23	33.0
	CNPMP5-W-25997	2/25/08		2.02	150
	CNPMP5-W-26009	3/13/08		1.83	221
	CNPMP5-W-26054	4/24/08		1.04	154
	CNPMP5-W-26629	6/4/08		1.25	-107
	CNPMP5-W-26648	7/8/08		3.93	111
	CNPMP5-W-26667	8/6/08		0.43	163
	CNPMP5-W-26693	9/10/08		2.51	117
PMP6	CNPMP6-W-26065	1/8/08	50-60	0.96	-276
	CNPMP6-W-26090	1/24/08		3.36	-155
	CNPMP6-W-25993	2/25/08		3.18	133
	CNPMP6-W-26010	3/13/08		3.31	231
	CNPMP6-W-26055	4/24/08		2.67	197
	CNPMP6-W-26630	6/5/08		2.94	99.9
	CNPMP6-W-26649	7/7/08		9.96	108
	CNPMP6-W-26668	8/6/08		9.13	88.6
	CNPMP6-W-26694	9/8/08		3.32	173
PMP7	CNPMP7-W-26066	1/8/08	50-60	1.01	-381
	CNPMP7-W-26091	1/24/08		2.9	-201
	CNPMP7-W-25996	2/25/08		2.73	129
	CNPMP7-W-26011	3/13/08		3.20	218
	CNPMP7-W-26056	4/24/08		3.32	198
	CNPMP7-W-26631	6/5/08		3.77	94.6
	CNPMP7-W-26650	7/7/08		12.48	106
	CNPMP7-W-26669	8/6/08		9.67	85.0
	CNPMP7-W-26695	9/9/08		2.18	14.7
PMP8	CNPMP8-W-26075	1/9/08	50-60	0.08	-548
	CNPMP8-W-26092	1/24/08		1.01	-201
	CNPMP8-W-25994	2/25/08		0.31	-121.8
	CNPMP8-W-26012	3/13/08		–	–
	CNPMP8-W-26057	4/24/08		0.18	-186
	CNPMP8-W-26632	6/5/08		0.06	-190
	CNPMP8-W-26651	7/8/08		0.08	-135
	CNPMP8-W-26670	8/6/08		1.30	-158
	CNPMP8-W-26696	9/9/08		0.03	-129
PMP9	CNPMP9-W-26077	1/10/08	50-60	0.59	-323
	CNPMP9-W-26109	1/24/08		2.64	-244
	CNPMP9-W-25989	2/24/08		3.53	-22.8
	CNPMP9-W-26013	3/13/08		4.18	75.2

TABLE 4.2 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Dissolved Oxygen (mg/L)	ORP (mV)
	CNPMP9-W-26058	4/24/08		5.32	41.0
	CNPMP9-W-26633	6/5/08		5.60	0.8
	CNPMP9-W-26652	7/8/08		5.67	34.4
	CNPMP9-W-26671	8/6/08		18.65	-10.0
	CNPMP9-W-26697	9/9/08		7.78	44.9
SB04	CNSB04-W-26076	1/10/08	51-61	8.73	89.0
	CNSB04-W-26094	1/24/08		6.32	184
	CNSB04-W-26117	2/23/08		5.53	266
	CNSB04-W-26002	3/12/08		6.16	154
	CNSB04-W-26047	4/24/08		3.72	147
	CNSB04-W-26622	6/4/08		4.73	128
	CNSB04-W-26641	7/7/08		3.88	164
	CNSB04-W-26660	8/6/08		0.90	127
	CNSB04-W-26684	9/9/08		6.48	69.9
SB07R	CNSB07R-W-26073	1/9/08	45-60	6.64	130
	CNSB07R-W-26111	1/24/08		5.97	167
	CNSB07R-W-25984	2/24/08		4.64	276
	CNSB07R-W-26003	3/12/08		5.33	108
	CNSB07R-W-26048	4/24/08		1.93	158
	CNSB07R-W-26623	6/4/08		4.06	111
	CNSB07R-W-26642	7/7/08		4.03	128
	CNSB07R-W-26661	8/6/08		0.78	154
	CNSB07R-W-26686	9/9/08		5.08	55.0
SB08	CNSB08-W-26070	1/9/08	52-62	4.58	118
	CNSB08-W-26112	1/24/08		2.84	175
	CNSB08-W-25978	2/24/08		3.30	254
	CNSB08-W-26004	3/12/08		3.63	102
	CNSB08-W-26049	4/23/08		2.55	168
	CNSB08-W-26624	6/4/08		2.57	131
	CNSB08-W-26643	7/7/08		2.04	176
	CNSB08-W-26662	8/6/08		0.64	102
	CNSB08-W-26687	9/8/08		2.70	230

TABLE 4.3 Results of organic analyses at the AGEM Laboratory for groundwater samples collected during the ISCR pilot study post-injection sampling events.

				Concentration (μg/L)		
Location	Sample	Sample Date	Depth (ft BGL)	Carbon Tetrachloride	Chloroform	Methylene Chloride
MW02	CNMW02-W-26074	1/9/08	49.5-59.5	0.3 J[a]	23	ND[b]
	CNMW02-W-26097	1/24/08		ND	11	1.8
	CNMW02-W-26099	2/23/08		ND	1.6	1.3
	CNMW02-W-26000	3/12/08		ND	1.2	1.9
	CNMW02-W-26045	4/24/08		ND	6.6	2.4
	CNMW02-W-26620	6/4/08		9.8	22	5.6
	CNMW02-W-26639	7/8/08		6.8	69	13
	CNMW02-W-26658	8/6/08		21	72	12
	CNMW02-W-26674	9/8/08		18	57	11
MW03	CNMW03-W-26078	1/10/08	50.5-60.5	2.9	ND	ND
	CNMW03-W-26115	2/23/08		2.1	ND	ND
	CNMW03-W-26001	3/12/08		2.3	ND	ND
	CNMW03-W-26046	4/23/08		2.4	ND	ND
	CNMW03-W-26621	6/4/08		2.7	0.2 J	ND
	CNMW03-W-26640	7/7/08		3.3	ND	ND
	CNMW03-W-26659	8/6/08		3.2	0.5 J	ND
	CNMW03-W-26675	9/9/08		3.2	0.3 J	ND
PMP1	CNPMP1-W-26079	1/10/08	50-60	158	22	ND
	CNPMP1-W-26083	1/24/08		0.5 J	92	6.8
	CNPMP1-W-25985	2/24/08		71	87	6.0
	CNPMP1-W-26005	3/13/08		131	49	ND
	CNPMP1-W-26050	4/24/08		113	41	1.2
	CNPMP1-W-26625	6/5/08		150	39	0.7 J
	CNPMP1-W-26644	7/8/08		145	33	ND
	CNPMP1-W-26663	8/6/08		142	29	ND
	CNPMP1-W-26689	9/9/08		136	30	ND
PMP2	CNPMP2-W-26081	1/10/08	50-60	980	951	4.2
	CNPMP2-W-26084	1/24/08		265	875	17
	CNPMP2-W-25986	2/24/08		1249	715	24
	CNPMP2-W-26006	3/13/08		1550	456	Diluted
	CNPMP2-W-26051	4/24/08		2254	476	8.7
	CNPMP2-W-26626	6/5/08		2873	340	6.6
	CNPMP2-W-26645	7/8/08		1831	282	6.1
	CNPMP2-W-26664	8/6/08		1315	246	5.2
	CNPMP2-W-26690	9/9/08		1854	318	5.6
PMP3	CNPMP3-W-26071	1/9/08	50-60	112	116	1.0
	CNPMP3-W-26086	1/24/08		4.2	79	3.4
	CNPMP3-W-25990	2/25/08		3.1	147	6.5
	CNPMP3-W-26007	3/13/08		3.9	110	10
	CNPMP3-W-26052	4/24/08		16	89	28
	CNPMP3-W-26627	6/5/08		46	129	32
	CNPMP3-W-26646	7/8/08		42	90	20
	CNPMP3-W-26665	8/6/08		40	67	8.9
	CNPMP3-W-26691	9/9/08		21	57	6.2

TABLE 4.3 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Concentration (μg/L) Carbon Tetrachloride	Chloroform	Methylene Chloride
PMP4	CNPMP4-W-26068	1/9/08	48.75-58.75	36	12	ND
	CNPMP4-W-26087	1/24/08		10	6.9	1.1
	CNPMP4-W-25992	2/25/08		42	5.8	0.6 J
	CNPMP4-W-26008	3/13/08		31	4.4	ND
	CNPMP4-W-26053	4/24/08		33	6.8	0.8 J
	CNPMP4-W-26628	6/5/08		60	6.3	ND
	CNPMP4-W-26647	7/7/08		52	4.9	ND
	CNPMP4-W-26666	8/6/08		50	4.8	ND
	CNPMP4-W-26692	9/9/08		49	4.2	ND
PMP5	CNPMP5-W-26069	1/9/08	50-60	321	97	2.6
	CNPMP5-W-26088	1/24/08		265	121	4.6
	CNPMP5-W-25997	2/25/08		421	62	0.7 J
	CNPMP5-W-26009	3/13/08		70	13	0.7 J
	CNPMP5-W-26054	4/24/08		357	101	2.9
	CNPMP5-W-26629	6/4/08		365	91	2.7
	CNPMP5-W-26648	7/8/08		397	71	2.5
	CNPMP5-W-26667	8/6/08		476	55	1.7
	CNPMP5-W-26693	9/10/08		418	46	1.6 J
PMP6	CNPMP6-W-26065	1/8/08	50-60	37	18	ND
	CNPMP6-W-26090	1/24/08		26	31	2.9
	CNPMP6-W-25993	2/25/08		111	8.8	ND
	CNPMP6-W-26010	3/13/08		94	10	ND
	CNPMP6-W-26055	4/24/08		103	13	ND
	CNPMP6-W-26630	6/5/08		101	9.8	ND
	CNPMP6-W-26649	7/7/08		96	8.5	ND
	CNPMP6-W-26668	8/6/08		108	8.2	ND
	CNPMP6-W-26694	9/8/08		110	7.8	ND
PMP7	CNPMP7-W-26066	1/8/08	50-60	119	26	ND
	CNPMP7-W-26091	1/24/08		62	40	1.6
	CNPMP7-W-25996	2/25/08		123	17	0.7 J
	CNPMP7-W-26011	3/13/08		121	14	0.6 J
	CNPMP7-W-26056	4/24/08		134	13	ND
	CNPMP7-W-26631	6/5/08		120	8.8	ND
	CNPMP7-W-26650	7/7/08		120	7.6	ND
	CNPMP7-W-26669	8/6/08		154	9.2	ND
	CNPMP7-W-26695	9/9/08		119	13	ND
PMP8	CNPMP8-W-26075	1/9/08	50-60	30	606	3.4
	CNPMP8-W-26092	1/24/08		31	430	28
	CNPMP8-W-25994	2/25/08		287	374	25
	CNPMP8-W-26012	3/13/08		122	292	20
	CNPMP8-W-26057	4/24/08		72	553	41
	CNPMP8-W-26632	6/5/08		73	364	24
	CNPMP8-W-26651	7/8/08		67	339	23
	CNPMP8-W-26670	8/6/08		105	317	18
	CNPMP8-W-26696	9/9/08		72	125	3.4

TABLE 4.3 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Concentration (μg/L) Carbon Tetrachloride	Chloroform	Methylene Chloride
PMP9	CNPMP9-W-26077	1/10/08	50-60	1.9	0.9 J	ND
	CNPMP9-W-26109	1/24/08		3.1	1.1	ND
	CNPMP9-W-25989	2/24/08		4.7	0.8 J	ND
	CNPMP9-W-26013	3/13/08		4.0	0.5 J	ND
	CNPMP9-W-26058	4/24/08		5.7	1.8	ND
	CNPMP9-W-26633	6/5/08		6.3	0.6 J	ND
	CNPMP9-W-26652	7/8/08		7.2	1.4	ND
	CNPMP9-W-26671	8/6/08		12	1.1	ND
	CNPMP9-W-26697	9/9/08		7.6	0.4 J	ND
SB04	CNSB04-W-26076	1/10/08	51-61	10	2.1	ND
	CNSB04-W-26094	1/24/08		15	0.2 J	ND
	CNSB04-W-26117	2/23/08		42	0.4 J	ND
	CNSB04-W-26002	3/12/08		30	0.3 J	ND
	CNSB04-W-26047	4/24/08		16	0.3 J	ND
	CNSB04-W-26622	6/4/08		25	0.4 J	ND
	CNSB04-W-26641	7/7/08		14	0.2 J	ND
	CNSB04-W-26660	8/6/08		11	0.2 J	ND
	CNSB04-W-26684	9/9/08		15	0.3 J	ND
SB07R	CNSB07R-W-26073	1/9/08	45-60	30	1.8	ND
	CNSB07R-W-26111	1/24/08		19	0.9 J	ND
	CNSB07R-W-25984	2/24/08		24	1.4	ND
	CNSB07R-W-26003	3/12/08		13	0.9 J	ND
	CNSB07R-W-26048	4/24/08		10	0.8 J	ND
	CNSB07R-W-26623	6/4/08		17	1.0	ND
	CNSB07R-W-26642	7/7/08		15	0.9 J	ND
	CNSB07R-W-26661	8/6/08		15	0.9 J	ND
	CNSB07R-W-26686	9/9/08		21	1.4 J	ND
SB08	CNSB08-W-26070	1/9/08	52-62	32	1.5	ND
	CNSB08-W-26112	1/24/08		36	1.5	ND
	CNSB08-W-25978	2/24/08		44	1.5	ND
	CNSB08-W-26004	3/12/08		28	1.1	ND
	CNSB08-W-26049	4/23/08		23	1.2	ND
	CNSB08-W-26624	6/4/08		24	1.4	ND
	CNSB08-W-26643	7/7/08		17	1.0	ND
	CNSB08-W-26662	8/6/08		20	1.1	ND
	CNSB08-W-26687	9/8/08		22	1.2 J	ND

[a] Qualifier J indicates as estimated concentration below the purge-and-trap method quantitation limit of 1.0 μg/L.

[b] ND, not detected at an instrument detection limit of 0.1 μg/L.

TABLE 4.4 Results of purge-and-trap organic analyses at the AGEM Laboratory for soil samples collected at PSB13 during the August 2008 post-injection sampling event.

				Concentration (μg/kg)		
Location	Sample	Sample Date	Depth (ft BGL)	Carbon Tetrachloride	Chloroform	Methylene Chloride
PSB13	CNPSB13-S-27120	8/21/08	2	ND[a]	ND	ND
	CNPSB13-S-27121	8/21/08	4	ND	ND	ND
	CNPSB13-S-27122	8/21/08	6	ND	ND	ND
	CNPSB13-S-27123	8/21/08	8	ND	ND	ND
	CNPSB13-S-27124	8/21/08	10	ND	5.1 J[b]	ND
	CNPSB13-S-27125	8/21/08	12	ND	3 J	ND
	CNPSB13-S-27126	8/21/08	14	ND	13	ND
	CNPSB13-S-27127	8/21/08	16	6.5 J	8.3 J	ND
	CNPSB13-S-27128	8/21/08	18	ND	3.4 J	11
	CNPSB13-S-27129	8/21/08	20	ND	13	ND
	CNPSB13-S-27130	8/21/08	22	6.2 J	6.9 J	ND
	CNPSB13-S-27131	8/21/08	24	ND	6.7 J	ND
	CNPSB13-S-27132	8/21/08	26	3 J	16	ND
	CNPSB13-S-27133	8/21/08	28	4 J	15	ND
	CNPSB13-S-27134	8/21/08	30	ND	13	ND
	CNPSB13-S-27135	8/21/08	32	ND	17	ND
	CNPSB13-S-27136	8/21/08	34	46	4.8 J	ND
	CNPSB13-S-27137	8/21/08	36	61	9.6 J	ND
	CNPSB13-S-27138	8/21/08	38	32	7 J	ND
	CNPSB13-S-27139	8/21/08	40	10	3.6 J	ND

[a] ND, not detected at an instrument detection limit of 1 μg/kg.

[b] Qualifier J indicates an estimated concentration below the purge-and-trap method quantitation limit of 10 μg/kg.

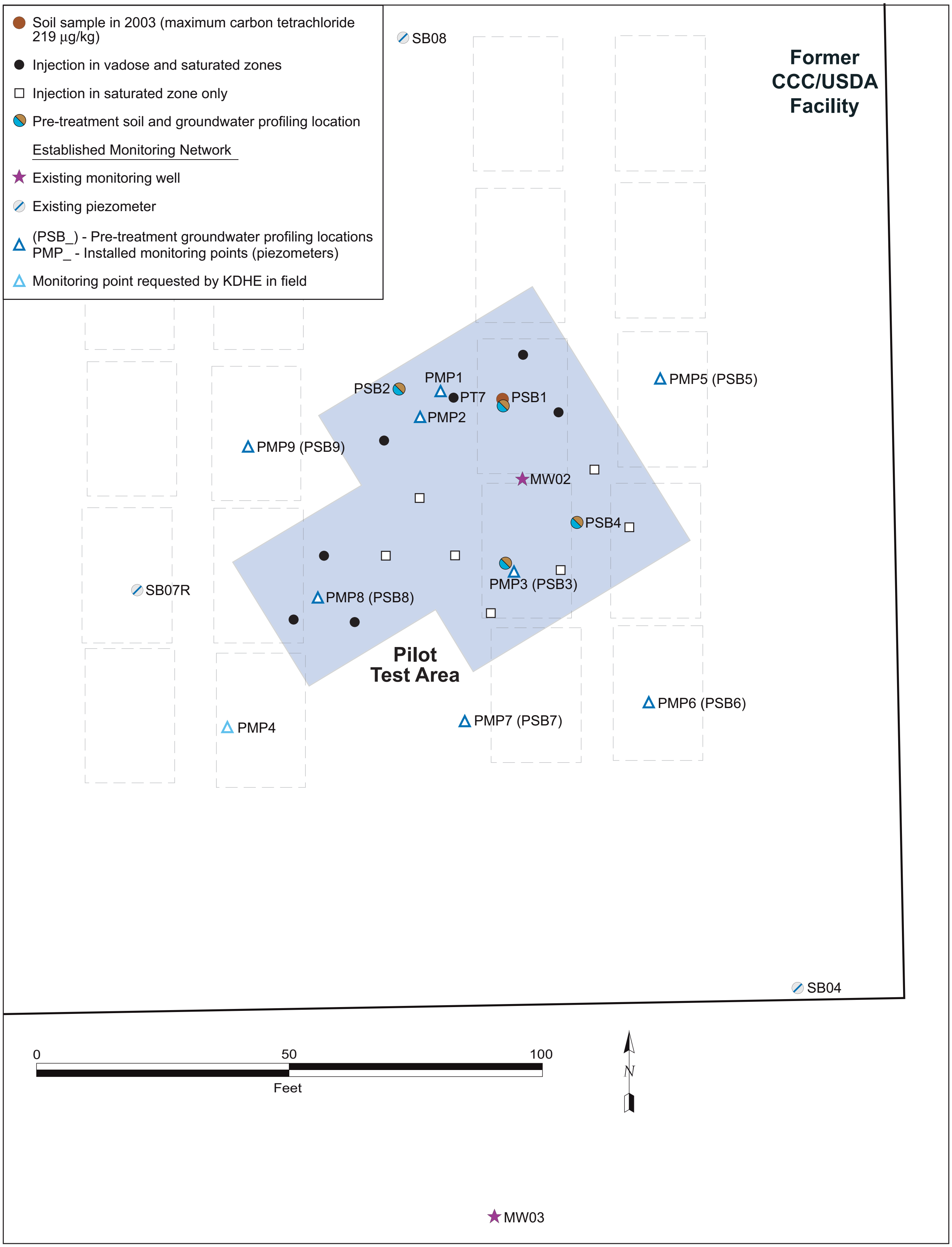

FIGURE 4.1 Locations of injection points and post-injection groundwater monitoring points.

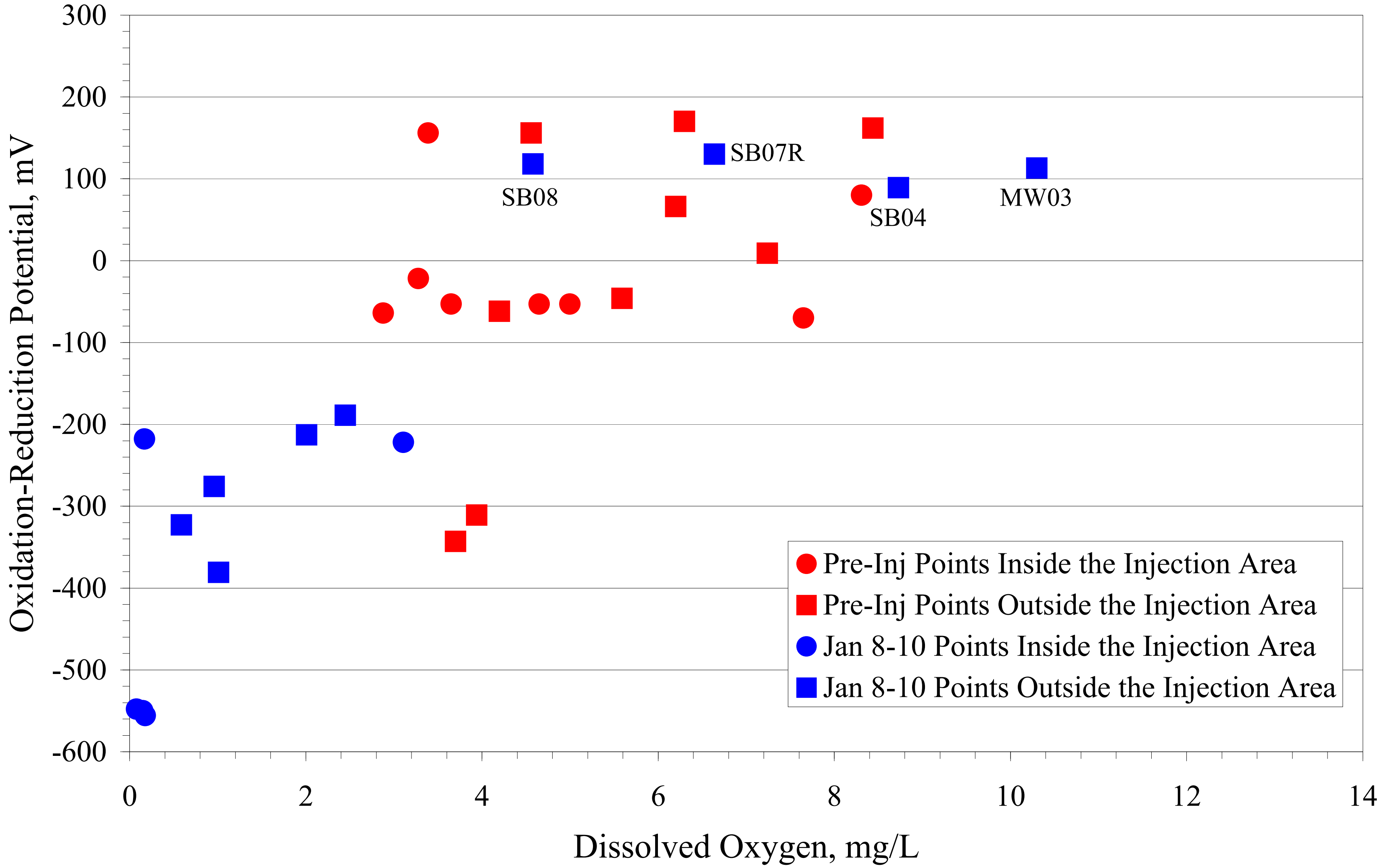

FIGURE 4.2 Dissolved oxygen concentrations and oxidation-reduction potential levels in groundwater samples collected at permanent monitoring points during the initial (January 8-10, 2008) post-injection sampling event.

Post-Injection Sampling Results
January 8-10, 2008

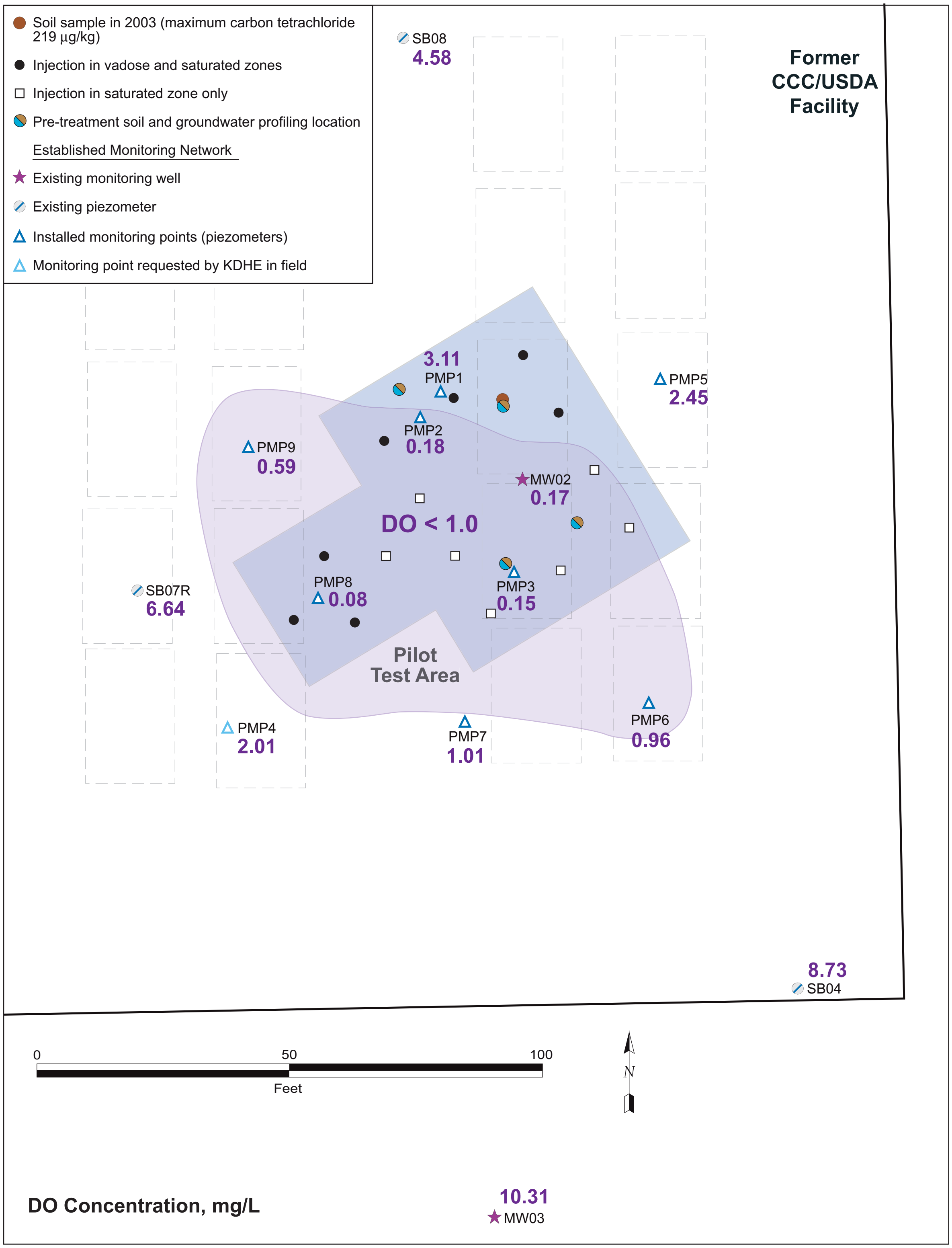

FIGURE 4.3 Dissolved oxygen concentrations in groundwater samples collected at permanent monitoring points during the initial (January 8-10, 2008) post-injection sampling event.

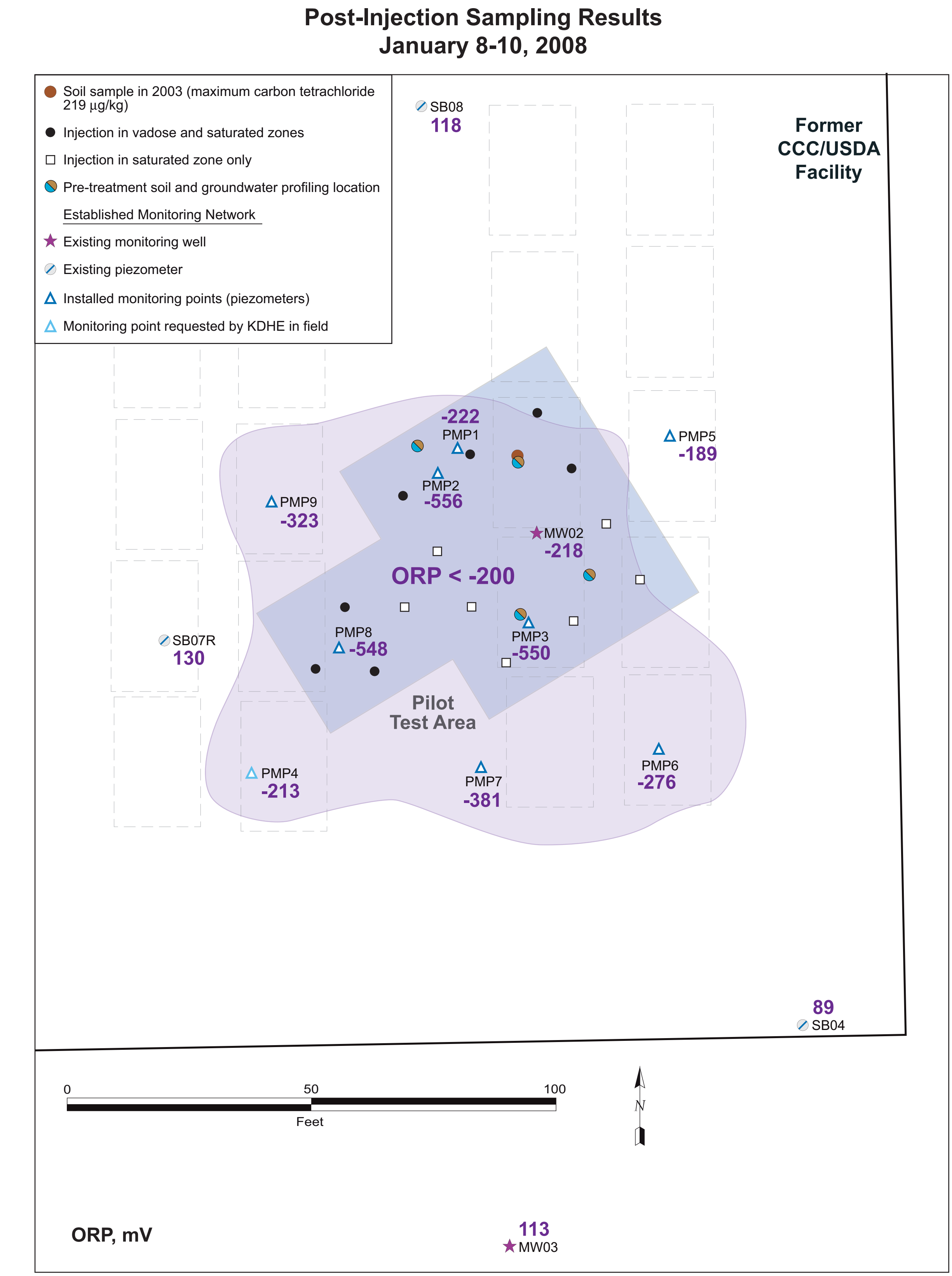

FIGURE 4.4 Oxidation-reduction potential levels in groundwater samples collected at permanent monitoring points during the initial (January 8-10, 2008) post-injection sampling event.

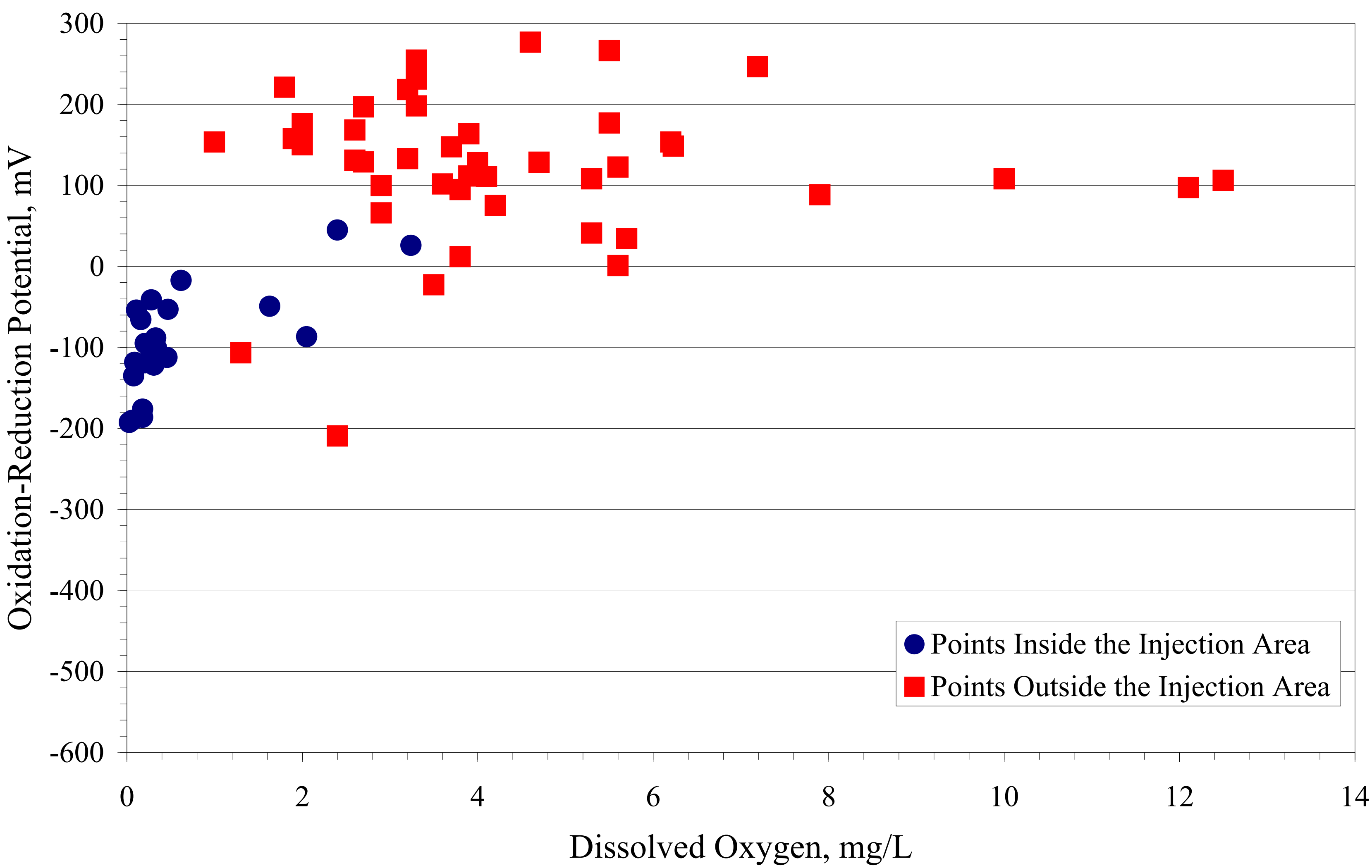

FIGURE 4.5 Dissolved oxygen concentrations and oxidation-reduction potential levels in groundwater samples collected at permanent monitoring points during post-injection sampling in February-September 2008.

Post-Injection Sampling Results
September 2008

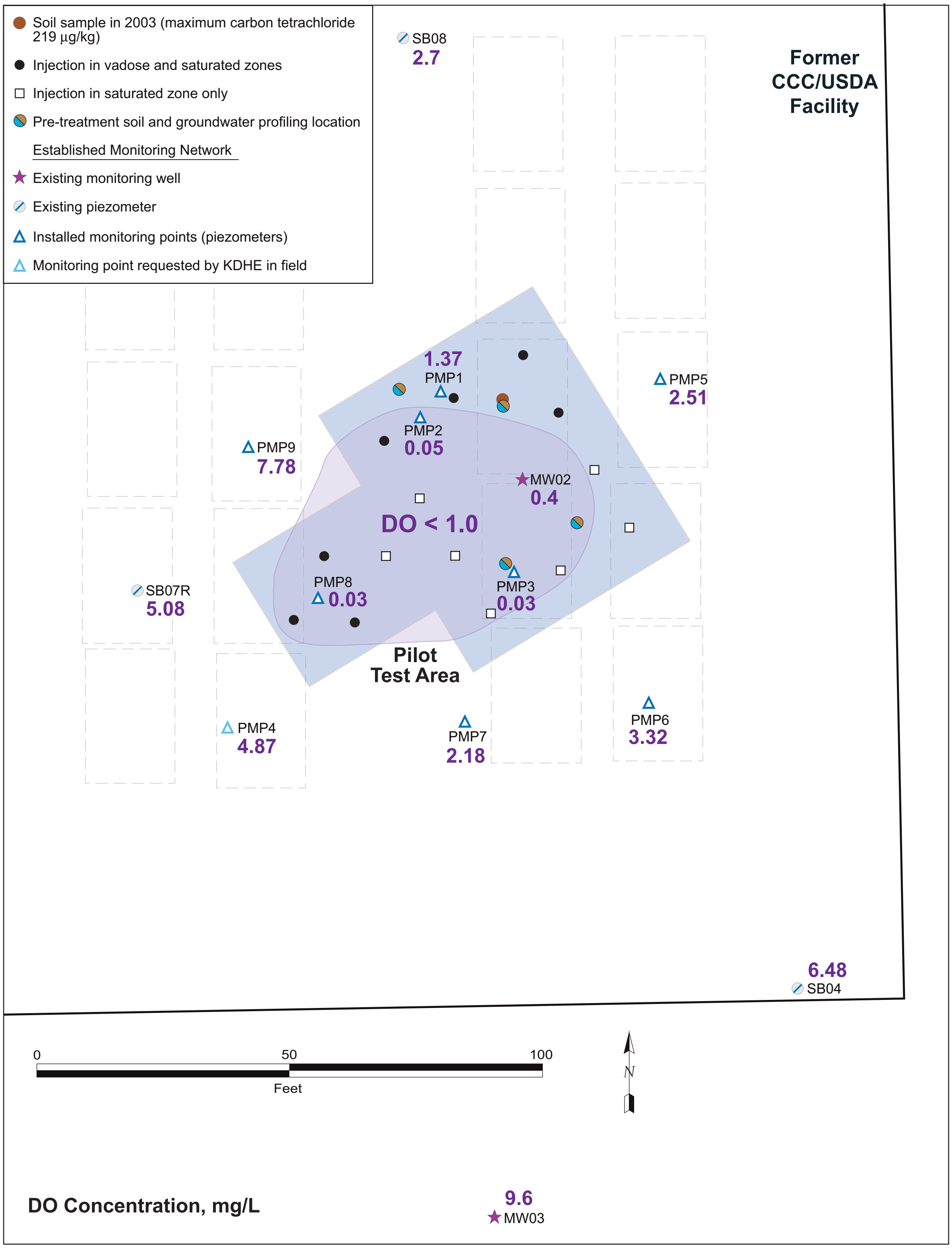

FIGURE 4.6 Dissolved oxygen concentrations in groundwater samples collected at permanent monitoring points during the September 2008 post-injection sampling event.

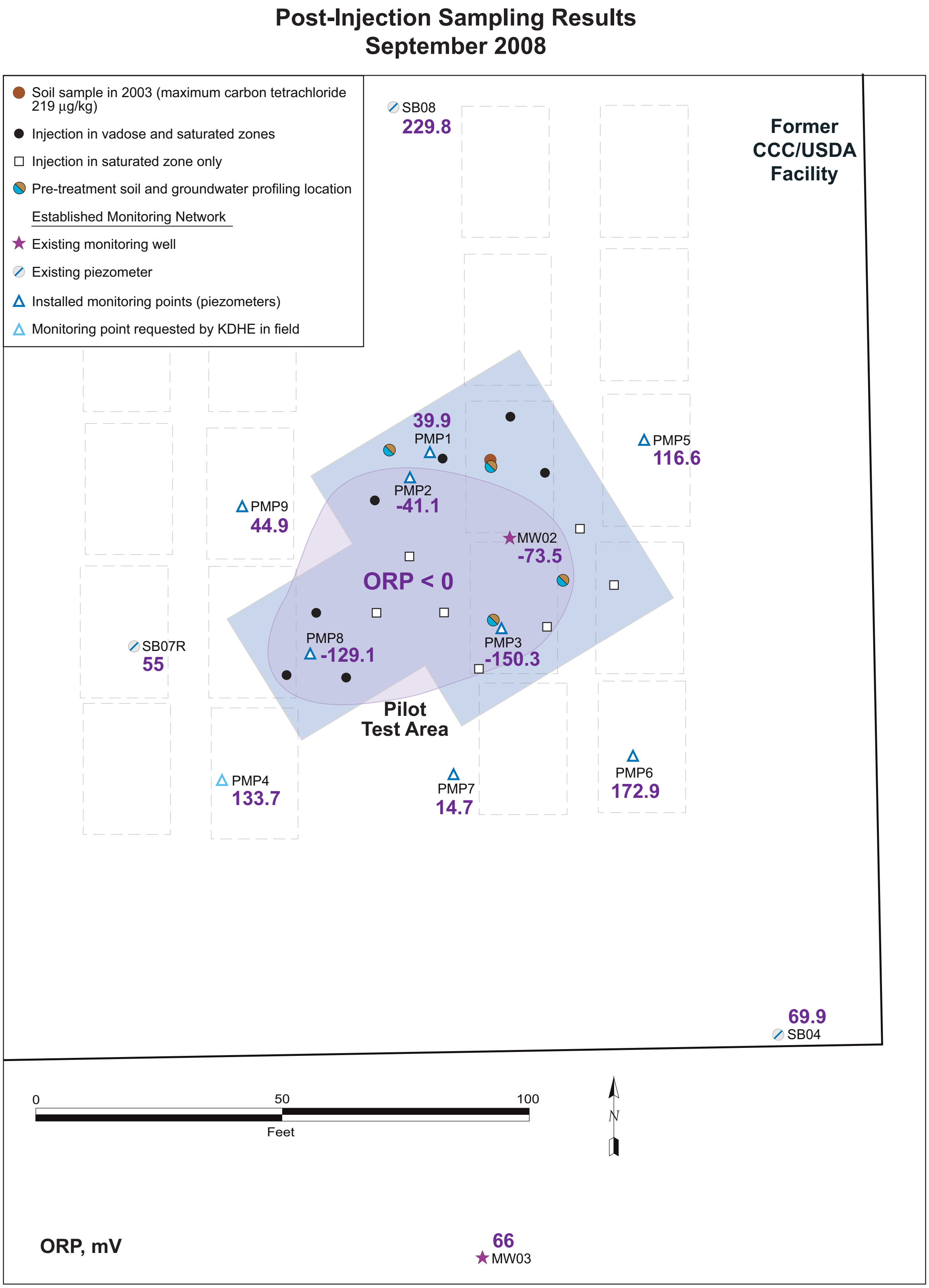

FIGURE 4.7 Oxidation-reduction potential levels in groundwater samples collected at permanent monitoring points during the September 2008 post-injection sampling event.

FIGURE 4.8 Appearance of groundwater collected from monitoring well MW02 during the September 2008 post-injection sampling event.

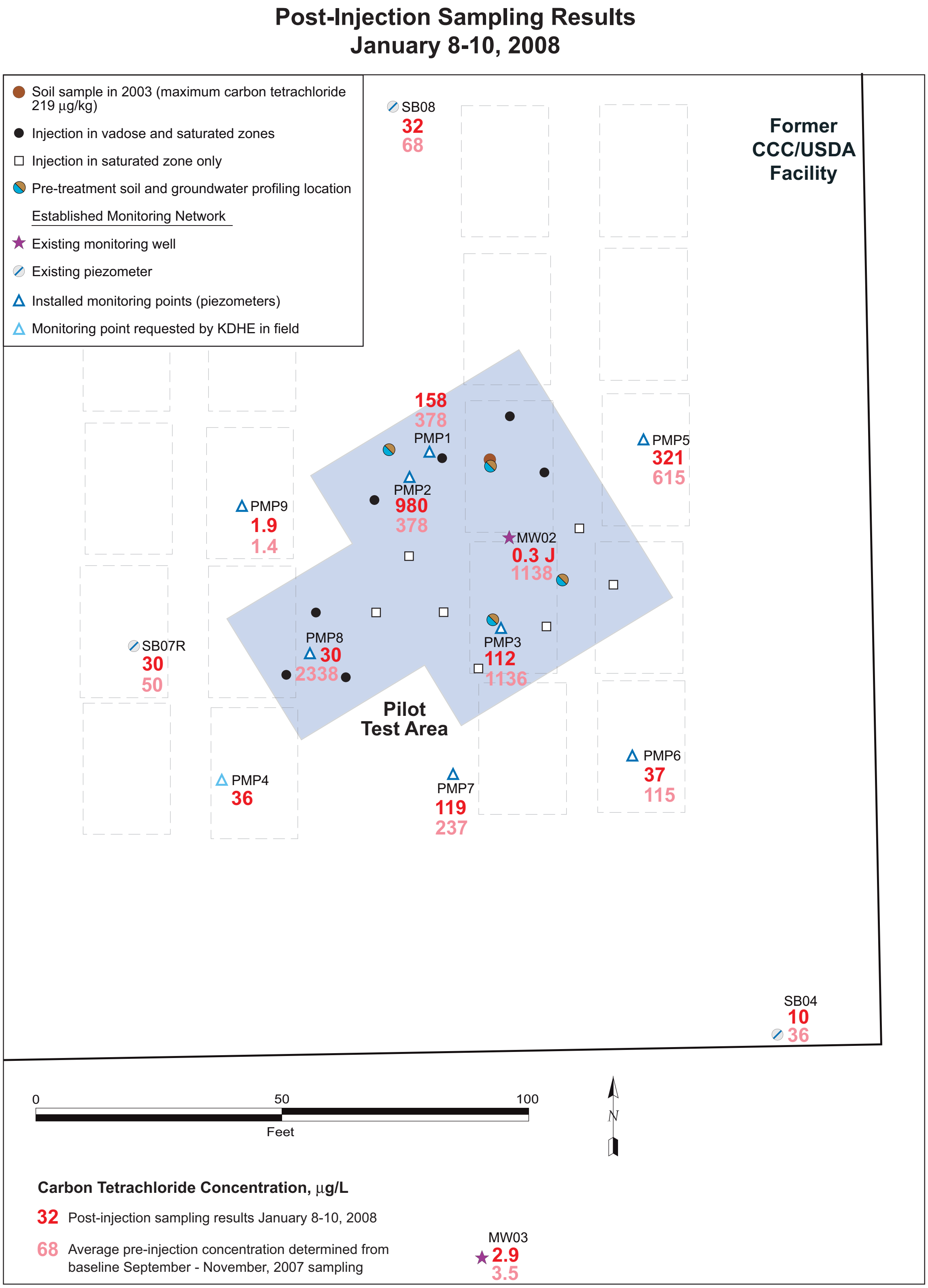

FIGURE 4.9 Carbon tetrachloride concentrations in groundwater samples collected at permanent monitoring points during the initial (January 8-10, 2008) post-injection sampling event, with pre-injection values for comparison.

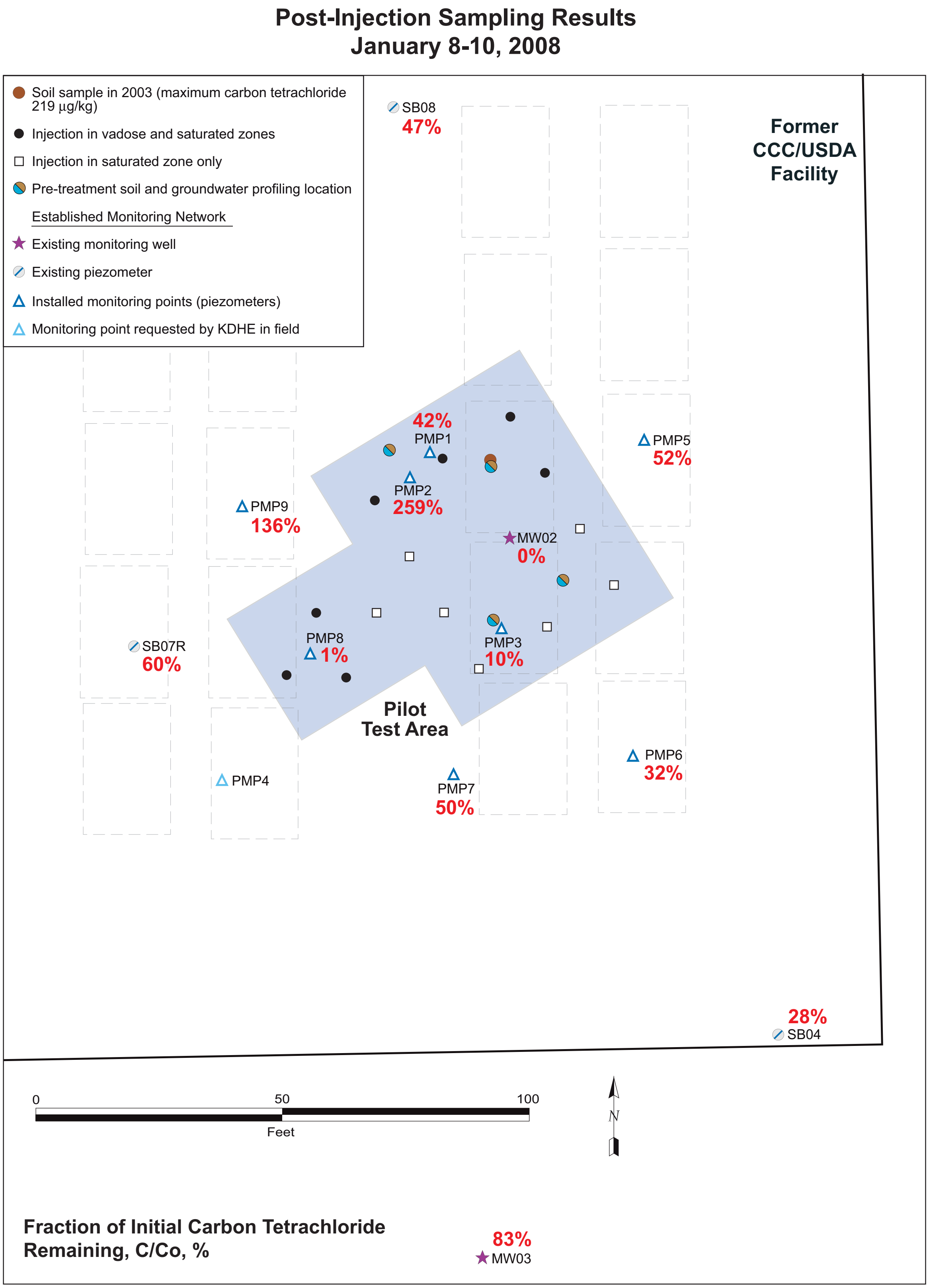

FIGURE 4.10 Calculated fraction of carbon tetrachloride remaining, in comparison to pre-injection concentrations, in groundwater samples collected at permanent monitoring points during the initial (January 8-10, 2008) post-injection sampling event.

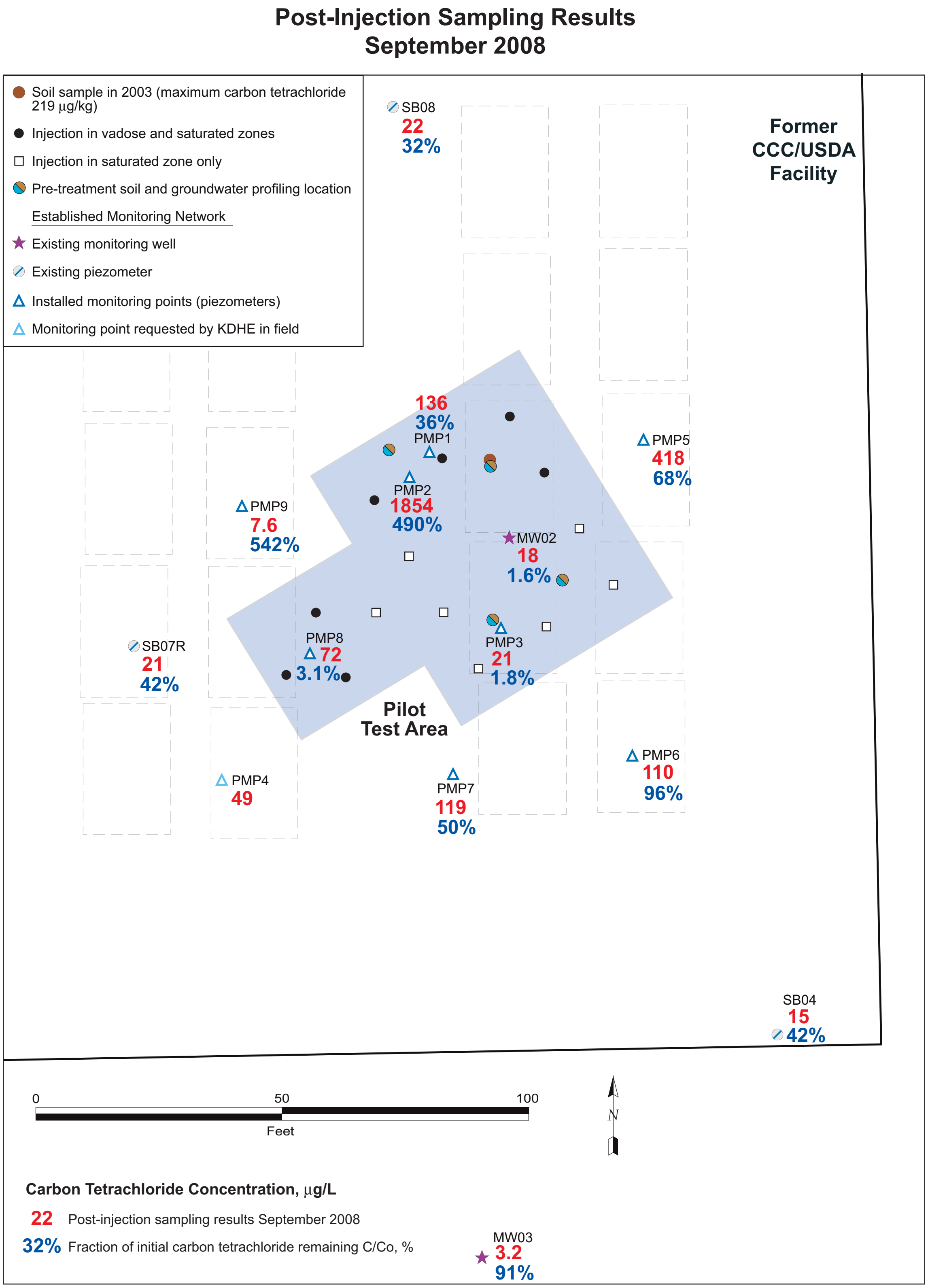

FIGURE 4.11 Carbon tetrachloride concentrations in groundwater samples collected at permanent monitoring points during the September 2008 post-injection sampling event, with calculated fraction of carbon tetrachloride remaining, in comparison to pre-injection concentrations.

Post-Injection Sampling Results
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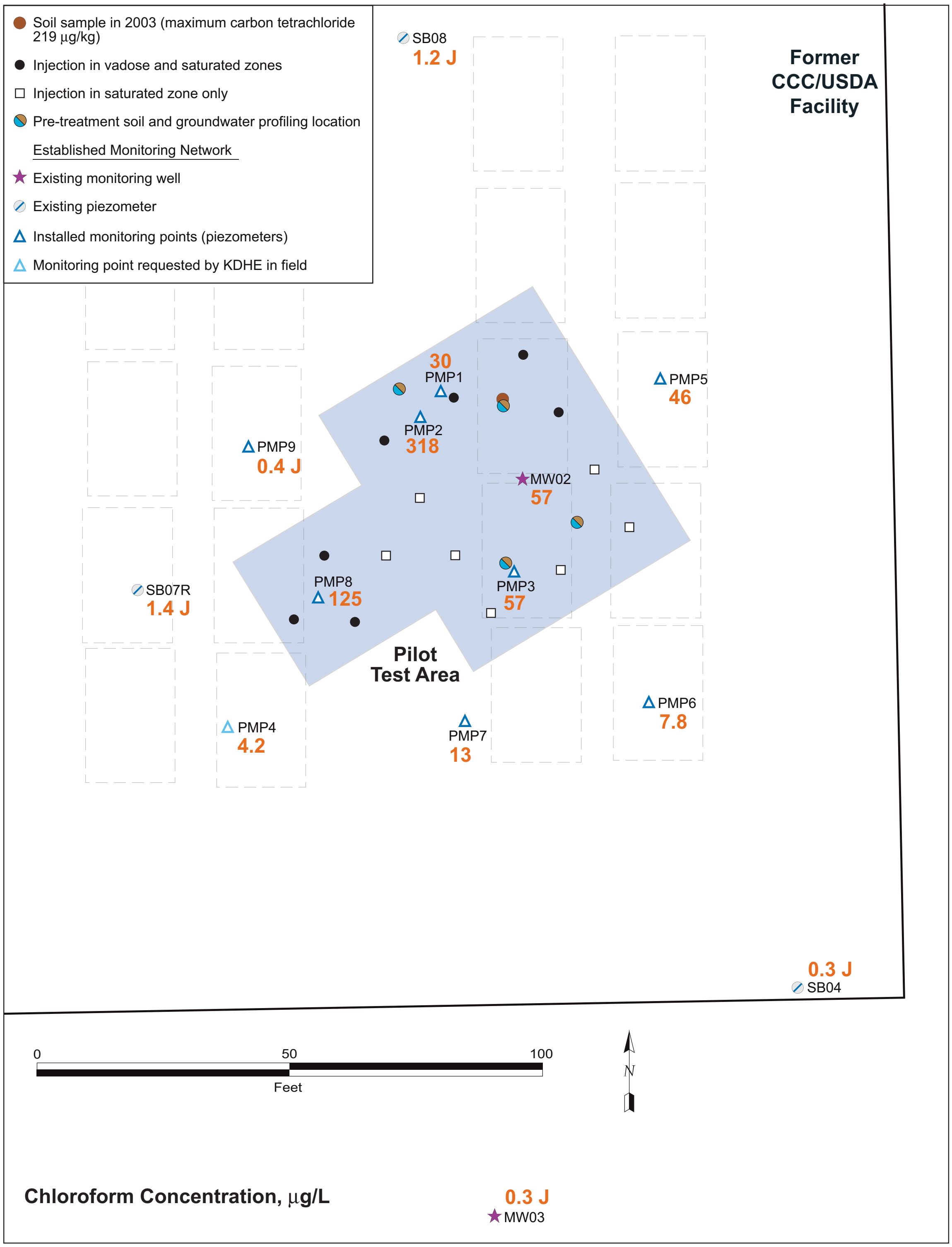

FIGURE 4.12 Chloroform concentrations in groundwater samples collected at permanent monitoring points during the September 2008 post-injection sampling event.

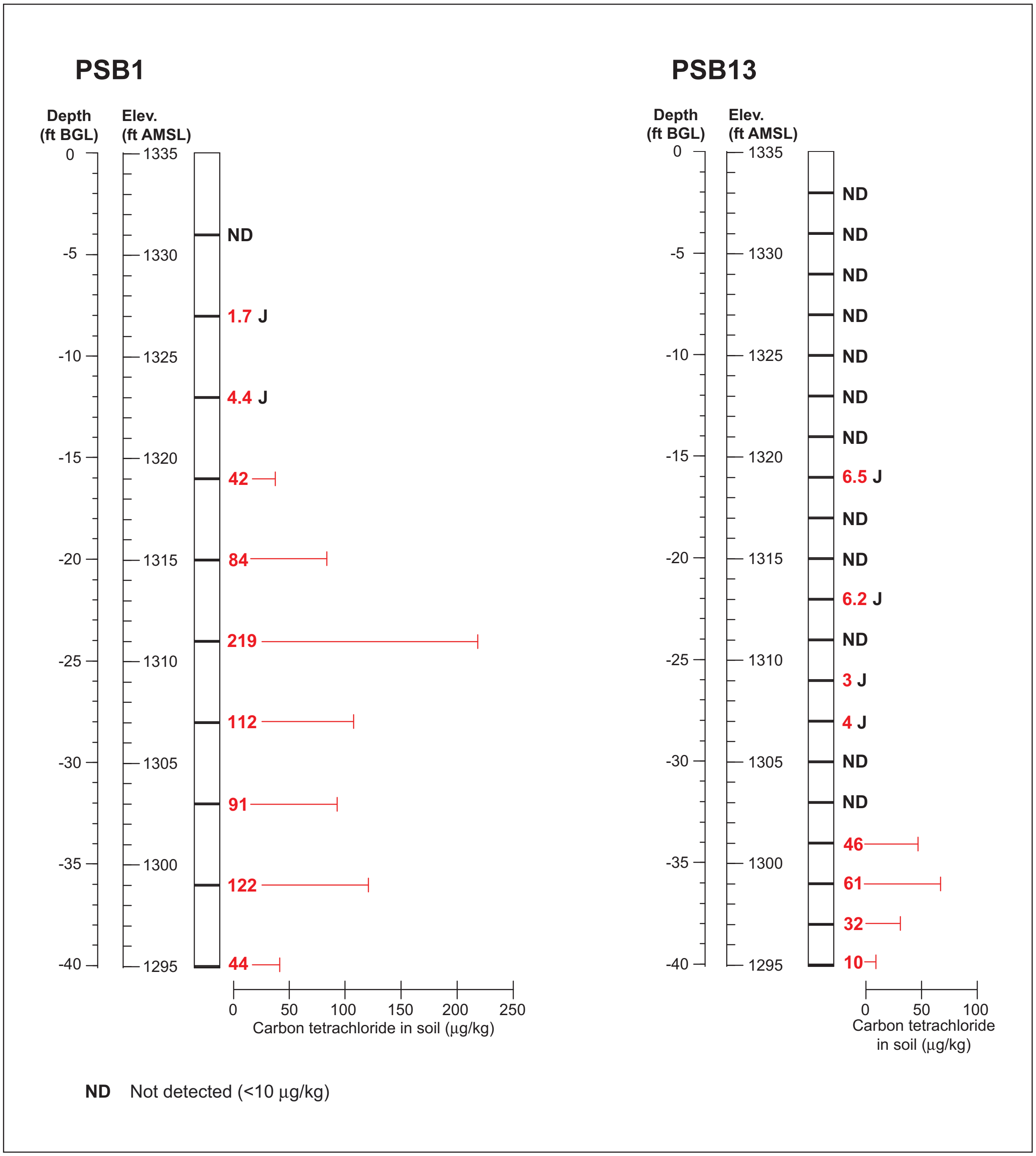

FIGURE 4.13 Comparison of carbon tetrachloride concentrations in the vadose zone soils at pre-injection sampling point PSB1 (November 2007) and corresponding post-injection sampling point PSB13 (August 2008).

5 Conclusions and Recommendations

5.1 Conclusions

This report documents and provides a technical evaluation of the results of the Centralia ISCR pilot test as of September 2008. The primary observations and interpretations developed from these data are as follows:

- The ISCR technology was successfully implemented at the SB12-MW02 pilot test site; however, several technical and logistic concerns were identified during the injection program:

  - Injection pressures exceeding 300 psi were required to achieve placement of the slurry.

  - Frequent daylighting of the injected fluids to the surface occurred.

  - Pre-existing borings in and near the injection area provided conduits for preferential daylighting of the injected fluids.

  - The estimation of an effective injection radius of influence is problematic for the subsurface conditions at Centralia.

- The ISCR materials initially generated extremely reducing, oxygen-depleted groundwater conditions (with ORP values of -200 mV to -550 mV and DO < 1 mg/L) within the injection field. Initial, less dramatic reductions in DO and ORP were also observed at monitoring points outside the treatment area.

- The DO and ORP values within the injection field have remained consistently lower than those at the monitoring points outside the injection area; however, the extremely low ORP levels observed initially were maintained only for approximately 5-7 weeks after injection. The continuing DO and ORP levels in the injection field *should* be conducive to enhanced biodegradation of carbon tetrachloride, but they are not sufficient to promote thermodynamic instability or the abiotic breakdown of carbon tetrachloride.

- A reduction of 96-99% in the levels of carbon tetrachloride in groundwater in the injection area was observed within the first 5-7 weeks after injection. Decreases in carbon tetrachloride concentrations of approximately 20-70% were also observed at most monitoring points near the injection area in this time frame.

- Extended monitoring has shown that the dramatically lower carbon tetrachloride concentrations observed in the injection area have increased slightly but remain at or near the initial post-injection levels.

- Carbon tetrachloride, chloroform, and methylene chloride concentrations at all monitoring points have shown little or no clear trending indicating further contaminant decrease since the initial (January 8-10, 2008) post-injection sampling event.

- Persistent high carbon tetrachloride concentrations have been observed at monitoring points PMP1 and PMP2, at the northern margin of the injection field. The observed contaminant levels suggest that multiple possible factors, including lithologic heterogeneity, heterogeneity in the pre-injection groundwater carbon tetrachloride distribution, and unpredictable subsurface distribution of the injected fluids, might have influenced the potential effectiveness of the ISCR treatment approach at Centralia on a localized scale.

- Carbon tetrachloride concentrations in the vadose zone soils at pre-injection sampling point PSB1 (former sampling location SB12) showed an apparent decrease, at all sampled depths, in response to ISCR treatment of the vadose zone soils in the area. The carbon tetrachloride concentrations in the treated soils at this location decreased (from a maximum pre-injection concentration of 219 μg/kg) to levels below the KDHE Tier 2 RBSL of 200 μg/kg for this contaminant in soils (maximum of 61 μg/kg at post-injection sampling point PSB13).

5.2 Recommendations

The following recommendations, based on the technical findings summarized in this report, are presented for consideration with regard to the Centralia site:

- Adventus has estimated that the EHC materials might have an effect on the subsurface geochemical environment in the pilot test area for 1-5 years (Argonne 2007a). Monitoring of the ISCR pilot test area should continue, in order to assess the long-term impacts of the ISCR treatment on the groundwater at Centralia. A monitoring plan will be submitted to the KDHE for review. With the KDHE's approval, this plan will be implemented while a Corrective Action Study for the Centralia site is being prepared.

- Further implementation of the ISCR approach at Centralia in the context of an Interim Measure (Argonne 2007a) should not be pursued at this time. The factors influencing this determination include the following:

  - The groundwater that has been treated at Centralia does not meet KDHE regulatory requirements for the contaminants (carbon tetrachloride and chloroform) targeted for remediation through use of ISCR technology. There is presently no indication that the concentrations of these contaminants will reach acceptable regulatory levels in the treated area in the future.

  - Existing hydrogeologic data for the remainder of the Centralia site indicate that the subsurface conditions beneath much of this area are *less* favorable for the use of injection technologies than those encountered near SB12-MW02.

  - The expected areal influence of additional ISCR injections is limited. Very detailed internal characterization of the groundwater plume would therefore be required to support potential further injection efforts. A very closely spaced injection grid would also be required to address the identified lateral and vertical heterogeneity of the carbon tetrachloride distribution in the Centralia aquifer.

- The future potential for beneficial use of groundwater at Centralia treated with the ISCR approach is questionable. The time frame required for return of the treated groundwater to acceptable general quality levels after ISCR treatment cannot presently be estimated.

- Further identification and critical evaluation of potential remedial alternatives for Centralia should be conducted as part of a Corrective Action Study for this site.

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Appendix A:

Sequence of Pre-Injection Baseline Sampling Activities and Post-Injection Monitoring Activities

TABLE A.1 Sequence of sampling activities during the Centralia pilot study, November 2007-September 2008.

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Pre-injection baseline sampling, November 2007									
11/12/07	13:59	CNPSB1-S-16338	Soil	CPT	PSB1	4	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	14:17	CNPSB1-S-16339	Soil	CPT	PSB1	8	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	14:24	CNPSB1-S-16340	Soil	CPT	PSB1	12	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	14:53	CNPSB1-S-16341	Soil	CPT	PSB1	16	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	15:11	CNPSB1-S-16342	Soil	CPT	PSB1	20	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	15:27	CNPSB1-S-16343	Soil	CPT	PSB1	24	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	15:46	CNPSB1-S-16344	Soil	CPT	PSB1	28	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	16:08	CNPSB1-S-16345	Soil	CPT	PSB1	32	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	16:21	CNQCTB-S-16347[b]	Soil	TB	QC	–	6333	11/13/07	Trip blank sent to the AGEM Laboratory for organic analysis with soil samples listed on COCs 6333 and 6349.
11/12/07	16:28	CNPSB1-S-16346	Soil	CPT	PSB1	36	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	16:49	CNPSB1-S-19946	Soil	CPT	PSB1	40	6333	11/13/07	Vertical-profile soil sampling at location of former SB12.
11/12/07	18:30	CNPSB1-W-16245	Water	CPT	PSB1	50-55	6348	11/13/07	Depth to water = 31 ft from top of riser. Water level rising. Depth of hole = 59.3 ft. Purged with Waterra pump. Sampled with bailer. Water very muddy. Difficult to preserve to pH < 2 for inorganic analysis because of high sediment content.
11/13/07	7:10	CNQCTB-W-19947[b]	Water	TB	QC	–	6348	11/13/07	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COC 6348. Commercial distilled water.
11/13/07	7:13	CNQCTB-W-19948[b]	Water	TB	QC	–	6346	11/13/07	Trip blank sent to Severn-Trent for methane analysis with water samples listed on COC 6349.
11/13/07	8:16	CNPSB1-W-16246	Water	CPT	PSB1	55-60	6348	11/13/07	Sample collected by using bailer after purging with Waterra pump. Water very muddy.
11/13/07	8:20	CNPSB1-W-16246REP[b]	Water	CPT	PSB1	55-60	6348	11/13/07	Replicate of sample CNPSB1-W-16246.
11/13/07	10:47	CNPSB2-S-19949	Soil	CPT	PSB2	3.8	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	10:55	CNPSB2-S-19950	Soil	CPT	PSB2	8	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	11:06	CNPSB2-S-19951	Soil	CPT	PSB2	12	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	11:23	CNPSB2-S-19952	Soil	CPT	PSB2	16	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	11:35	CNPSB2-S-19953	Soil	CPT	PSB2	20	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	11:54	CNPSB2-S-19954	Soil	CPT	PSB2	24	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	11:55	CNPSB2-S-19954REP [b]	Soil	CPT	PSB2	24	6349	11/13/07	Replicate of sample CNPSB2-S-19954.
11/13/07	12:12	CNPSB2-S-19955	Soil	CPT	PSB2	28	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	13:29	CNPSB2-S-19956	Soil	CPT	PSB2	32	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	13:50	CNPSB2-S-19957	Soil	CPT	PSB2	36	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	14:16	CNPSB2-S-19958	Soil	CPT	PSB2	40	6349	11/13/07	Vertical-profile soil sampling.
11/13/07	16:01	CNPSB2-W-16247	Water	CPT	PSB2	50-55	6348	11/13/07	Depth to water = 29.2 ft from top of riser. Depth of hole = 61.38 ft. Immediate water, muddy.
11/13/07	17:22	CNPSB2-W-16248	Water	CPT	PSB2	55-60	6348	11/13/07	Depth to water = 29.2 ft from top of riser. Depth of hole = 66.1 ft. Immediate water, muddy.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Pre-injection baseline sampling, November 2007 (cont.)									
11/13/07	19:00	CNPSB3-W-16249	Water	CPT	PSB3	50-55	6352	11/14/07	Depth to water = 30.1 ft from top of riser. Depth of hole = 61.5 ft. Water is muddy.
11/14/07	8:04	CNQCTB-W-19959[b]	Water	TB	QC	–	6352	11/14/07	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COC 6352.
11/14/07	8:05	CNQCTB-W-19960[b]	Water	TB	QC	–	6355	11/14/07	Trip blank sent to Severn-Trent for methane analysis with water samples listed on COC 6355.
11/14/07	8:24	CNQCTB-W-19961[b]	Water	TB	QC	–	6347	11/14/07	Trip blank sent to Envirosystems, Inc., for verification organic analysis with water samples listed on COC 6347.
11/14/07	8:35	CNPSB3-W-16250	Water	CPT	PSB3	55-60	6352	11/14/07	Depth to water = approx 32 ft from top of riser. Water level rising. Depth of hole = 66.3 ft. Immediate water, muddy.
11/14/07	8:40	CNPSB3-W-16250REP[b]	Water	CPT	PSB3	55-60	6352	11/14/07	Replicate of sample CNPSB3-W-16250.
11/14/07	9:24	CNQCBR-W-19962[b]	Water	RI	QC	–	6352	11/14/07	Rinsate of decontaminated sampling bailer after collection of sample CNPSB3-W-16250 and replicate CNPSB3-W-16250DUP.
11/14/07	10:44	CNPSB4-W-16251	Water	CPT	PSB4	50-55	6352	11/14/07	Depth to water = 29.9 ft from top of riser. Depth of hole = 60.9 ft. Immediate water, muddy.
11/14/07	11:44	CNPSB4-W-16252	Water	CPT	PSB4	55-60	6352	11/14/07	Depth to water = 30.9 ft from top of riser. Water level rising. Depth of hole = 65.68 ft. Immediate water, very muddy.
11/14/07	14:26	CNPSB6-W-16253	Water	CPT	PSB6	50-55	6352	11/14/07	Depth to water = 30.3 ft from top of riser. Depth of hole = 61.04 ft. Immediate water, muddy.
11/14/07	15:33	CNPSB6-W-16254	Water	CPT	PSB6	55-60	6352	11/14/07	Depth to water = 30.44 ft from top of riser. Depth of hole = 66.0 ft. Immediate water, muddy.
11/14/07	16:42	CNPSB5-W-16255	Water	CPT	PSB5	50-55	6352	11/14/07	Depth to water = 30.6 ft from top of riser. Water level rising. Depth of hole = 61.1 ft.
11/14/07	18:00	CNPSB5-W-16256	Water	CPT	PSB5	55-60	6364	11/15/07	Depth to water = 34.4 ft from top of riser. Water level rising. Depth of hole = 65.9 ft.
11/15/07	8:14	CNQCTB-W-19963[b]	Water	TB	QC	–	6364	11/15/07	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COC 6364.
11/15/07	8:15	CNQCTB-W-19964[b]	Water	TB	QC	–	6363	11/15/07	Trip blank sent to Severn-Trent for methane analysis with water samples listed on COC 6363.
11/15/07	9:36	CNPSB7-W-16257	Water	CPT	PSB7	55-60	6364	11/15/07	Depth to water = 29.7 ft from top of riser. Water level rising. Depth of hole = 65.85 ft. Immediate water, muddy.
11/15/07	10:58	CNPSB7-W-16258	Water	CPT	PSB7	50-55	6364	11/15/07	Set as temporary riser with sand and Benseal in the morning. ORP reading erratic, from -211 to -611 mV.
11/15/07	12:51	CNPSB8-W-26060	Water	CPT	PSB8	50-55	6364	11/15/07	Sampled via riser.
11/15/07	13:27	CNQCFB-W-19965[b]	Water	FB	QC	–	6364	11/15/07	Blank of water used during field event.
11/15/07	13:54	CNPSB8-W-26061	Water	CPT	PSB8	55-60	6364	11/15/07	Depth to water = 28.55 ft from top of riser. Depth of hole = 65.6 ft. Actual interval is 54.63 to 59.63 ft BGL. Could not push to 60 ft.
11/15/07	13:55	CNPSB8-W-26061REP[b]	Water	CPT	PSB8	55-60	6364	11/15/07	Replicate of sample CNPSB8-W-26061.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Pre-injection baseline sampling, November 2007 (cont.)									
11/15/07	14:01	CNPUBL-W-26062[b]	Water	FB	QC	–	6366 6362	11/15/07	Blank of water used during field event, sent to Severn-Trent for attenuation parameter analysis and to Envirosystems for VOCs analyses including carbon disulfide.
11/15/07	15:15	CNPSB9-W-26063	Water	CPT	PSB9	50-55	6364	11/15/07	Depth to water = approx 42 ft from top of riser. Water level rising. Depth of hole = 61.2 ft. Water entered rods more slowly than at all previous locations. Muddy.
11/15/07	16:08	CNPSB9-W-26064	Water	CPT	PSB9	55-60	6364	11/15/07	Depth to water = approx 38 ft from top of riser. Water level rising. Depth of hole = 66.34 ft.
11/16/07	7:48	CNPSB4-S-19966	Soil	CPT	PSB4	4	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	8:04	CNPSB4-S-19967	Soil	CPT	PSB4	8	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	8:09	CNQCTB-S-19969[b]	Soil	TB	QC	–	6368	11/16/07	Trip blank sent to the AGEM Laboratory for organic analysis with soil samples listed on COCs 6368 and 6369.
11/16/07	8:19	CNPSB4-S-19968	Soil	CPT	PSB4	12	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	8:36	CNPSB4-S-19970	Soil	CPT	PSB4	16	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	8:50	CNPSB4-S-19971	Soil	CPT	PSB4	20	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	9:19	CNPSB4-S-19972	Soil	CPT	PSB4	24	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	9:20	CNPSB4-S-19972REP[b]	Soil	CPT	PSB4	24	6368	11/16/07	Replicate of sample CNPSB4-S-19972.
11/16/07	9:38	CNPSB4-S-19973	Soil	CPT	PSB4	28	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	9:57	CNPSB4-S-19974	Soil	CPT	PSB4	32	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	10:19	CNPSB4-S-19975	Soil	CPT	PSB4	36	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	10:51	CNPSB4-S-25960	Soil	CPT	PSB4	40	6368	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	11:45	CNPSB3-S-25961	Soil	CPT	PSB3	8	6369	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	11:58	CNPSB3-S-25962	Soil	CPT	PSB3	12	6369	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	13:24	CNPSB3-S-25963	Soil	CPT	PSB3	16	6369	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	13:34	CNPSB3-S-25964	Soil	CPT	PSB3	20	6369	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	14:05	CNPSB3-S-25965	Soil	CPT	PSB3	24	6369	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	14:23	CNPSB3-S-25966	Soil	CPT	PSB3	28	6369	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	14:24	CNPSB3-S-25966REP[b]	Soil	CPT	PSB3	28	6369	11/16/07	Replicate of sample CNPSB3-S-25966.
11/16/07	14:42	CNPSB3-S-25967	Soil	CPT	PSB3	32	6369	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	14:55	CNPSB3-S-25968	Soil	CPT	PSB3	36	6369	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	15:15	CNPSB3-S-25969	Soil	CPT	PSB3	40	6369	11/16/07	Vertical profile subsurface soil sampling.
11/16/07	15:35	CNPSB3-S-25970	Soil	CPT	PSB3	4	6369	11/16/07	Vertical profile subsurface soil sampling.
11/27/07	9:40	CN-S-MeohBlank-27Nov07	Soil	TB	QC	–	3441	11/27/07	Trip blank sent to TestAmerica for verification organic analysis with soil samples listed on COC 3441.
Post-injection sampling, December 2007									
12/6/07	13:05	CNPSB11-W-25971	Water	CPT	PSB11	26-30	6023	12/18/07	Post-injection. Water recovered from core barrel to analyze for bromide tracer. Limited water available (<200 mL).
12/7/07	11:46	CNPSB11-W-25972	Water	CPT	PSB11	54-58	6023	12/18/07	Post-injection. Water recovered from core barrel to analyze for bromide tracer. Limited water available (~100 mL).

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, December 2007 (cont.)									
12/17/07	15:15	CNPSB12-W-25973	Water	CPT	PSB12	54-58	6023	12/18/07	Post-injection. Water recovered from core barrel to analyze for bromide tracer. Free water (500 mL) with small amount of mud.
Post-injection sampling, January 8-10, 2008									
1/8/08	11:00	CNPMP6-W-26065	Water	CPT/P	PMP6	50-60	6379	1/10/08	New 0.5-in. piezometer at pre-injection location PSB6. Measured inside crawler: water level = 30.7 ft, total depth = 66.05 ft. Silt in screen. Immediate water, muddy, brown with sediment. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/8/08	16:56	CNPMP7-W-26066	Water	CPT/P	PMP7	50-60	6379	1/10/08	New 0.5-in. piezometer at pre-injection location PSB7. Measured inside crawler: water level = 28.9 ft and rising, total depth = 65.6 ft. Immediate water. Very muddy, tan/brown, with sediment. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/8/08	17:03	CNPMP7-W-26067[b]	Water	CPT/P	PMP7	50-60	6379	1/10/08	Replicate of sample CNPMP7-W-26066.
1/8/08	17:12	CNQCBR-W-25974[b]	Water	RI	QC	–	6379	1/10/08	Rinsate of decontaminated sampling bailer after collection of sample CNPMP7-W-26066 and replicate CNPMP7-W-26067.
1/9/08	8:18	CNQCTB-W-25975[b]	Water	TB	QC	–	6379	1/10/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COCs 6379 and 6381.
1/9/08	8:21	CNQCTB-W-25976[b]	Water	TB	QC	–	6380	1/10/08	Trip blank sent to Envirosystems for verification organic analysis with water samples listed on COC 6380.
1/9/08	9:31	CNPMP5-W-26069	Water	CPT/P	PMP5	50-60	6379	1/10/08	New 1-in. piezometer at pre-injection location PSB5. Measured from stickup (0.7 ft above grade level) water level = 23.59 ft. Water muddy, brown, with sediment. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/9/08	9:41	CNPMP4-W-26068	Water	CPT/P	PMP4	48.75-58.75	6379	1/10/08	New 0.5-in. piezometer southeast of SB07R as requested by KDHE. Measured inside cone penetrometer: water level = 27.35 ft and rising, total depth = 63.83 ft. Immediate water, muddy, brown sediment. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/9/08	11:09	CNSB08-W-26070	Water	CPT/P	SB08	52-62	6379	1/10/08	Depth to water from TOC = 19.57 ft. Depth of 1-in. well = 59.81 ft. Water slightly cloudy/tan. Collected without purging by using bailer for VOCs and Waterra pump for bromide.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, January 8-10, 2008 (cont.)									
1/9/08	12:44	CNPMP3-W-26071	Water	CPT/P	PMP3	50-60	6379	1/10/08	New 0.5-in. piezometer at pre-injection location PSB3. Measured inside crawler: water level = 28.60 ft, total depth = 65.50 ft. Immediate water, muddy, brown. Unpleasant odor. Magnetic black fine sediment in water. Iron is average of 0.48 and 0.77 mg/L.
1/9/08	12:52	CNPMP3-W-26072[b]	Water	CPT/P	PMP3	50-60	6379	1/10/08	Replicate of sample CNPMP3-W-26071.
1/9/08	13:52	CNSB07R-W-26073	Water	CPT/P	SB07R	45-60	6379	1/10/08	Depth to water from TOC = 18.60 ft. Water almost clear, faintly cloudy. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/9/08	15:21	CNMW02-W-26074	Water	MW	MW02	49.5-59.5	6379	1/10/08	Depth to water from TOC = 20.95 ft. Depth of well = 61.28 ft. Water cloudy gray. Smells bad, like sewage. Magnetic fine black sediment. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/9/08	16:04	CNQCBR-W-25977[b]	Water	RI	QC	–	6379	1/10/08	Rinsate of decontaminated sampling bailer after collection of sample CNPMP3-W-26071 and replicate CNPMP3-W-26072 and prior to collection of sample CNPMP8-W-26075.
1/9/08	16:19	CNPMP8-W-26075	Water	CPT/P	PMP8	50-60	6379	1/10/08	New piezometer at pre-injection location PSB8. Measured inside crawler: water level = 35.3 ft and rising, total depth = 65.5 ft. Water, muddy, brown. Faint smell. Magnetic fine black sediment. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/10/08	8:26	CNSB04-W-26076	Water	CPT/P	SB04	51-61	6381	1/10/08	Depth to water from TOC = 22.58 ft. Depth of well = 59.37 ft. Water pale muddy brown. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/10/08	9:31	CNPMP9-W-26077	Water	CPT/P	PMP9	50-60	6381	1/10/08	New 0.5-in. piezometer at pre-injection location PSB9. Measured inside crawler: water level = 22.6 ft, total depth = 65.9 ft. Immediate water, muddy, brown. Magnetic fine black sediment. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/10/08	10:44	CNMW03-W-26078	Water	MW	MW03	50.5-60.5	6381	1/10/08	Depth to water from TOC = 21.46 ft. Depth of well = 62.45 ft. Water slightly cloudy tan. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/10/08	13:46	CNPMP1-W-26079	Water	CPT/P	PMP1	50-60	6381	1/10/08	New piezometer 3 ft offset from PT7. Measured inside crawler: water level = 32.6 ft and rising, total depth = 65.78 ft. Immediate water, muddy, brown. Magnetic fine black sediment. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
1/10/08	13:50	CNPMP1-W-26080[b]	Water	CPT/P	PMP1	50-60	6381	1/10/08	Replicate of sample CNPMP1-W-26079.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, January 8-10, 2008 (cont.)									
1/10/08	16:52	CNPMP2-W-26081	Water	CPT/P	PMP2	50-60	6381	1/10/08	New piezometer midway between PT2 and PT7. Measured inside crawler: water level = 38.0 ft and rising, total depth = 66.00 ft. Water muddy, brown. Magnetic sediment. Collected without purging by using bailer for VOCs and Waterra pump for bromide.
Post-injection sampling, January 24, 2008									
1/24/08	8:28	CNPMP1-W-26083	Water	CPT/P	PMP1	50-60	6030	1/24/08	Depth to water from ground = 21.90 ft. Depth to bottom = 57.72 ft. Sample collected by using Waterra tube.
1/24/08	9:41	CNPMP2-W-26084	Water	CPT/P	PMP2	50-60	6030	1/24/08	Depth to water from ground = 21.90 ft. Depth to bottom = 58.40 ft. Sample collected by using Waterra tube.
1/24/08	9:42	CNPMP2-W-26085[b]	Water	CPT/P	PMP2	50-60	6030	1/24/08	Replicate of sample CNPMP2-W-26084.
1/24/08	10:48	CNPMP3-W-26086	Water	CPT/P	PMP3	50-60	6030	1/24/08	Depth to water from ground = 22.96 ft. Depth to bottom = 58.10 ft. Sample collected by using Waterra tube.
1/24/08	11:27	CNPMP4-W-26087	Water	CPT/P	PMP4	48.75-58.75	6030	1/24/08	Depth to water from ground = 19.95 ft. Depth to bottom = 56.80 ft. Sample collected by using Waterra tube.
1/24/08	11:56	CNPMP5-W-26088	Water	CPT/P	PMP5	50-60	6030	1/24/08	Depth to water from ground = 23.18 ft. Depth to bottom = 59.30 ft. Sample collected by using Waterra tube.
1/24/08	11:57	CNPMP5-W-26089[b]	Water	CPT/P	PMP5	50-60	6030	1/24/08	Replicate of sample CNPMP5-W-26088.
1/24/08	12:45	CNPMP6-W-26090	Water	CPT/P	PMP6	50-60	6030	1/24/08	Depth to water from ground = 23.20 ft. Depth to bottom = 59.18 ft. Sample collected by using Waterra tube.
1/24/08	13:10	CNPMP7-W-26091	Water	CPT/P	PMP7	50-60	6030	1/24/08	Depth to water from ground = 21.11 ft. Depth to bottom = 58.23 ft. Sample collected by using Waterra tube.
1/24/08	13:45	CNPMP8-W-26092	Water	CPT/P	PMP8	50-60	6030	1/24/08	Depth to water from ground = 21.00 ft. Depth to bottom = 56.10 ft. Sample collected by using Waterra tube.
1/24/08	14:25	CNPMP9-W-26109	Water	CPT/P	PMP9	50-60	6031	1/24/08	Depth to water from ground = 16.46 ft. Depth to bottom = 58.65 ft. Sample collected by using Waterra tube.
1/24/08	14:49	CNSB07R-W-26111	Water	CPT/P	SB07R	45-60	6031	1/24/08	Depth to water from ground = 18.75 ft. Depth to bottom = 58.48 ft. Sample collected by using Waterra tube.
1/24/08	15:19	CNSB04-W-26094	Water	CPT/P	SB04	51-61	6030	1/24/08	Depth to water from ground = 23.03 ft. Depth to bottom = 59.36 ft. Sample collected by using Waterra tube.
1/24/08	15:40	CNSB08-W-26112	Water	CPT/P	SB08	52-62	6031	1/24/08	Sample collected by using Waterra tube.
1/24/08	15:45	CNQCTB-W-25980[b]	Water	TB	QC	–	6030	1/24/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COCs 6030, 6031, and 6032.
1/24/08	15:46	CNQCTB-W-25981[b]	Water	TB	QC	–	6028	1/24/08	Trip blank sent to Envirosystems for verification organic analysis with water samples listed on COC 6028.
1/24/08	15:50	CNQCRI-W-25982[b]	Water	RI	QC	–	6032	1/24/08	Rinsate of decontaminated sampling tube after collection of sample CNSB08-W-26112.
1/24/08	16:30	CNMW02-W-26097	Water	MW	MW02	49.5-59.5	6031	1/24/08	Depth to water from ground = 22.07 ft. Depth to bottom = 61.24 ft. Sample collected by using Waterra tube.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, January 24, 2008 (cont.)									
1/24/08	16:31	CNMW02-W-26098[b]	Water	MW	MW02	49.5-59.5	6031	1/24/08	Replicate of sample CNMW02-W-26097.
Post-injection sampling, February 2008									
2/23/08	10:51	CNMW02-W-26099	Water	MW	MW02	49.5-59.5	6212	2/25/08	Depth to water = 22.37 ft. Depth of 4-in. well = 61.2 ft. Sample collected by using low-flow bladder pump after purging of 3.9 L.
2/23/08	14:38	CNMW03-W-26115	Water	MW	MW03	50.5-60.5	6212	2/25/08	Depth to water = 21.81 ft. Depth of 4-in. well = 62.4 ft. Sample collected by using low-flow bladder pump after purging of 5 L.
2/23/08	16:38	CNSB04-W-26117	Water	CPT/P	SB04	51-61	6212	2/25/08	Depth to water = 22.97 ft. Depth of 1-in. well = 59.35 ft. Sample collected by using low-flow bladder pump after purging of 5.6 L.
2/24/08	8:30	CNQCTB-W-26118[b]	Water	TB	QC	–	6212	2/25/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COCs 6212 and 6215.
2/24/08	8:33	CNQCTB-W-25983[b]	Water	TB	QC	–	6213	2/25/08	Trip blank sent to Envirosystems for verification organic analysis with water samples listed on COC 6213.
2/24/08	8:43	CNQCPR-W-26119[b]	Water	RI	QC	–	6212	2/25/08	Rinsate of decontaminated low-flow bladder pump after sampling at SB04.
2/24/08	9:38	CNSB08-W-25978	Water	CPT/P	SB08	52-62	6212	2/25/08	Depth to water = 19.78 ft. Depth of 1-in. well = 59.76 ft. Sample collected by using low-flow bladder pump after purging of 3.5 L.
2/24/08	9:42	CNSB08-W-25979[b]	Water	CPT/P	SB08	52-62	6212	2/25/08	Replicate of sample CNSB08-W-25978.
2/24/08	12:22	CNSB07R-W-25984	Water	CPT/P	SB07R	45-60	6212	2/25/08	Depth to water = 18.89 ft. Depth of 2-in. well = 58.53 ft. Sample collected by using low-flow bladder pump after purging of 4 L.
2/24/08	15:19	CNPMP1-W-25985	Water	MW	PMP1	50-60	6212	2/25/08	Depth to water = 22.09 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 1.2 L.
2/24/08	16:00	CNPMP2-W-25986	Water	MW	PMP2	50-60	6212	2/25/08	Depth to water = 22.50 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 410 mL.
2/24/08	16:04	CNPMP2-W-25988[b]	Water	MW	PMP2	50-60	6212	2/25/08	Replicate of sample CNPMP2-W-25986.
2/24/08	18:04	CNPMP9-W-25989	Water	MW	PMP9	50-60	6212	2/25/08	Depth to water = 17.12 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 7 L.
2/25/08	9:44	CNPMP3-W-25990	Water	MW	PMP3	50-60	6215	2/25/08	Depth to water = 22.84 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 3 L. Water pale cloudy brown.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, February 2008 (cont.)									
2/25/08	11:49	CNPMP4-W-25992	Water	MW	PMP4	48.75-58.75	6215	2/25/08	Depth to water = 20.36 ft. Depth of 0.5-in. well = 58.75 ft. Sample collected by using Waterra pump as bailer after purging of 5 L. Water muddy brown.
2/25/08	13:19	CNPMP6-W-25993	Water	MW	PMP6	50-60	6215	2/25/08	Depth to water = 23.68 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump as bailer after purging of 4.5 L. Water muddy brown.
2/25/08	14:50	CNPMP8-W-25994	Water	MW	PMP8	50-60	6215	2/25/08	Depth to water = 21.49 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump as bailer after purging of 3 L.
2/25/08	16:11	CNPMP7-W-25996	Water	MW	PMP7	50-60	6215	2/25/08	Depth to water = 22.47 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump as bailer after purging of 2.5 L.
2/25/08	17:28	CNPMP5-W-25997	Water	MW	PMP5	50-60	6215	2/25/08	Depth to water = 23.72 ft. Depth of 1-in. well = 60 ft. Sample collected by using low-flow bladder pump after purging of 3 L.
2/25/08	18:13	CNWAS-W-25998[b]	Water	BT	QC	–	6215	2/25/08	Sample from drum containing waste purge water collected during low-flow sampling of wells.
Post-injection sampling, March 2008									
3/12/08	10:07	CNMW02-W-26000	Water	MW	MW02	49.5-59.5	6078	3/13/08	Depth to water = 21.85 ft. Depth of 4-in. well = 59.50 ft. Sample collected by using low-flow bladder pump after purging of 3.05 L. Purge water had greenish color and had an odor.
3/12/08	12:06	CNMW03-W-26001	Water	MW	MW03	50.5-60.5	6078	3/13/08	Depth to water = 21.22 ft. Depth of 4-in. well = 60.50 ft. Sample collected by using low-flow bladder pump after purging of 3.51 L. Purge water was clear.
3/12/08	12:07	CNMW03DUP-W-26021[b]	Water	MW	MW03	50.5-60.5	6078	3/13/08	Replicate of sample CNMW03-W-26001.
3/12/08	14:09	CNSB07R-W-26003	Water	CPT/P	SB07R	45-60	6078	3/13/08	Depth to water = 18.23 ft. Depth of 2-in. well = 60 ft. Sample collected by using low-flow bladder pump after purging of 2.26 L. Purge water was clear.
3/12/08	14:32	CNQCIR-W-26017[b]	Water	RI	QC	–	6078	3/13/08	Rinsate of decontaminated bladder pump after collection of sample CNSB07R-W-26003.
3/12/08	15:51	CNSB08-W-26004	Water	CPT/P	SB08	52-62	6078	3/13/08	Depth to water = 19.24 ft. Depth of 1-in. well = 59.86 ft. Sample collected by using low-flow bladder pump after purging of 1.92 L. Purge water was clear.
3/12/08	17:14	CNSB04-W-26002	Water	CPT/P	SB04	51-61	6078	3/13/08	Depth to water = 22.34 ft. Depth of 1-in. well = 59.41 ft. Sample collected by using low-flow bladder pump after purging of 3.21 L. Purge water was clear.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, March 2008 (cont.)									
3/13/08	8:34	CNPMP5-W-26009	Water	MW	PMP5	50-60	6080	3/13/08	Depth to water = 23.20 ft. Depth of 1-in. well = 59.96 ft. Sample collected by using low-flow bladder pump after purging of 1.24 L. Purge water was clear.
3/13/08	9:05	CNQCIR-W-26018[b]	Water	RI	QC	–	6080	3/13/08	Rinsate of decontaminated bladder pump after collection of sample CNPMP5-W-26009.
3/13/08	10:15	CNPMP6-W-26010	Water	MW	PMP6	50-60	6080	3/13/08	Depth to water = 23.20 ft. Depth of 0.5-in. well = 58.45 ft. Sample collected by using Waterra pump tubing as bailer after purging of 4.5 L. Purge water was muddy brown.
3/13/08	11:22	CNPMP7-W-26011	Water	MW	PMP7	50-60	6080	3/13/08	Depth to water = 21.09 ft. Depth of 0.5-in. well = 58.65 ft. Sample collected by using Waterra pump tubing as bailer after purging of 4.45 L. Purge water was cloudy tan.
3/13/08	12:58	CNPMP3-W-26007	Water	MW	PMP3	50-60	6080	3/13/08	Depth to water = 21.83 ft. Depth of 0.5-in. well = 56.70 ft. Sample collected by using Waterra pump tubing as bailer after purging of 3.04 L. Purge water was mousy gray
3/13/08	12:59	CNPMP3DUP-W-26022[b]	Water	MW	PMP3	50-60	6080	3/13/08	Replicate of sample CNPMP3-W-26007.
3/13/08	14:20	CNPMP4-W-26008	Water	MW	PMP4	48.75-58.75	6080	3/13/08	Depth to water = 19.90 ft. Well silted in. Used Waterra pump to remove sandy material and purge 3 well volumes, then sampled. Purge water was dark tan with no odor. No field measurements.
3/13/08	14:30	CNPMP9-W-26013	Water	MW	PMP9	50-60	6080	3/13/08	Depth to water = 16.10 ft. Depth of 0.5-in. well = 58.0 ft. Sample collected by using Waterra pump tubing as bailer after purging of 5.3 L. Purge water was tan; no odor.
3/13/08	14:45	CNQCTB-W-26014[b]	Water	TB	QC	–	6080	3/13/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COCs 6078 and 6080.
3/13/08	14:46	CNQCTB-W-26014a[b]	Water	TB	QC	–	6081	3/13/08	Trip blank sent to Envirosystems for verification organic analysis with water samples listed on COC 6081.
3/13/08	16:06	CNPMP8-W-26012	Water	MW	PMP8	50-60	6082	3/13/08	Depth to water = 20.95 ft. Well silted in. Used Waterra pump to remove sand and gray-colored material (with odor) and purge 3 well volumes, then sampled. Only iron measured in field.
3/13/08	16:39	CNPMP2-W-26006	Water	MW	PMP2	50-60	6082	3/13/08	Depth to water = 21.80 ft. Well silted in. Used Waterra pump to remove sand and brown material (with odor) and purge 3 well volumes, then sampled. Only iron measured in field.
3/13/08	17:15	CNPMP1-W-26005	Water	MW	PMP1	50-60	6082	3/13/08	Depth to water = 21.45 ft. Well silted in. Used Waterra pump to remove sand and brown material (with odor) and purge 3 well volumes, then sampled. Only iron measured in field.
3/13/08	17:30	CNQCTB-W-26016[b]	Water	TB	QC	–	6082	3/13/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COC 6082.
3/19/08	9:13	CNMW01-W-26023	Water	MW	MW01	54.5-64.5	6083	3/19/08	Depth to water = 11.89 ft. Depth of 4-in. well = 69.55 ft. Sample collected by using low-flow bladder pump after purging of 4.31 L. Purge water clear, no odor.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, March 2008 (cont.)									
3/19/08	9:47	CNQCIR-W-26034[b]	Water	RI	QC	–	6083	3/19/08	Rinsate of decontaminated bladder pump after collection of sample CNMW01-W-26023.
3/19/08	11:46	CNMW04-W-26024	Water	MW	MW04	37.5-47.5	6083	3/19/08	Depth to water = 24.23 ft. Depth of 4-in. well = 49.25 ft. Sample collected by using low-flow bladder pump after purging of 3.72 L.
3/19/08	11:47	CNMW04DUP-W-26036[b]	Water	MW	MW04	37.5-47.5	6083	3/19/08	Replicate of sample CNMW04-W-26024.
3/19/08	13:56	CNMW05-W-26025	Water	MW	MW05	34.5-44.5	6083	3/19/08	Depth to water = 7.32 ft. Depth of 4-in. well = 47.58 ft. Sample collected by using low-flow bladder pump after purging of 4.25 L.
3/19/08	15:30	CNMW06-W-26026	Water	MW	MW06	46.5-56.5	6083	3/19/08	Depth to water = 34.70 ft. Depth of 4-in. well = 60.03 ft. Sample collected by using low-flow bladder pump after purging of 2.12 L. Purge water was tan.
3/19/08	15:31	CNMW06DUP-W-26037[b]	Water	MW	MW06	46.5-56.5	6083	3/19/08	Replicate of sample CNMW06-W-26026.
3/19/08	16:57	CNQCTB-W-26035[b]	Water	TB	QC	–	6083	3/19/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COC 6083.
3/19/08	16:58	CNQCTB-W-26035a[b]	Water	TB	QC	–	6081	3/19/08	Trip blank sent to Envirosystems for verification organic analysis with water samples listed on COCs 6079 and 6081.
3/19/08	18:22	CNMW07-W-26027	Water	MW	MW07	45-55	6085	3/20/08	Depth to water = 28.32 ft. Depth of 2-in. well = 58.50 ft. Sample collected by using low-flow bladder pump after purging of 2.5 L. Purge water was cloudy.
3/19/08	14:00	Centralia-WW[b]	Water	BT	QC	–	–	3/20/08	Composite sample of accumulated waste purge water for analysis at Pace Analytical Services, Lenexa, Kansas.
3/20/08	8:46	CNMW10-W-26030	Water	MW	MW10	30-45	6085	3/20/08	Depth to water = 20.90 ft. Depth of 2-in. well = 47.73 ft. Sample collected by using low-flow bladder pump after purging of 4.0 L.
3/20/08	9:44	CNSB09-W-26033	Water	CPT/P	SB09	32-42	6085	3/20/08	Depth to water = 2.90 ft. Depth of 1-in. well = 35.50 ft. Sample collected by using low-flow bladder pump after purging of 2.36 L.
3/20/08	10:12	CNMW08-W-26028	Water	MW	MW08	38-53	6085	3/20/08	Depth to water = 18.85 ft. Depth of 2-in. well = 57.15 ft. Sample collected by using low-flow bladder pump after purging of 4.1 L.
3/20/08	11:40	CNMW09-W-26029	Water	MW	MW09	25-35	6085	3/20/08	Depth to water = 0 ft. Depth of 2-in. well = 39.15 ft. Sample collected by using low-flow bladder pump after purging of 9 L. Water flowed out of casing when the plug was removed.
3/20/08	11:45	CNQCIR-W-26039	Water	RI	QC	–	6085	3/20/08	Rinsate of decontaminated bladder pump after collection of sample CNMW09-W-26029.
3/20/08	13:23	CNSB01-W-26031	Water	CPT/P	SB01	40-50	6085	3/20/08	Depth to water = 15.87 ft. Depth of 1-in. well = 48.90 ft. Sample collected by using low-flow bladder pump after purging of 5.4 L.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, March 2008 (cont.)									
3/20/08	14:50	CNSB05-W-26032	Water	CPT/P	SB05	32-42	6085	3/20/08	Depth to water = 7.43 ft. Depth of 1-in. well = 41.02 ft. Sample collected by using Waterra pump tubing as bailer after purging of 10 L. Observation: the well casing seemed to be broken at 2 ft 3 in. below grade.
3/20/08	14:55	CNQCTB-W-26038[b]	Water	TB	QC	–	6085	3/20/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COC 6085.
3/20/08	14:55	CNQCTB-W-26038a[b]	Water	TB	QC	–	6130	3/20/08	Trip blank sent to Envirosystems for verification organic analysis with water samples listed on COC 6130.
Post-injection sampling, April 2008									
4/23/08	16:51	CNSB08-W-26049	Water	CPT/P	SB08	52-62	4793	4/24/08	Depth to water = 18.10 ft. Depth of 1-in. well = 59.80 ft. Sample collected by using low-flow bladder pump after purging of 1.77 L. Purge water slightly cloudy.
4/23/08	18:18	CNMW03-W-26046	Water	MW	MW03	50.5-60.5	4793	4/24/08	Depth to water = 20.15 ft. Depth of 4-in. well = 62.20 ft. Sample collected by using low-flow bladder pump after purging of 3.365 L. Purge water clear.
4/24/08	9:03	CNSB04-W-26047	Water	CPT/P	SB04	51-61	4794	4/24/08	Depth to water = 21.30 ft. Depth of 1-in. well = 59.40 ft. Sample collected by using low-flow bladder pump after purging of 1.64 L. Purge water clear.
4/24/08	9:04	CNSB04DUP-W-26062[b]	Water	CPT/P	SB04	51-61	4793	4/24/08	Replicate of sample CNSB04-W-26047.
4/24/08	9:18	CNQCIR-W-26060[b]	Water	RI	QC	–	4793	4/24/08	Rinsate of decontaminated bladder pump after collection of sample CNSB04-W-26047 and replicate CNSB04DUP-W-26062.
4/24/08	10:26	CNPMP6-W-26055	Water	MW	PMP6	50-60	4794	4/24/08	Depth to water = 20.80 ft. Depth of 0.5-in. well = 57.10 ft. Sample collected by using Waterra pump tubing as bailer after purging of 5.5 L (3 well volumes). Purge water light brown.
4/24/08	10:37	CNPMP5-W-26054	Water	MW	PMP5	50-60	4794	4/24/08	Depth to water = 20.79 ft. Depth of 1-in. well = 58.90 ft. Sample collected by using Waterra pump tubing as bailer after purging of 1.5 L. Purge water gray looking.
4/24/08	10:38	CNPMP5DUP-W-26063[b]	Water	MW	PMP5	50-60	4793	4/24/08	Replicate of sample CNPMP5-W-26054.
4/24/08	10:52	CNQCIR-W-26061[b]	Water	RI	QC	–	4793	4/24/08	Rinsate of decontaminated bladder pump after collection of sample CNPMP5-W-26054 and replicate CNPMP5DUP-W-26063.
4/24/08	11:48	CNPMP7-W-26056	Water	MW	PMP7	50-60	4794	4/24/08	Depth to water = 19.70 ft. Depth of 0.5-in. well = 56.85 ft. Sample collected by using Waterra pump tubing as bailer after purging of 5.1 L (3 well volumes). Purge water cloudy tan.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, April 2008 (cont.)									
4/24/08	12:06	CNSB07R-W-26048	Water	CPT/P	SB07R	45-60	4794	4/24/08	Depth to water = 17.87 ft. Depth of 2-in. well = 58.50 ft. Sample collected by using low-flow bladder pump after purging of 2.82 L.
4/24/08	12:40	CNPMP4-W-26053	Water	MW	PMP4	48.75-58.75	4794	4/24/08	Depth to water = 17.70 ft. Depth of 0.5-in. well = 57.40 ft. Sample collected by using Waterra pump as bailer after purging of 5.5 L (3 well volumes). Water brown and sandy.
4/24/08	13:41	CNPMP8-W-26057	Water	MW	PMP8	50-60	4794	4/24/08	Depth to water = 18.60 ft. Depth of 0.5-in. well = 58.8 ft. Sample collected by using Waterra pump as bailer after purging of 5 L (3 well volumes). Purge water brown.
4/24/08	13:46	CNMW02-W-26045	Water	MW	MW02	49.5-59.5	4794	4/24/08	Depth to water = 20.72 ft. Depth of 4-in. well = 61.40 ft. Sample collected by using low-flow bladder pump after purging of 2.5 L. Purge water black; tubing and probes covered with slimy substance with strong odor. Iron sample bronze color.
4/24/08	14:40	CNPMP3-W-26052	Water	MW	PMP3	50-60	4794	4/24/08	Depth to water = 20.30 ft. Depth of 0.5-in. well = 56.10 ft. Sample collected by using Waterra pump as bailer after purging of 5.5 L (3 well volumes). Purge water light brown to greenish color, with odor. Iron sample turned red orange.
4/24/08	15:25	CNPMP9-W-26058	Water	MW	PMP9	50-60	4794	4/24/08	Depth to water = 13.68 ft. Depth of 0.5-in. well = 56.50 ft. Sample collected by using Waterra pump as bailer after purging of 5.5 L (3 well volumes). Purge water tan.
4/24/08	15:49	CNQCTB-W-26059[b]	Water	TB	QC	–	4793	4/24/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COCs 4793 and 4794.
4/24/08	15:50	CNQCTB-W-26059a[b]	Water	TB	QC	–	6084	4/24/08	Trip blank sent to Envirosystems for verification organic analysis with water samples listed on COC 6084.
4/24/08	16:06	CNPMP2-W-26051	Water	MW	PMP2	50-60	4794	4/24/08	Depth to water = 19.61 ft. Depth of 0.5-in. well = 59.05 ft. Sample collected by using Waterra pump as bailer after purging of 5.4 L (3 well volumes). Purge water dark tan.
4/24/08	16:39	CNPMP1-W-26050	Water	MW	PMP1	50-60	4794	4/24/08	Depth to water = 19.46 ft. Depth of 0.5-in. well = 58.68 ft. Sample collected by using Waterra pump as bailer after purging of 5 L (3 well volumes). Purge water dark tan.
Post-injection sampling, June 2008									
6/4/08	11:44	CNSB04-W-26622	Water	CPT/P	SB04	51-61	6128	6/5/08	Depth to water = 20.8 ft. Depth of 1-in. well = 59.35 ft. Sample collected by using low-flow bladder pump after purging of 2.5 L. Purge water clear.
6/4/08	12:58	CNMW03-W-26621	Water	MW	MW03	50.5-60.5	6128	6/5/08	Depth to water = 19.7 ft. Depth of 4-in. well = 62.41 ft. Sample collected by using low-flow bladder pump after purging of 6 L. Purge water clear.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, June 2008 (cont.)									
6/4/08	14:06	CNSB07R-W-26623	Water	CPT/P	SB07R	45-60	6128	6/5/08	Depth to water = 17.9 ft. Depth of 2-in. well = 58.53 ft. Sample collected by using low-flow bladder pump after purging of 6.2 L. Purge water clear.
6/4/08	14:08	CNSB07RDUP-W-26636[b]	Water	CPT/P	SB07R	45-60	6128	6/5/08	Replicate of sample CNSB07R-W-26623.
6/4/08	14:40	CNQCIR-W-26634[b]	Water	RI	QC	–	6128	6/5/08	Rinsate of decontaminated bladder pump after collection of sample CNSB07R-W-26623 and replicate CNSB07RDUP-W-26636.
6/4/08	17:32	CNSB08-W-26624	Water	CPT/P	SB08	52-62	6128	6/5/08	Depth to water = 19 ft. Depth of 1-in. well = 59.76 ft. Sample collected by using low-flow bladder pump after purging of 2.5 L. Purge water clear.
6/4/08	18:36	CNMW02-W-26620	Water	MW	MW02	49.5-59.5	6128	6/5/08	Depth to water = 20.4 ft. Depth of 4-in. well = 61.2 ft. Sample collected by using low-flow bladder pump after purging of 6.1 L. Purge water grayish tint with manure-like odor.
6/4/08	20:18	CNPMP5-W-26629	Water	MW	PMP5	50-60	6128	6/5/08	Depth to water = 20.5 ft. Depth of 1-in. well = 60 ft. Sample collected by using low-flow bladder pump after purging of 3 L. Purge water cloudy to greenish tint with odor.
6/4/08	20:40	CNQCIR-W-26635[b]	Water	RI	QC	–	6128	6/5/08	Rinsate of decontaminated bladder pump after collection of sample CNPMP5-W-26629.
6/5/08	9:52	CNPMP6-W-26630	Water	MW	PMP6	50-60	6129	6/5/08	Depth to water = 20.2 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6 L (3 well volumes). Purge water brown.
6/5/08	10:28	CNPMP7-W-26631	Water	MW	PMP7	50-60	6129	6/5/08	Depth to water = 19 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6.5 L (3 well volumes). Purge water brown.
6/5/08	11:27	CNPMP4-W-26628	Water	MW	PMP4	48.75-58.75	6129	6/5/08	Depth to water = 17 ft. Depth of 0.5-in. well = 58.75 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6.5 L (3 well volumes). Purge water brown.
6/5/08	12:18	CNPMP8-W-26632	Water	MW	PMP8	50-60	6129	6/5/08	Depth to water = 17.7 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6.5 L. Purge water brownish gray with odor.
6/5/08	13:18	CNPMP3-W-26627	Water	MW	PMP3	50-60	6129	6/5/08	Depth to water = 19.8 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6 L. Purge water brownish gray with odor.
6/5/08	13:50	CNQCTB-W-26638[b]	Water	TB	QC	–	6129	6/5/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COCs 6128 and 6129.
6/5/08	13:51	CNQCTB-W-26638a[b]	Water	TB	QC	–	6130	6/5/08	Trip blank sent to Envirosystems for verification organic analysis with water samples listed on COC 6130.
6/5/08	13:58	CNPMP9-W-26633	Water	MW	PMP9	50-60	6129	6/5/08	Depth to water = 13.2 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 7 L. Purge water cloudy to brownish.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, June 2008 (cont.)									
6/5/08	14:35	CNPMP2-W-26626	Water	MW	PMP2	50-60	6129	6/5/08	Depth to water = 19 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 9 L. Purge water brownish with odor.
6/5/08	14:36	CNPMP2DUP-W-26637[b]	Water	MW	PMP2	50-60	6129	6/5/08	Replicate of sample CNPMP2-W-26626.
6/5/08	15:17	CNPMP1-W-26625	Water	MW	PMP1	50-60	6129	6/5/08	Depth to water = 19.2 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 7 L. Purge water brown with an odor.
Post-injection sampling, July 2008									
7/7/08	14:26	CNSB04-W-26641	Water	CPT/P	SB04	51-61	6131	7/8/08	Depth to water = 20.75 ft. Depth of 1-in. well = 59.35 ft. Sample collected by using low-flow bladder pump after purging of 2.5 L. Water clear.
7/7/08	14:28	CNSB04DUP-W-26655[b]	Water	CPT/P	SB04	51-61	6131	7/8/08	Replicate of sample CNSB04-W-26641.
7/7/08	15:40	CNMW03-W-26640	Water	MW	MW03	50.5-60.5	6131	7/8/08	Depth to water = 20.1 ft. Depth of 4-in. well = 62.41 ft. Sample collected by using low-flow bladder pump after purging of 6.9 L.
7/7/08	16:52	CNSB07R-W-26642	Water	CPT/P	SB07R	45-60	6131	7/8/08	Depth to water = 17.3 ft. Depth of 2-in. well = 58.53 ft. Sample collected by using low-flow bladder pump after purging of 6 L. Water clear.
7/7/08	17:22	CNPMP4-W-26647	Water	MW	PMP4	48.75-58.75	6131	7/8/08	Depth to water = 17.4 ft. Depth of 0.5-in. well = 58.75 ft. Sample collected by using Waterra pump tubing as bailer after purging of 5.9 L. Water brown.
7/7/08	18:16	CNPMP7-W-26650	Water	MW	PMP7	50-60	6131	7/8/08	Depth to water = 19.3 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6.2 L. Water cloudy.
7/7/08	18:26	CNSB08-W-26643	Water	CPT/P	SB08	52-62	6131	7/8/08	Depth to water = 17.7 ft. Depth of 1-in. well = 59.76 ft. Sample collected by using low-flow bladder pump after purging of 3.5 L. Water clear.
7/7/08	19:01	CNPMP6-W-26649	Water	MW	PMP6	50-60	6131	7/8/08	Depth to water = 20.4 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6.5 L. Water tan.
7/8/08	12:02	CNPMP5-W-26648	Water	MW	PMP5	50-60	6125	7/8/08	Depth to water = 20.4 ft. Depth of 1-in. well = 60 ft. Sample collected by using low-flow bladder pump after purging of 3.7 L. Water muddy.
7/8/08	12:30	CNPMP3-W-26646	Water	MW	PMP3	50-60	6125	7/8/08	Depth to water = 19.8 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 7.5 L.
7/8/08	13:09	CNPMP8-W-26651	Water	MW	PMP8	50-60	6125	7/8/08	Depth to water = 18.2 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 8 L.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, July 2008 (cont.)									
7/8/08	13:16	CNMW02-W-26639	Water	MW	MW02	49.5-59.5	6125	7/8/08	Depth to water = 19.7 ft. Depth of 4-in. well = 61.2 ft. Sample collected by using low-flow bladder pump after purging of 6 L.
7/8/08	13:54	CNPMP9-W-26652	Water	MW	PMP9	50-60	6125	7/8/08	Depth to water = 13.2 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 8 L.
7/8/08	13:55	CNPMP9DUP-W-26656[b]	Water	MW	PMP9	50-60	6125	7/8/08	Replicate of sample CNPMP9-W-26652.
7/8/08	14:00	CNQCIR-W-26653[b]	Water	RI	QC	–	6125	7/8/08	Rinsate of decontaminated sampling tube after collection of sample CNPMP9-W-26652 and replicate CNPMP9DUP-W-26656.
7/8/08	15:15	CNPMP2-W-26645	Water	MW	PMP2	50-60	6125	7/8/08	Depth to water = 19.2 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 7 L. Water tannish color.
7/8/08	15:55	CNPMP1-W-26644	Water	MW	PMP1	50-60	6125	7/8/08	Depth to water = 19.3 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 7 L. Water milky brown.
7/8/08	16:05	CNQCIR-W-26654[b]	Water	RI	QC	–	6125	7/8/08	Rinsate of decontaminated sampling tube after collection of sample CNPMP1-W-26644.
7/8/08	16:30	CNQCTB-W-26657[b]	Water	TB	QC	–	6125	7/8/08	Trip blank with water samples listed on COCs 6125 and 6131 to the AGEM Laboratory for organic analysis.
7/8/08	16:31	CNQCTB-W-26657a[b]	Water	TB	QC	–	6132	7/8/08	Trip blank sent to TestAmerica for verification organic analysis with water samples listed on COC 6132.
7/16/08	13:30	CN-WW[b]	Water	BT	QC	–	–	7/17/08	Composite sample of accumulated waste purge water for analysis at Pace Analytical Services, Lenexa, Kansas.
Post-injection sampling, August 2008									
8/6/08	12:34	CNPMP6-W-26668	Water	MW	PMP6	50-60	6115	8/6/08	Depth to water = 21.5 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6 L. Water tan in color.
8/6/08	12:34	CNPMP9-W-26671	Water	MW	PMP9	50-60	6115	8/6/08	Depth to water = 15.1 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 7 L.
8/6/08	12:50	CNSB08-W-26662	Water	CPT/P	SB08	52-62	6115	8/6/08	Depth to water = 18.2 ft. Depth of 1-in. well = 59.76 ft. Sample collected by using low-flow bladder pump after purging of 3 L.
8/6/08	13:10	CNPMP7-W-26669	Water	MW	PMP7	50-60	6115	8/6/08	Depth to water = 19.9 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6 L. Water clear to cloudy.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, August 2008 (cont.)									
8/6/08	13:56	CNSB07R-W-26661	Water	CPT/P	SB07R	45-60	6115	8/6/08	Depth to water = 18 ft. Depth of 2-in. well = 58.53 ft. Sample collected by using low-flow bladder pump after purging of 5.3 L.
8/6/08	14:10	CNPMP4-W-26666	Water	MW	PMP4	48.75-58.75	6115	8/6/08	Depth to water = 19.1 ft. Depth of 0.5-in. well = 58.75 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6.2 L. Water tannish in color.
8/6/08	15:46	CNPMP8-W-26670	Water	MW	PMP8	50-60	6115	8/6/08	Depth to water = 19.7 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6.5 L. Water greenish brown in color with odor.
8/6/08	16:00	CNMW03-W-26659	Water	MW	MW03	50.5-60.5	6115	8/6/08	Depth to water = 20.2 ft. Depth of 4-in. well = 62.41 ft. Sample collected by using low-flow bladder pump after purging of 8 L. Water muggy.
8/6/08	16:21	CNPMP3-W-26665	Water	MW	PMP3	50-60	6115	8/6/08	Depth to water = 21.1 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6.2 L.
8/6/08	17:08	CNSB04-W-26660	Water	CPT/P	SB04	51-61	6115	8/6/08	Depth to water = 21.5 ft. Depth of 1-in. well = 59.35 ft. Sample collected by using low-flow bladder pump after purging of 3.2 L.
8/6/08	18:06	CNPMP2-W-26664	Water	MW	PMP2	50-60	6115	8/6/08	Depth to water = 20.5 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6 L. Water tannish brown in color with odor.
8/6/08	18:24	CNPMP5-W-26667	Water	MW	PMP5	50-60	6115	8/6/08	Depth to water = 21 ft. Depth of 1-in. well = 60 ft. Sample collected by using low-flow bladder pump after purging of 3.5 L.
8/6/08	18:44	CNPMP1-W-26663	Water	MW	PMP1	50-60	6115	8/6/08	Depth to water = 20.1 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump tubing as bailer after purging of 6 L. Water brownish in color with odor.
8/6/08	19:10	CNMW02-W-26658	Water	MW	MW02	49.5-59.5	6115	8/6/08	Depth to water = 20.4 ft. Depth of 4-in. well = 61.2 ft. Sample collected by using low-flow bladder pump after purging of 5.3 L.
8/6/08	19:20	CNQCTB-W-26672[b]	Water	TB	QC	–	6115	8/6/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COC 6115.
8/6/08	19:21	CNQCTB-W-26672a[b]	Water	TB	QC	–	6116	8/6/08	Trip blank sent to TestAmerica for verification organic analysis with water samples listed on COC 6116.
8/21/08	10:55	CNPSB13-S-27120	Soil	CPT	PSB13	2	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	10:56	CNPSB13-S-27121	Soil	CPT	PSB13	4	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	11:17	CNPSB13-S-27122	Soil	CPT	PSB13	6	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	11:18	CNPSB13-S-27123	Soil	CPT	PSB13	8	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	11:23	CNPSB13-S-27124	Soil	CPT	PSB13	10	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	11:24	CNPSB13-S-27125	Soil	CPT	PSB13	12	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	11:29	CNPSB13-S-27126	Soil	CPT	PSB13	14	4309	8/21/08	Vertical profile soil sampling at location near PSB1.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, August 2008 (cont.)									
8/21/08	11:30	CNPSB13-S-27127	Soil	CPT	PSB13	16	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	11:35	CNPSB13-S-27128	Soil	CPT	PSB13	18	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	11:36	CNPSB13-S-27129	Soil	CPT	PSB13	20	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	12:01	CNPSB13-S-27130	Soil	CPT	PSB13	22	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	12:02	CNPSB13-S-27131	Soil	CPT	PSB13	24	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	14:29	CNPSB13-S-27132	Soil	CPT	PSB13	26	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	14:30	CNPSB13-S-27133	Soil	CPT	PSB13	28	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	15:25	CNPSB13-S-27134	Soil	CPT	PSB13	30	4309	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	16:10	CNPSB13-S-27135	Soil	CPT	PSB13	32	4310	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	17:48	CNPSB13-S-27136	Soil	CPT	PSB13	34	4310	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	18:45	CNPSB13-S-27137	Soil	CPT	PSB13	36	4310	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	20:02	CNPSB13-S-27138	Soil	CPT	PSB13	38	4311	8/21/08	Vertical profile soil sampling at location near PSB1.
8/21/08	21:20	CNPSB13-S-27139	Soil	CPT	PSB13	40	4311	8/21/08	Vertical profile soil sampling at location near PSB1.
Post-injection sampling, September 2008									
9/8/08	12:04	CNSB08-W-26687	Water	CPT/P	SB08	52-62	6122	9/10/08	Depth to water = 18.6 ft. Depth of 1-in. well = 62 ft. Sample collected by using low-flow bladder pump after purging of 3 L. Water clear.
9/8/08	13:16	CNMW02-W-26674	Water	MW	MW02	49.5-59.5	6122	9/10/08	Depth to water = 21.9 ft. Depth of 4-in. well = 59.5 ft. Sample collected by using low-flow bladder pump after purging of 6.7 L. Water tannish in color with strong manure-like odor. Carbon dioxide difficult to read.
9/8/08	13:19	CNPMP6-W-26694	Water	MW	PMP6	50-60	6124	9/10/08	Depth to water = 20.9 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump after purging of 5.2 L. Water brown to tannish in color.
9/9/08	9:30	CNMW01-W-26673	Water	MW	MW01	54.5-64.5	6123	9/10/08	Depth to water = 13.6 ft. Depth of 4-in. well = 64.5 ft. Sample collected by using low-flow bladder pump after purging of 10 L. Water clear.
9/9/08	10:52	CNSB07R-W-26686	Water	CPT/P	SB07R	45-60	6123	9/10/08	Depth to water = 18.4 ft. Depth of 2-in. well = 60 ft. Sample collected by using low-flow bladder pump after purging of 6 L. Water clear.
9/9/08	11:27	CNPMP7-W-26695	Water	MW	PMP7	50-60	6123	9/10/08	Depth to water = 20 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump. Water has light brown tint.
9/9/08	12:04	CNSB04-W-26684	Water	CPT/P	SB04	51-61	6123	9/10/08	Depth to water = 21.9 ft. Depth of 1-in. well = 61 ft. Sample collected by using low-flow bladder pump after purging of 3.2 L. Water clear.
9/9/08	12:33	CNPMP4-W-26692	Water	MW	PMP4	48.75-58.75	6123	9/10/08	Depth to water = 19.15 ft. Depth of 0.5-in. well = 58.75 ft. Sample collected by using Waterra pump after purging of 5.5 L. Water tannish-brown in color.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, September 2008 (cont.)									
9/9/08	12:54	CNMW03-W-26675	Water	MW	MW03	50.5-60.5	6123	9/10/08	Depth to water = 20.8 ft. Depth of 4-in. well = 60.5 ft. Sample collected by using low-flow bladder pump after purging of 6.3 L. Water clear.
9/9/08	13:10	CNPMP8-W-26696	Water	MW	PMP8	50-60	6123	9/10/08	Depth to water = 20.3 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump after purging of 5.5 L. Water tannish in color with odor.
9/9/08	13:40	CNPMP3-W-26691	Water	MW	PMP3	50-60	6123	9/10/08	Depth to water = 21.6 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump after purging of 5.2 L. Water cloudy to grayish tint in color with odor.
9/9/08	13:48	CNMW10-W-26682	Water	MW	MW10	30-45	6123	9/10/08	Depth to water = 21.1 ft. Depth of 2-in. well = 45 ft. Sample collected by using low-flow bladder pump after purging of 7 L. Water clear.
9/9/08	14:12	CNPMP9-W-26697	Water	MW	PMP9	50-60	6122	9/10/08	Depth to water = 16.2 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump after purging of 5.4 L. Water clear to cloudy.
9/9/08	14:42	CNPMP2-W-26690	Water	MW	PMP2	50-60	6123	9/10/08	Depth to water = 20.9 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump after purging of 5.1 L. Water clear to cloudy with strong odor.
9/9/08	15:10	CNMW06-W-26678	Water	MW	MW06	46.5-56.5	6123	9/10/08	Depth to water = 36.6 ft. Depth of 4-in. well = 56.5 ft. Sample collected by using low-flow bladder pump after purging of 6.4 L. Water tannish in color.
9/9/08	15:12	CNPMP1-W-26689	Water	MW	PMP1	50-60	6123	9/10/08	Depth to water = 20.9 ft. Depth of 0.5-in. well = 60 ft. Sample collected by using Waterra pump after purging of 5 L. Water brown-tan in color with odor.
9/9/08	16:18	CNMW07-W-26679	Water	MW	MW07	45-55	6123	9/10/08	Depth to water = 28.2 ft. Depth of 2-in. well = 55 ft. Sample collected by using low-flow bladder pump after purging of 7 L. Water clear.
9/9/08	16:59	CNSB05-W-26685	Water	CPT/P	SB05	32-42	6123	9/10/08	Depth to water = 10.6 ft. Depth of 1-in. well = 42 ft. Sample collected by using Waterra pump after purging of 15 L. Water clear to cloudy.
9/9/08	17:10	CNMW04-W-26676	Water	MW	MW04	37.5-47.5	6123	9/10/08	Depth to water = 24 ft. Depth of 4-in. well = 47.5 ft. Sample collected by using low-flow bladder pump after purging of 6.2 L. Water clear.
9/10/08	9:22	CNMW05-W-26677	Water	MW	MW05	34.5-44.5	6124	9/10/08	Depth to water = 10 ft. Depth of 4-in. well = 44.5 ft. Sample collected by using low-flow bladder pump after purging of 5 L. Water clear.
9/10/08	9:23	CNMW05DUP-W-26698[b]	Water	MW	MW05	34.5-44.5	6124	9/10/08	Replicate of sample CNMW05-W-26677.
9/10/08	10:22	CNPMP5-W-26693	Water	MW	PMP5	50-60	6124	9/10/08	Depth to water = 21.4 ft. Depth of 1-in. well = 60 ft. Sample collected by using low-flow bladder pump after purging of 3 L. Water brownish color.

TABLE A.1 (Cont.)

Sample Date	Time	Sample	Sample Medium	Type[a]	Location	Depth (ft BGL)	Chain of Custody	Shipping Date	Sample Description
Post-injection sampling, September 2008 (cont.)									
9/10/08	11:38	CNSB01-W-26683	Water	CPT/P	SB01	40-50	6124	9/10/08	Depth to water = 20.1 ft. Depth of 1-in. well = 50 ft. Sample collected by using low-flow bladder pump after purging of 3 L. Water clear.
9/10/08	11:45	CNQCIR-W-26700[b]	Water	RI	QC	–	6124	9/10/08	Rinsate of decontaminated pump purge line after collection of sample CNSB01-W-26683.
9/10/08	12:22	CNMW09-W-26681	Water	MW	MW09	25-35	6124	9/10/08	Depth to water = 2.5 ft. Depth of 2-in. well = 35 ft. Sample collected by using low-flow bladder pump after purging of 6 L.
9/10/08	13:34	CNSB09-W-26688	Water	CPT/P	SB09	32-42	6124	9/10/08	Depth to water = 6.6 ft. Depth of 1-in. well = 42 ft. Sample collected by using low-flow bladder pump after purging of 3 L.
9/10/08	13:45	CNQCIR-W-26701[b]	Water	RI	QC	–	6124	9/10/08	Rinsate of decontaminated pump purge line after collection of sample CNMW09-W-26681.
9/10/08	14:28	CNMW08-W-26680	Water	MW	MW08	38-53	6124	9/10/08	Depth to water = 18.6 ft. Depth of 2-in. well = 53 ft. Sample collected by using low-flow bladder pump after purging of 6.5 L. Water clear.
9/10/08	14:29	CNMW08DUP-W-26699[b]	Water	MW	MW08	38-53	6124	9/10/08	Replicate of sample CNMW08-W-26680.
9/10/08	15:00	CNQCTB-W-26702[b]	Water	TB	QC	–	6124	9/10/08	Trip blank sent to the AGEM Laboratory for organic analysis with water samples listed on COCs 6122, 6123, and 6124.
9/10/08	15:01	CNQCTB-W-26702a[b]	Water	TB	QC	–	6134	9/10/08	Trip blank sent to TestAmerica for verification organic analysis with water samples listed on COC 6134.

[a] Sample types: BT, wastewater composite; CPT, cone penetrometer; CPT/P, piezometer; FB, field blank; MW, monitoring well; RI, rinsate; TB, trip blank.

[b] Quality control sample collected to monitor sample collection and handling activities.

Appendix B:

Photographs of Sediment Cores Collected in December 2007 at Post-Injection Investigation Points PSB10, PSB11, and PSB12

FIGURE B.1 Photographs of the soil core collected from boring PSB10 approximately two weeks after injection, in December 2007.

FIGURE B.1 (Cont.)

FIGURE B.1 (Cont.)

FIGURE B.1 (Cont.)

FIGURE B.1 (Cont.)

FIGURE B.1 (Cont.)

FIGURE B.2 Photographs of the soil core collected from boring PSB11 approximately two weeks after injection, in December 2007.

FIGURE B.2 (Cont.)

FIGURE B.2 (Cont.)

FIGURE B.2 (Cont.)

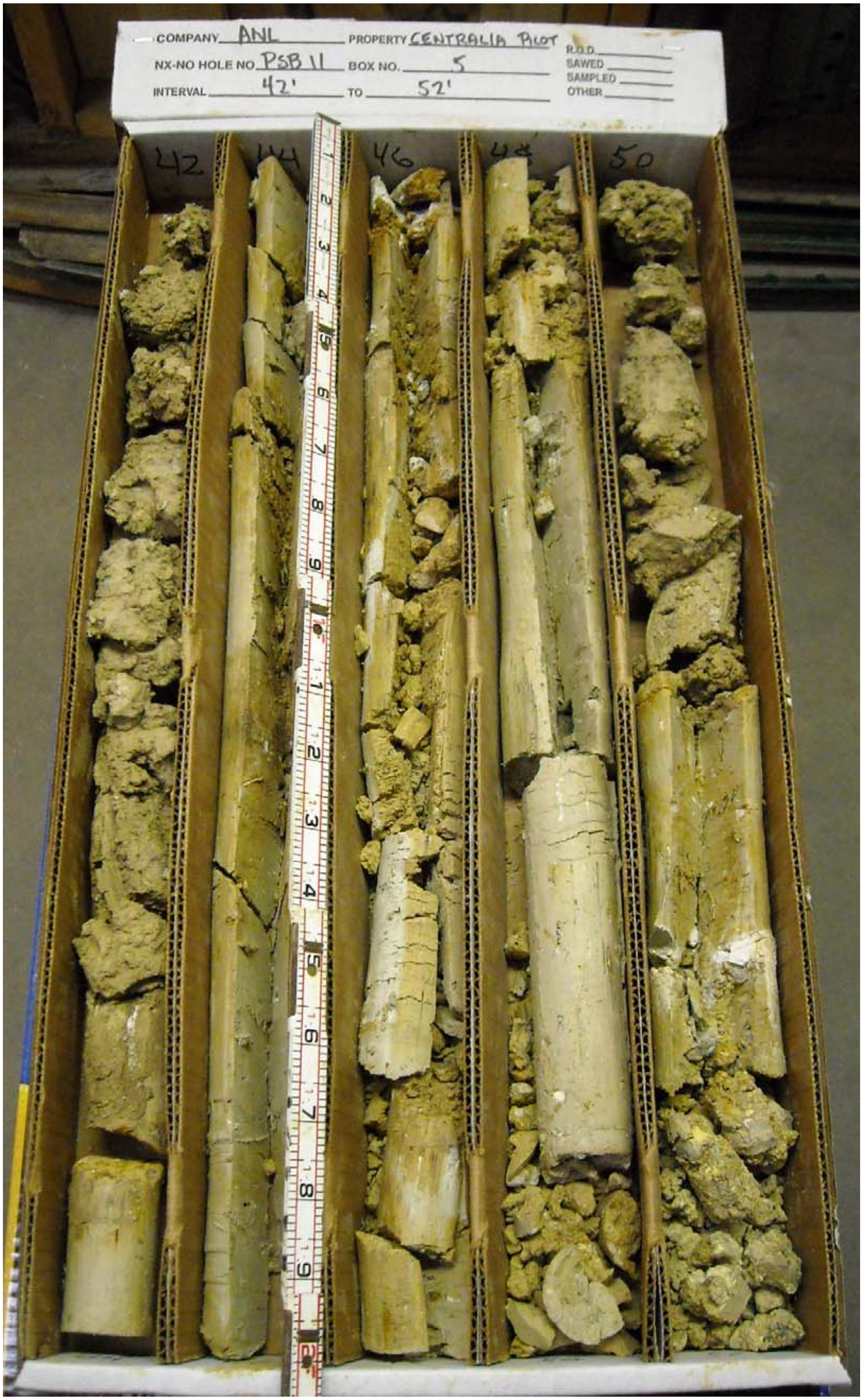


FIGURE B.2 (Cont.)

FIGURE B.2 (Cont.)

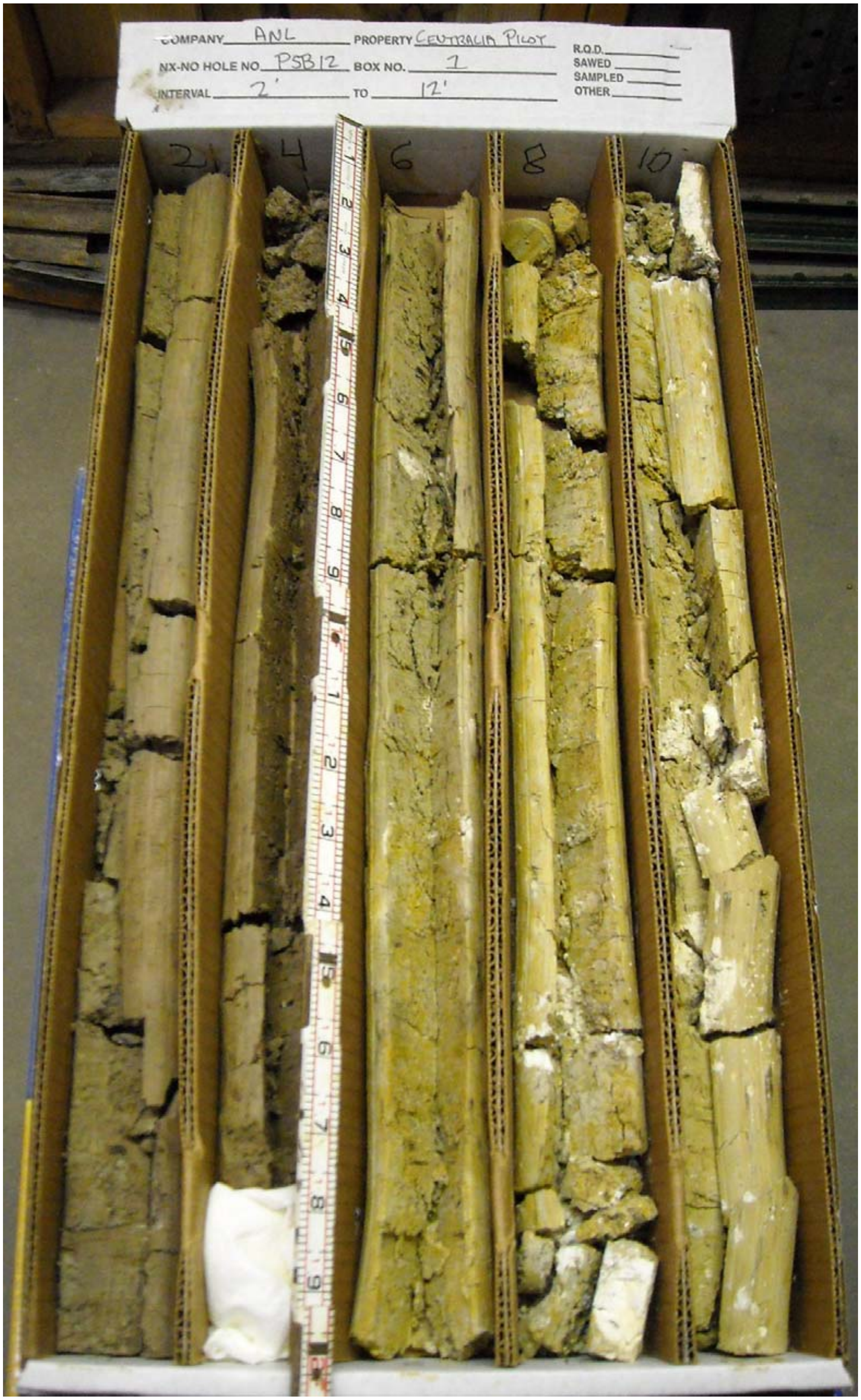


FIGURE B.3 Photographs of the soil core collected from boring PSB12 approximately two weeks after injection, in December 2007.

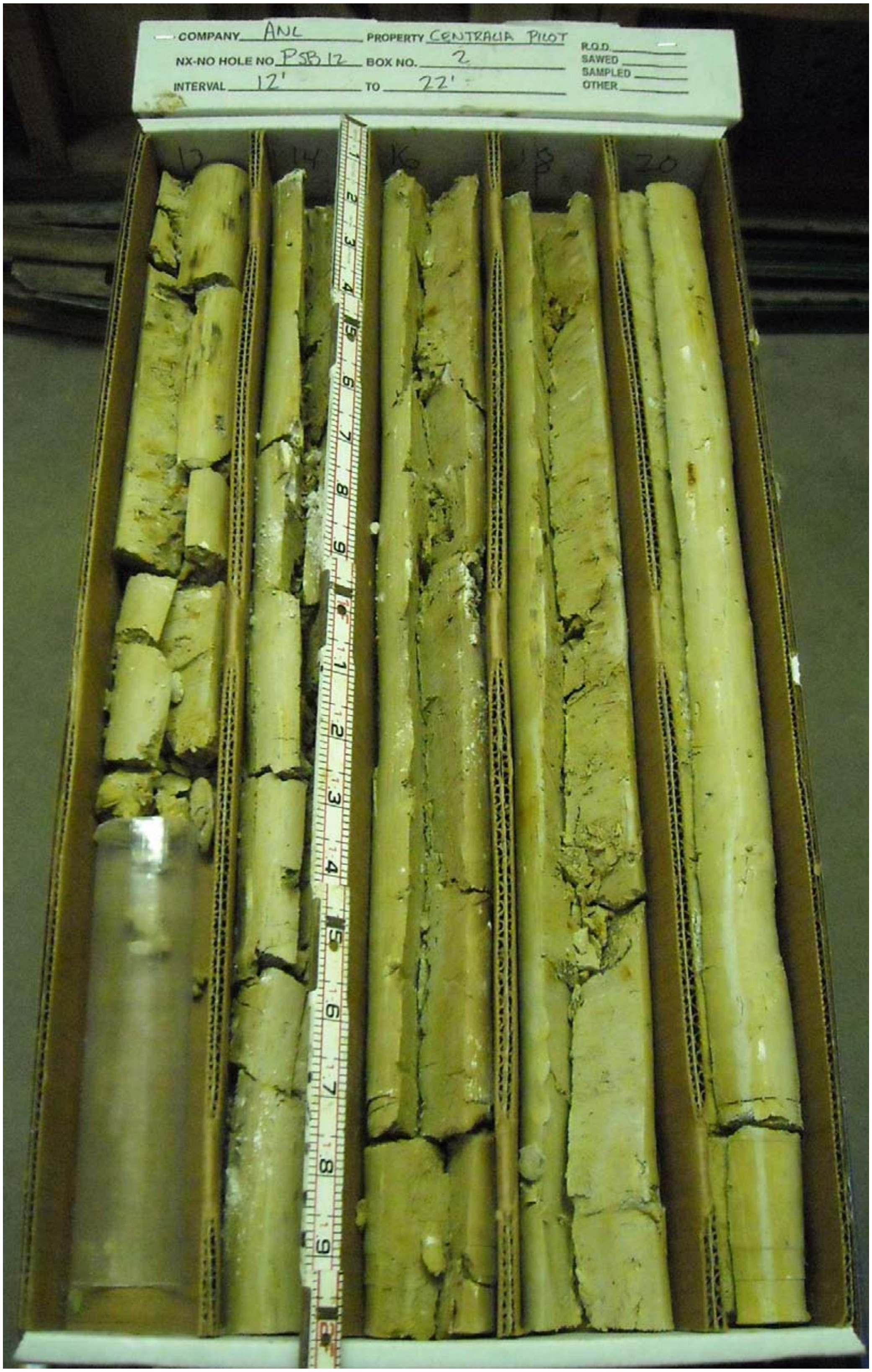


FIGURE B.2 (Cont.)

FIGURE B.2 (Cont.)

FIGURE B.2 (Cont.)

FIGURE B.2 (Cont.)

FIGURE B.2 (Cont.)

Appendix C:

KDHE Completion Variance and Well Registration Forms (WWC-5)

KANSAS

Kathleen Sebelius, Governor
Roderick L. Bremby, Secretary

DEPARTMENT OF HEALTH
AND ENVIRONMENT

www.kdheks.gov

Division of Environment

February 19, 2008

Delta Environmental
David Surgnier
% Argonne National Laboratory
EVS # 203, B-133
9700 South Cass, Ave.
Lemont, IL 60439

Re: Waiver request for flush mount monitoring wells for **USDA/CCC;** Centralia, Kansas. Located in the NE 1/4 of the NE 1/4 of the SE 1/4 of Section 1, Township 4 South, Range 11 East, Nemaha County, Kansas.

Dear Mr. Surgnier:

In accordance with Kansas Administrative Regulations **(K.A.R.) 28-30-9**, appealing regulations as stated in Article 30, your request for an exception to **K.A.R. 28-30-6(b)(1),(c) and (e)** for authorization of **20** geotechnical wells to be constructed less than 12 inches above the **finished ground level** and less than 20 feet of grout if ground **water encountered less than 20' below the surface**, at the above-mentioned site is hereby granted subject to the following stipulations:

1. Monitoring wells included in this request will be grouted from a maximum of two feet below a ground surface to within one foot above the screened section.

2. The wellhead will be encased in an approved water resistant/proof manhole. The manhole will be encased in cement, which is to be domed or sloped to allow drainage away from the manhole, (refer to the attached diagram page 2).

3. The casing of the monitoring well will be sealed with an approved watertight lock able monitoring well caps (refer to the attached diagram).

4. A copy of this KDHE letter, approving your request for waiver of **K.A.R. 28-30-6 (b)(1),(c) and (e)**, will be sent to KDHE attached to the water well record (WWC-5 Form) of the first well drilled under the granted waiver.

5. Upon completion of the project the wells covered by the waiver shall be plugged in accordance with **K.A.R. 28-30-7 (d).**

The decision to grant this waiver is based almost entirely on the data provided in your request. This waiver is to cover only the **20** wells mentioned and reportedly will be drilled by **Delta Environmental.** Kansas Water Well Contractor License **Number 680**. This waiver will become null and void if any of the information submitted in the request is found to be false or if the wells are not constructed in strict conformity to Kansas rules and regulations and the above mentioned, stipulations. Please contact Don Taylor, (785) 296-5522, if you have any questions or concerns pertaining to this matter.

Sincerely,

Don Taylor

Don Taylor
Environmental Technician
Bureau of Water
Geology Section

DT:jf

cc: Harper
North East District Office

MONITORING WELL DESIGN ADDITIONAL INSTRUCTIONS

Flush-Mount Well Head Completion:

K.A.R. 28-30-6(e) does not allow well casing to be terminated less than one foot above finished ground surface. Because state trust fund site investigations are often conducted in areas where completing monitoring well heads above grade is not practical, consideration must be given to completing flush-mount monitoring well heads.

If monitoring wells must be completed with a flush-mount well head design, a waiver of K.A.R. 28-30-6(e) must be requested in writing. The procedures for requesting a waiver of this regulation are described as follows:

1. Prior to the monitoring well installation, the written request must be submitted to Mr. Don Taylor at the address indicated below.

2. The request must contain the following information:
   a. Facility name and street address;
   b. Legal description of the property where the wells are proposed to be located;
      _____1/4_____1/4_____1/4 Sec. _____ Town. _____ Range _____
   c. Number of wells to be installed with flush-mount well heads;
   d. Reason(s) why the regulation should be waived;
   e. Approximate depth to groundwater in the local area;
   f. The general geology or lithologies expected to be encountered in drilling; and
   g. Specifications and/or diagrams of the vault proposed to be installed including the manufacturer's name and any other descriptive information such as a manufacturer's trade sheet.

3. Wait for approval of the waiver request before completing monitoring wells.

4. When waivers are approved and monitoring wells are installed with a flush-mount well head design, the well head completion must be indicated accordingly in the lithologic section of the WWC-5 water well record form. The name of the KDHE contact person that approved the waiver must also be provided in the lithologic section of the WWC-5 form.

5. Kansas licensed water well contractor and number.

Any waiver of regulations applies only to the wells and information indicated in the written request. A verbal request for waiver of regulations may be approved on any additional wells needed for the same area or site. The verbal request must be directed to Mr. Don Taylor.

Monitoring Well Grouting Requirements:

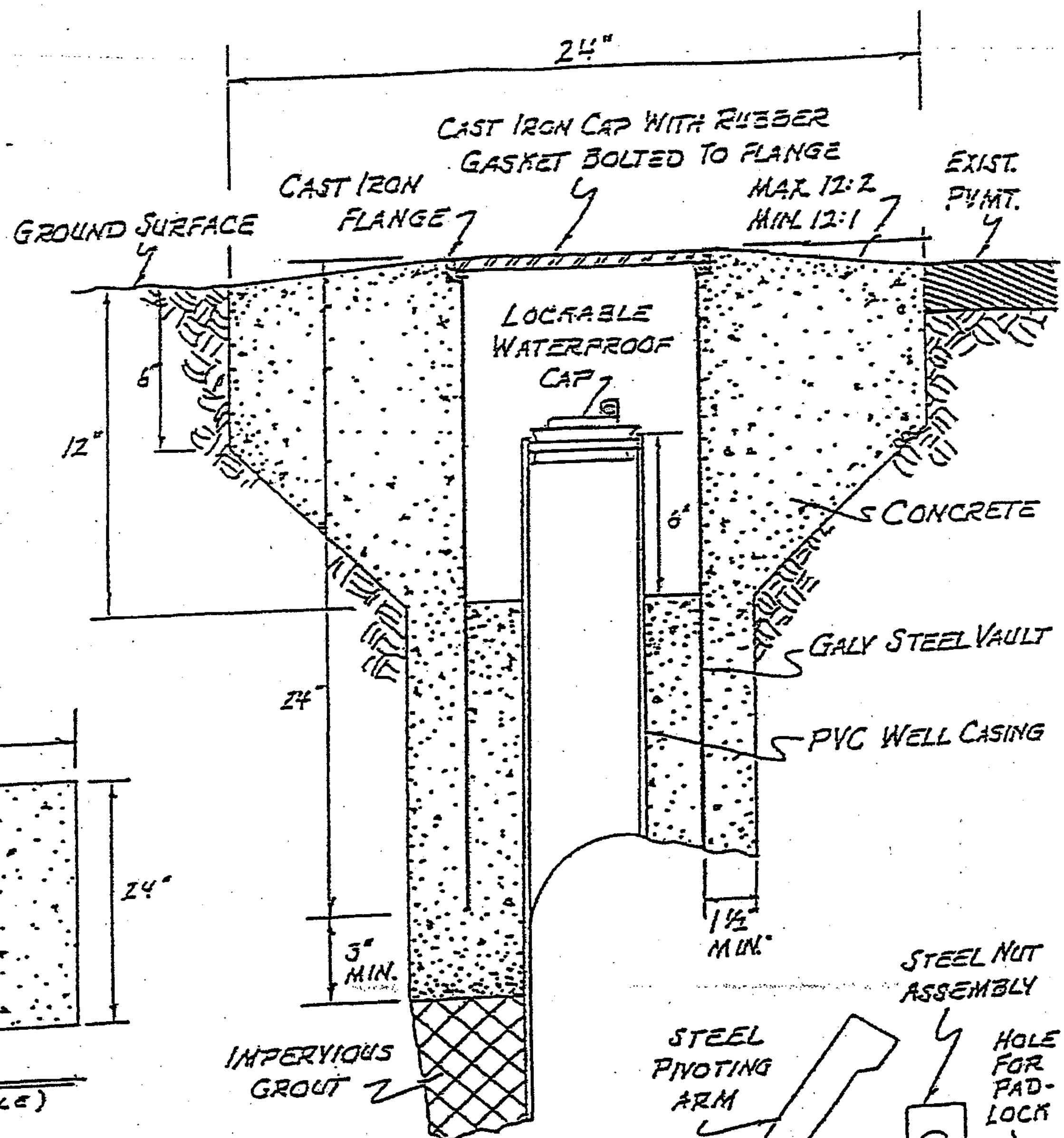
K.A.R. 28-30-6, part (b) requires that constructed or reconstructed wells be sealed by grouting the annular space between the casing and the well bore from ground level to a minimum of 20 feet or to a minimum of five feet into the first clay layer, whichever is greater. Part (c) of the same regulation specifies if groundwater is encountered at a depth less than the minimum grouting requirements, the grouting requirement may be modified to meet local conditions if approved by the department.

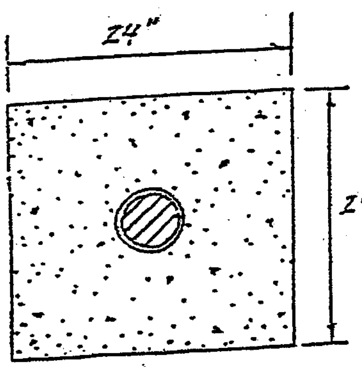
If modifications to the grouting requirements are necessary solely because of shallow groundwater, a waiver of the regulations is not needed; however, the reason for modifying the grouting requirements must be indicated accordingly on the WWC-5 water well record form. In situations where grouting modifications are required for reasons other than shallow groundwater, a waive of K.A.R. 28-30-6(b) must be obtained following the same procedures as described for flush-mount well heads above.

Submit requests for waivers and direct any questions on well design regulations to:

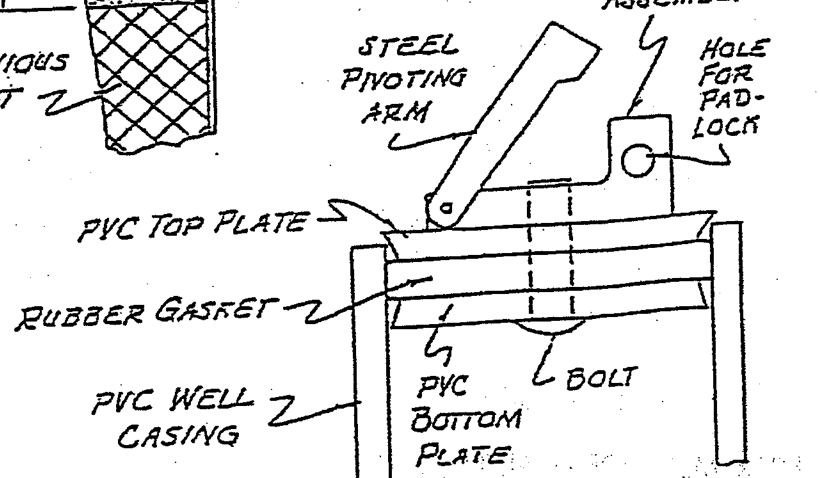
Mr. Don Taylor
Kansas Department of Health & Environment
Bureau of Water - Geology Section
1000 S.W. Jackson Street, Suite #420
Topeka, Kansas 66612-1367
Phone: (785) 296-5522

FLUSH-MOUNT WELL CONSTRUCTION DETAIL
(Not to Scale)





TOP VIEW
(NOT TO SCALE)



LOCKABLE WATERPROOF CAP
(NOT TO SCALE)

CASING Ø	2"	4"
VAULT Ø	6"	9"
CONC. PAD	24"x24"	24"x24"

[illegible] 10, 1993

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. **PMP-1**

1 LOCATION OF WATER WELL:

County	Fraction	Section Number	Township Number	Range Number
Nemaha	NE ¼ NE ¼ SE ¼	1	T 4 S/N (S circled)	R 11 E/W (E circled)

Distance and direction from nearest town or city street address of well if located within city?

2 WATER WELL OWNER: USDA/CCC

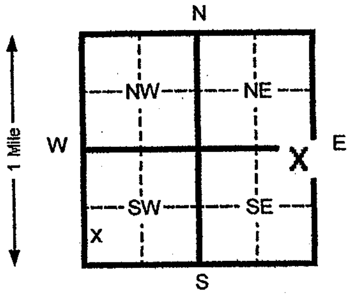
RR#, St. Address, Box # : Stop 0513, Room 4717-S/ 1400 Independence Ave SW

City, State, ZIP Code : Washington, DC 20250-0513

Board of Agriculture, Division of Water Resources

Application Number:

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:



4 DEPTH OF COMPLETED WELL 60 ft. ELEVATION: 1,334.40

Depth(s) Groundwater Encountered 1 51 ft. 2 N/A ft. 3 N/A ft.

WELL'S STATIC WATER LEVEL 20.1 ft. below land surface measured on mo/day/yr 09/23/08

Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm

Est. Yield N/A gpm: Well water was N/A ft. after N/A hours pumping N/A gpm

Bore Hole Diameter 4.25 in. to 21 ft. and 3.25 Pilot in. to 60 ft.

WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feed lot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden (domestic) 8 Air conditioning 9 Dewatering 10 Monitoring well (circled) 11 Injection well 12 Other (Specify below) Sand Point MW

Was a chemical/bacteriological sample submitted to Department? Yes ____ No X If yes, mo/day/yr sample was submitted N/A

Water Well Disinfected? Yes ____ No X

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC (circled) 3 RMP (SR) 4 ABS 5 Wrought Iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)

CASING JOINTS: Glued ____ Clamped ____ Welded ____ Threaded X

Blank casing diameter 1/2" in. to 60 ft., Dia N/A in. to N/A ft., Dia N/A in. to N/A ft.

Casing height above land surface Flush Mount in., weight Schedule 40 lbs./ft. Wall thickness or gauge No. .109"

TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC (circled) 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot (circled) 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)

SCREEN-PERFORATED INTERVALS: From 50 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.

GRAVEL PACK INTERVALS: From 48 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite (circled) 4 Other BenSeal Chips (circled)

Grout Intervals From 48 (#3) ft. to 0.5 ft. From 48 (#4) ft. to 45 ft. From N/A ft. to N/A ft.

What is the nearest source of possible contamination: 1 Septic tank (circled) 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/ Gas well 16 Other (specify below)

Direction from well? How many feet? 1000' East

FROM	TO	CODE	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2'		Top Soil			
2'	46'		Silt and Clay			
46'	47'		Silty Clay			
47'	48'		Silty Clay with some Sand			
48'	51'		Silty Clay and Sand			
51'	60'		Sand & Silt			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed (circled), (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/yr) 09/23/08 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 680 This Water Well Record was completed on (mo/day/yr) 09/27/08 under the business name of Delta Environmental by (signature)

INSTRUCTIONS: Please fill in blanks and circle the correct answers. Send three copies to Kansas Department of Health and Environment, Bureau of Water, 1000 S W Jackson St., Ste. 420, Topeka, Kansas 66612-1367. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

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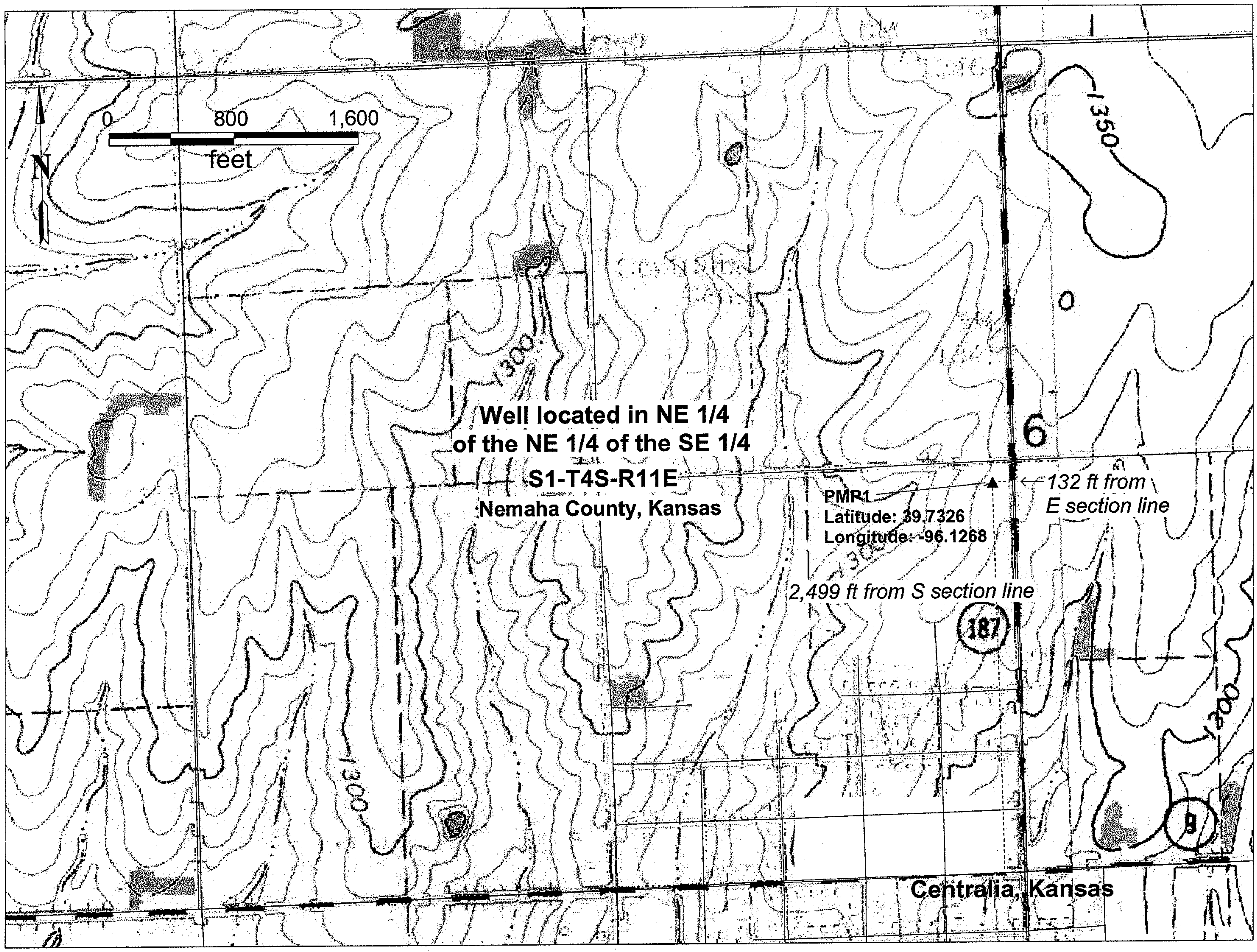
Form provided by Forms-On-A-Disk, Inc. · Dallas, Texas · (214) 340-9429


0
800
1,600
feet
N
Well located in NE 1/4
of the NE 1/4 of the SE 1/4
S1-T4S-R11E
Nemaha County, Kansas
PMP1
Latitude: 39.7326
Longitude: -96.1268
132 ft from
E section line
2,499 ft from S section line
1350
1300
6
187
Centralia, Kansas

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. **PMP-2**

1 LOCATION OF WATER WELL:	Fraction	Section Number	Township Number	Range Number
County: **Nemaha**	**NE** ¼ **NE** ¼ **SE** ¼	**1**	T **4** S/N	R **11** E/W

Distance and direction from nearest town or city street address of well if located within city?

2 WATER WELL OWNER: **USDA/CCC**
RR#, St. Address, Box # : **Stop 0513, Room 4717-S/ 1400 Independence Ave SW** Board of Agriculture, Division of Water Resources
City, State, ZIP Code : **Washington, DC 20250-0513** Application Number:

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:

N / W / E / S; NW, NE, SW, SE; X; x; 1 Mile

4 DEPTH OF COMPLETED WELL **60** ft. ELEVATION: **1,334.33**
Depth(s) Groundwater Encountered 1 **51** ft. 2 **N/A** ft. 3 **N/A** ft.
WELL'S STATIC WATER LEVEL **20.5** ft. below land surface measured on mo/day/yr **09/23/08**
Pump test data: Well water was **N/A** ft. after **N/A** hours pumping **N/A** gpm
Est. Yield **N/A** gpm: Well water was **N/A** ft. after **N/A** hours pumping **N/A** gpm
Bore Hole Diameter **4.25** in. to **21** ft. and **3.25 Pilot** in. to **60** ft.
WELL WATER TO BE USED AS: 5 Public water supply 8 Air conditioning 11 Injection well
1 Domestic 3 Feed lot 6 Oil field water supply 9 Dewatering 12 Other (Specify below)
2 Irrigation 4 Industrial 7 Lawn and garden (domestic) 10 Monitoring well **Sand Point MW**
Was a chemical/bacteriological sample submitted to Department? Yes ____ No **X** If yes, mo/day/yr sample was submitted **N/A** Water Well Disinfected? Yes ____ No **X**

5 TYPE OF BLANK CASING USED: 5 Wrought Iron 8 Concrete tile CASING JOINTS: Glued ____ Clamped ____
1 Steel 3 RMP (SR) 6 Asbestos-Cement 9 Other (specify below) Welded ____
2 PVC 4 ABS 7 Fiberglass Threaded **X**
Blank casing diameter **1/2"** in. to **60** ft., Dia **N/A** in. to **N/A** ft., Dia **N/A** in. to **N/A** ft.
Casing height above land surface **Flush Mount** in., weight **Schedule 40** lbs./ft. Wall thickness or gauge No. **.109"**
TYPE OF SCREEN OR PERFORATION MATERIAL: 7 PVC 10 Asbestos-cement
1 Steel 3 Stainless steel 5 Fiberglass 8 RMP (SR) 11 Other (specify)
2 Brass 4 Galvanized steel 6 Concrete tile 9 ABS 12 None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE: 5 Gauzed wrapped 8 Saw cut 11 None (open hole)
1 Continuous slot 3 Mill slot 6 Wire wrapped 9 Drilled holes
2 Louvered shutter 4 Key punched 7 Torch cut 10 Other (specify)
SCREEN-PERFORATED INTERVALS: From **50** ft. to **60** ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.
GRAVEL PACK INTERVALS: From **48** ft. to **60** ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other **BenSeal Chips**
Grout Intervals From **48 (#3)** ft. to **0.5** ft. From **48 (#4)** ft. to **45** ft. From **N/A** ft. to **N/A** ft.
What is the nearest source of possible contamination: 10 Livestock pens 14 Abandoned water well
1 Septic tank 4 Lateral lines 7 Pit privy 11 Fuel storage 15 Oil well/ Gas well
2 Sewer lines 5 Cess pool 8 Sewage lagoon 12 Fertilizer storage 16 Other (specify below)
3 Watertight sewer lines 6 Seepage pit 9 Feedyard 13 Insecticide storage
Direction from well? How many feet? **1000' East**

FROM	TO	CODE	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2'		Top Soil			
2'	46'		Silt and Clay			
46'	47'		Silty Clay			
47'	48'		Silty Clay with some Sand			
48'	51'		Silty Clay and Sand			
51'	60'		Sand & Silt			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/yr) **09/23/08** and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. **680** This Water Well Record was completed on (mo/day/yr) **09/27/08** under the business name of **Delta Environmental** by (signature)

INSTRUCTIONS: Please fill in blanks and circle the correct answers. Send three copies to Kansas Department of Health and Environment, Bureau of Water, 1000 S W Jackson St., Ste. 420, Topeka, Kansas 66612-1367. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

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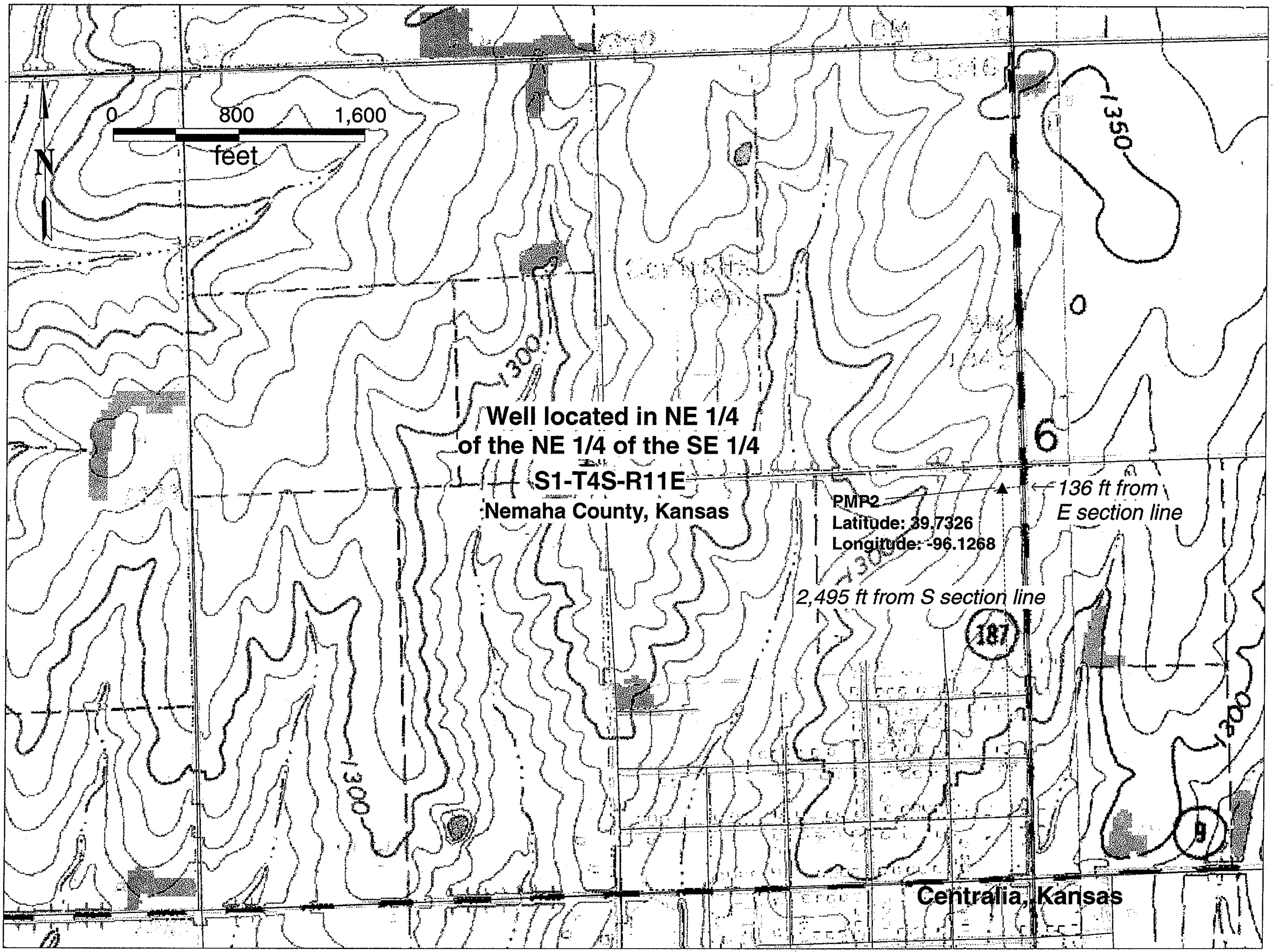
R
SEC



N
0
800
1,600
feet
1350
Well located in NE 1/4
of the NE 1/4 of the SE 1/4
S1-T4S-R11E
Nemaha County, Kansas
1300
6
PMP2
Latitude: 39.7326
Longitude: -96.1268
136 ft from
E section line
2,495 ft from S section line
187
9
Centralia, Kansas

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. **PMP-3**

1 LOCATION OF WATER WELL: County: **Nemaha** | Fraction **NE** ¼ **NE** ¼ **SE** ¼ | Section Number **1** | Township Number T **4** S/N | Range Number R **11** E/W

Distance and direction from nearest town or city street address of well if located within city?

2 WATER WELL OWNER: **USDA/CCC**
RR#, St. Address, Box # : **Stop 0513, Room 4717-S/ 1400 Independence Ave SW**
City, State, ZIP Code : **Washington, DC 20250-0513**
Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:

N / W / E / S — NW, NE, SW, SE — X — 1 Mile — X

4 DEPTH OF COMPLETED WELL **60** ft. ELEVATION: **1,335.26**
Depth(s) Groundwater Encountered 1 **51** ft. 2 **N/A** ft. 3 **N/A** ft.
WELL'S STATIC WATER LEVEL **21.1** ft. below land surface measured on mo/day/yr **09/23/08**
Pump test data: Well water was **N/A** ft. after **N/A** hours pumping **N/A** gpm
Est. Yield **N/A** gpm: Well water was **N/A** ft. after **N/A** hours pumping **N/A** gpm
Bore Hole Diameter **4.25** in. to **21** ft. and **3.25 Pilot** in. to **60** ft.
WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feed lot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden (domestic) 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below) **Sand Point MW**
Was a chemical/bacteriological sample submitted to Department? Yes ___ No **X** If yes, mo/day/yr sample was submitted **N/A**
Water Well Disinfected? Yes ___ No **X**

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought Iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued ___ Clamped ___ Welded ___ Threaded **X**
Blank casing diameter **1/2"** in. to **60** ft., Dia **N/A** in. to **N/A** ft., Dia **N/A** in. to **N/A** ft.
Casing height above land surface **Flush Mount** in., weight **Schedule 40** lbs./ft. Wall thickness or gauge No. **.109"**
TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)
SCREEN-PERFORATED INTERVALS: From **50** ft. to **60** ft. From ___ ft. to ___ ft.
From ___ ft. to ___ ft. From ___ ft. to ___ ft.
GRAVEL PACK INTERVALS: From **48** ft. to **60** ft. From ___ ft. to ___ ft.
From ___ ft. to ___ ft. From ___ ft. to ___ ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other **BenSeal Chips**
Grout Intervals From **48 (#3)** ft. to **0.5** ft. From **48 (#4)** ft. to **45** ft. From **N/A** ft. to **N/A** ft.
What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/ Gas well 16 Other (specify below)
Direction from well? How many feet? **1000' East**

FROM	TO	CODE	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2'		Top Soil			
2'	46'		Silt and Clay			
46'	47'		Silty Clay			
47'	48'		Silty Clay with some Sand			
48'	51'		Silty Clay and Sand			
51'	60'		Sand & Silt			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/yr) **09/23/08** and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. **680** This Water Well Record was completed on (mo/day/yr) **09/27/08** under the business name of **Delta Environmental** by (signature)

INSTRUCTIONS: Please fill in blanks and circle the correct answers. Send three copies to Kansas Department of Health and Environment, Bureau of Water, 1000 S W Jackson St., Ste. 420, Topeka, Kansas 66612-1367. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

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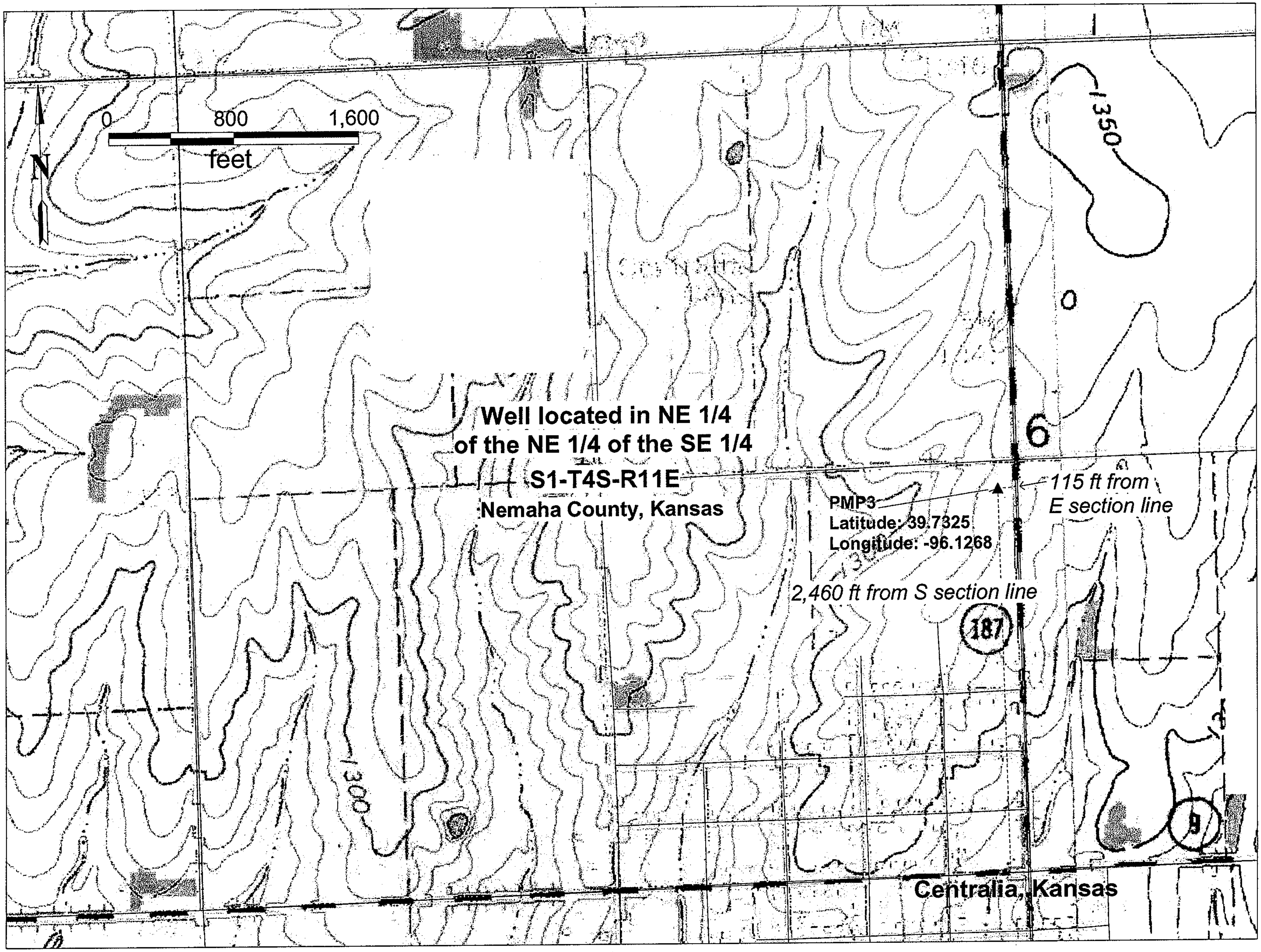
N
0
800
1,600
feet
1350
6
Well located in NE 1/4
of the NE 1/4 of the SE 1/4
S1-T4S-R11E
Nemaha County, Kansas
PMP3
Latitude: 39.7325
Longitude: -96.1268
115 ft from
E section line
2,460 ft from S section line
187
1300
9
Centralia, Kansas

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. PMP-4

1 LOCATION OF WATER WELL: County: Nemaha
Fraction: NE ¼ NE ¼ SE ¼
Section Number: 1
Township Number: T 4 [✓ S]/N
Range Number: R 11 [✓ E]/W

Distance and direction from nearest town or city street address of well if located within city?

2 WATER WELL OWNER: USDA/CCC
RR#, St. Address, Box # : Stop 0513, Room 4717-S/ 1400 Independence Ave SW
City, State, ZIP Code : Washington, DC 20250-0513
Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:

N
W E
S
1 Mile
NW NE
SW SE
X
X

4 DEPTH OF COMPLETED WELL 58.75 ft. ELEVATION: 1,332.78'
Depth(s) Groundwater Encountered 1 51 ft. 2 N/A ft. 3 N/A ft.
WELL'S STATIC WATER LEVEL 19.1 ft. below land surface measured on mo/day/yr 09/23/08
Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm
Est. Yield N/A gpm: Well water was N/A ft. after N/A hours pumping N/A gpm
Bore Hole Diameter 4.25 in. to 21 ft. and 3.25 Pilot in. to 60 ft.
WELL WATER TO BE USED AS: 1 Domestic 3 Feed lot 5 Public water supply 8 Air conditioning 11 Injection well
2 Irrigation 4 Industrial 6 Oil field water supply 9 Dewatering [✓ 12 Other (Specify below)]
7 Lawn and garden (domestic) [✓ 11 Monitoring well] Sand Point MW
Was a chemical/bacteriological sample submitted to Department? Yes ___ No X If yes, mo/day/yr sample was submitted N/A
Water Well Disinfected? Yes ___ No X

5 TYPE OF BLANK CASING USED: 1 Steel [✓ 2 PVC] 3 RMP (SR) 4 ABS 5 Wrought Iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued ___ Clamped ___ Welded ___ Threaded X
Blank casing diameter 1/2" in. to 58.75 ft., Dia N/A in. to N/A ft., Dia N/A in. to N/A ft.
Casing height above land surface Flush Mount in., weight Schedule 40 lbs./ft. Wall thickness or gauge No. .109"
TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2. Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile [✓ 7 PVC] 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter [✓ 3 Mill slot] 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)
SCREEN-PERFORATED INTERVALS: From 48.75 ft. to 58.75 ft. From ___ ft. to ___ ft.
From ___ ft. to ___ ft. From ___ ft. to ___ ft.
GRAVEL PACK INTERVALS: From 47 ft. to 58.75 ft. From ___ ft. to ___ ft.
From ___ ft. to ___ ft. From ___ ft. to ___ ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout [✓ 3 Bentonite] [✓ 4 Other BenSeal Chips]
Grout Intervals From 47 (#3) ft. to 0.5 ft. From 47 (#4) ft. to 45 ft. From N/A ft. to N/A ft.
What is the nearest source of possible contamination:
[✓ 1 Septic tank] 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/ Gas well 16 Other (specify below)
Direction from well? How many feet? 1000' East

FROM	TO	CODE	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2'		Top Soil			
2'	46'		Silt and Clay			
46'	47'		Silty Clay			
47'	48'		Silty Clay with some Sand			
48'	51'		Silty Clay and Sand			
51'	60'		Sand & Silt			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was [✓ (1) constructed], (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/yr) 09/23/08 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 680 This Water Well Record was completed on (mo/day/yr) 09/27/08 under the business name of Delta Environmental by (signature) [illegible]

INSTRUCTIONS: Please fill in blanks and circle the correct answers. Send three copies to Kansas Department of Health and Environment, Bureau of Water, 1000 S W Jackson St., Ste. 420, Topeka, Kansas 66612-1367. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

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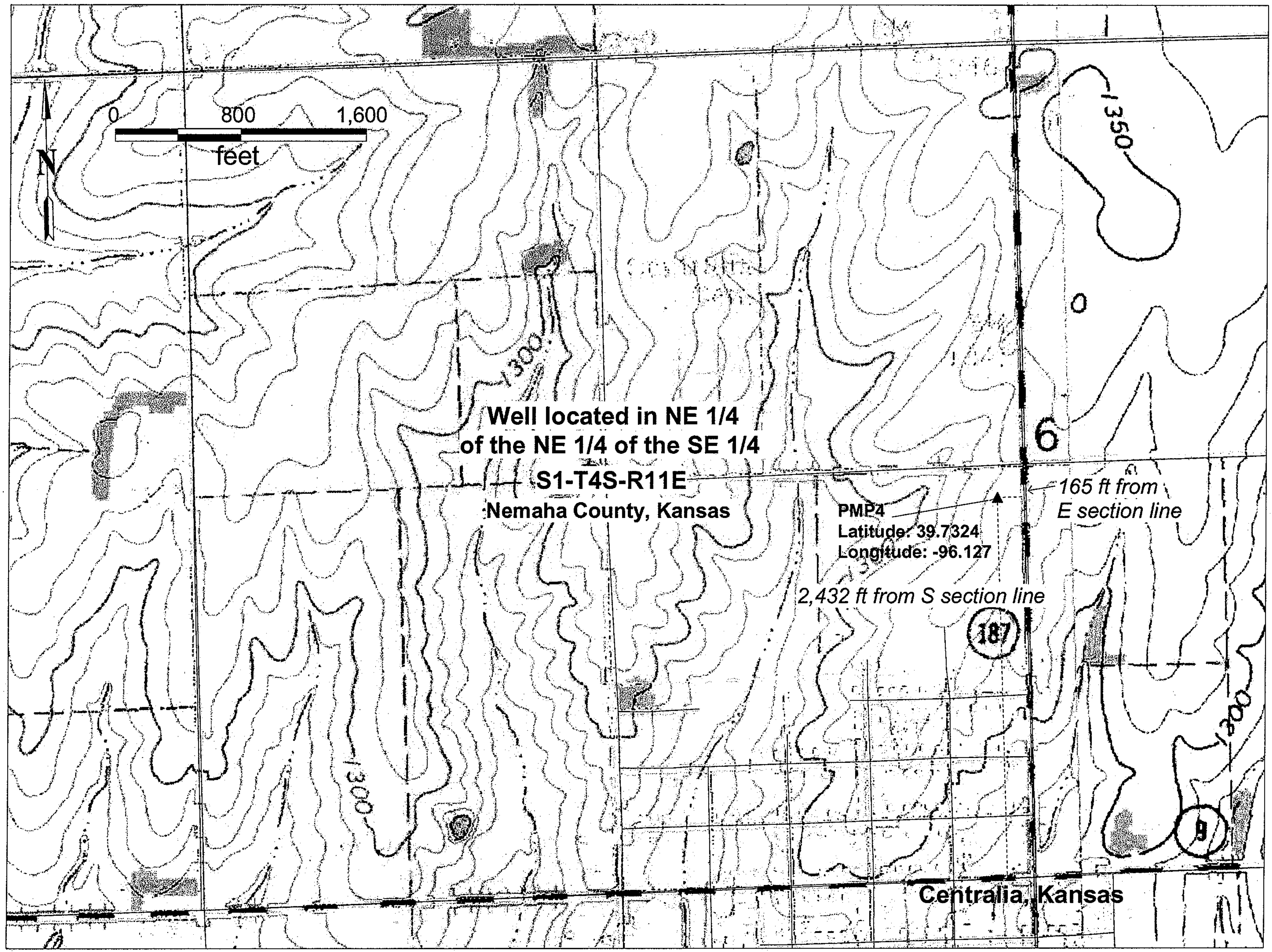


0
800
1,600
feet
N
1350
1300
1300
1300
Well located in NE 1/4
of the NE 1/4 of the SE 1/4
S1-T4S-R11E
Nemaha County, Kansas
6
165 ft from
E section line
PMP4
Latitude: 39.7324
Longitude: -96.127
2,432 ft from S section line
187
9
Centralia, Kansas

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. PMP-5

1 LOCATION OF WATER WELL: County: Nemaha | Fraction: NE ¼ NE ¼ SE ¼ | Section Number: 1 | Township Number: T 4 S/N | Range Number: R 11 E/W

Distance and direction from nearest town or city street address of well if located within city?

2 WATER WELL OWNER: USDA/CCC
RR#, St. Address, Box # : Stop 0513, Room 4717-S/ 1400 Independence Ave SW
City, State, ZIP Code : Washington, DC 20250-0513
Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:

N / W / E / S; NW, NE, SW, SE; X; X; 1 Mile

OFFICE USE ONLY

4 DEPTH OF COMPLETED WELL 60 ft. ELEVATION: 1,335.07

Depth(s) Groundwater Encountered 1 51 ft. 2 N/A ft. 3 N/A ft.

WELL'S STATIC WATER LEVEL 20.1 ft. below land surface measured on mo/day/yr 09/23/08

Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm

Est. Yield N/A gpm: Well water was N/A ft. after N/A hours pumping N/A gpm

Bore Hole Diameter 4.25 in. to 21 ft. and 3.25 Pilot in. to 60 ft.

WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feed lot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden (domestic) 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below) Sand Point MW

Was a chemical/bacteriological sample submitted to Department? Yes ____ No X If yes, mo/day/yr sample was submitted N/A

Water Well Disinfected? Yes ____ No X

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought Iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)

CASING JOINTS: Glued ____ Clamped ____ Welded ____ Threaded X

Blank casing diameter 1" in. to 60 ft., Dia N/A in. to N/A ft., Dia N/A in. to N/A ft.

Casing height above land surface Flush Mount in., weight Schedule 40 lbs./ft. Wall thickness or gauge No. .113"

TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)

SCREEN-PERFORATED INTERVALS: From 50 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.

GRAVEL PACK INTERVALS: From 48 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other BenSeal Chips

Grout Intervals From 48 (#3) ft. to 0.5 ft. From 48 (#4) ft. to 45 ft. From N/A ft. to N/A ft.

What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/ Gas well 16 Other (specify below)

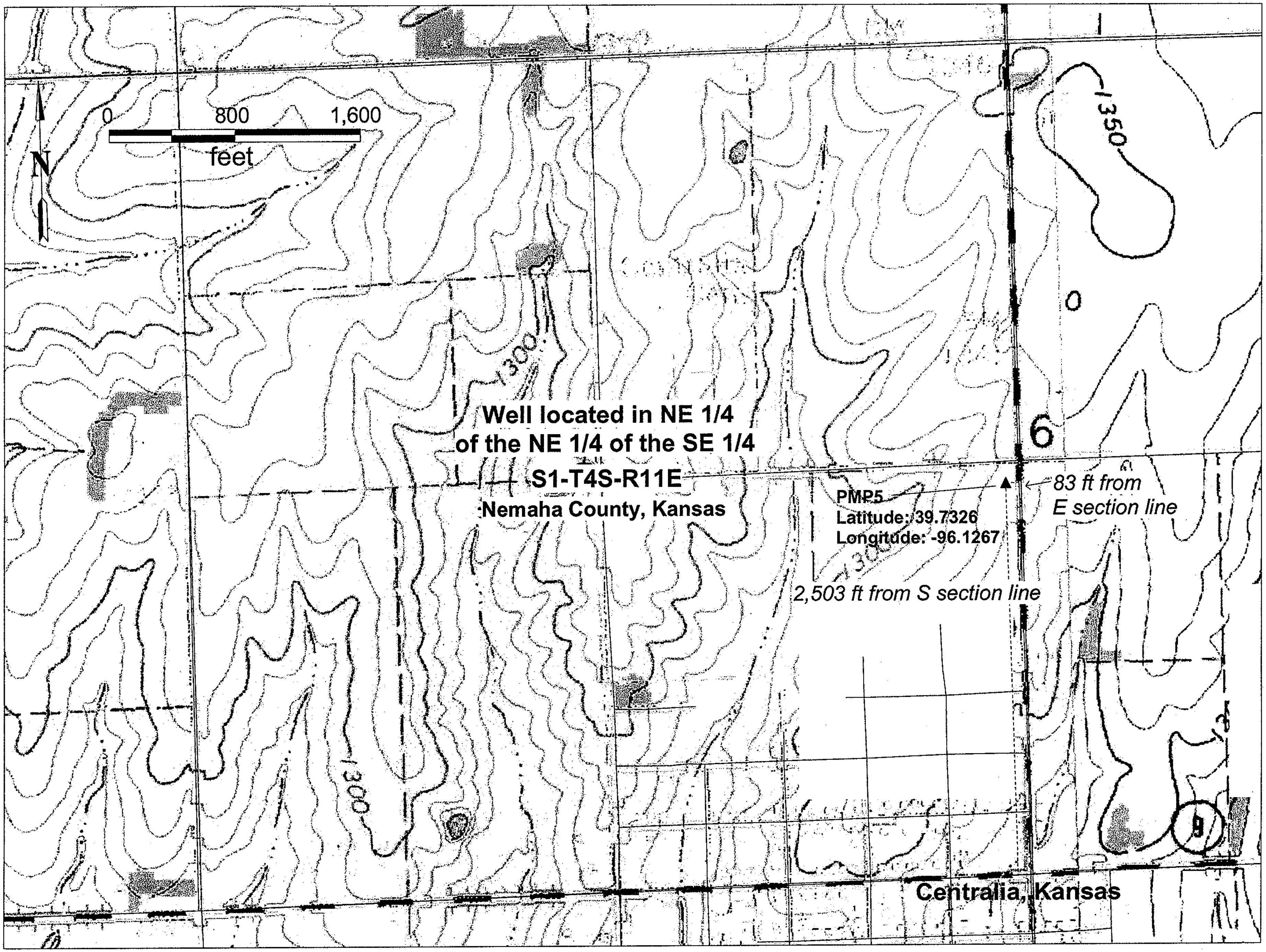
Direction from well? How many feet? 1000' East

FROM	TO	CODE	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2'		Top Soil			
2'	46'		Silt and Clay			
46'	47'		Silty Clay			
47'	48'		Silty Clay with some Sand			
48'	51'		Silty Clay and Sand			
51'	60'		Sand & Silt			

T R SEC

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/yr) 09/23/08 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 680 This Water Well Record was completed on (mo/day/yr) 09/27/08 under the business name of Delta Environmental by (signature)

INSTRUCTIONS: Please fill in blanks and circle the correct answers. Send three copies to Kansas Department of Health and Environment, Bureau of Water, 1000 S W Jackson St., Ste. 420, Topeka, Kansas 66612-1367. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.


0
800
1,600
feet
N
1350
1300
1300
1300
6
Well located in NE 1/4
of the NE 1/4 of the SE 1/4
S1-T4S-R11E
Nemaha County, Kansas
PMP5
Latitude: 39.7326
Longitude: -96.1267
83 ft from
E section line
2,503 ft from S section line
Centralia, Kansas

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. PMP-6

1 LOCATION OF WATER WELL: County: Nemaha | Fraction NE ¼ NE ¼ SE ¼ | Section Number 1 | Township Number T 4 S/N | Range Number R 11 E/W

Distance and direction from nearest town or city street address of well if located within city?

2 WATER WELL OWNER: USDA/CCC
RR#, St. Address, Box # : Stop 0513, Room 4717-S/ 1400 Independence Ave SW
City, State, ZIP Code : Washington, DC 20250-0513
Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:

N
NW NE
W X E
SW SE
x
S
1 Mile

4 DEPTH OF COMPLETED WELL 60 ft. ELEVATION: 1,335.19
Depth(s) Groundwater Encountered 1 51 ft. 2 N/A ft. 3 N/A ft.
WELL'S STATIC WATER LEVEL 21.5 ft. below land surface measured on mo/day/yr 09/23/08
Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm
Est. Yield N/A gpm: Well water was N/A ft. after N/A hours pumping N/A gpm
Bore Hole Diameter 4.25 in. to 21 ft. and 3.25 Pilot in. to 60 ft.
WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feed lot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden (domestic) 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below) Sand Point MW
Was a chemical/bacteriological sample submitted to Department? Yes ____ No X If yes, mo/day/yr sample was submitted N/A
Water Well Disinfected? Yes No X

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought Iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued ____ Clamped ____ Welded ____ Threaded X
Blank casing diameter 1/2" in. to 60 ft., Dia N/A in. to N/A ft., Dia N/A in. to N/A ft.
Casing height above land surface Flush Mount in., weight Schedule 40 lbs./ft. Wall thickness or gauge No. .109"
TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)
SCREEN-PERFORATED INTERVALS: From 50 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.
GRAVEL PACK INTERVALS: From 48 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.

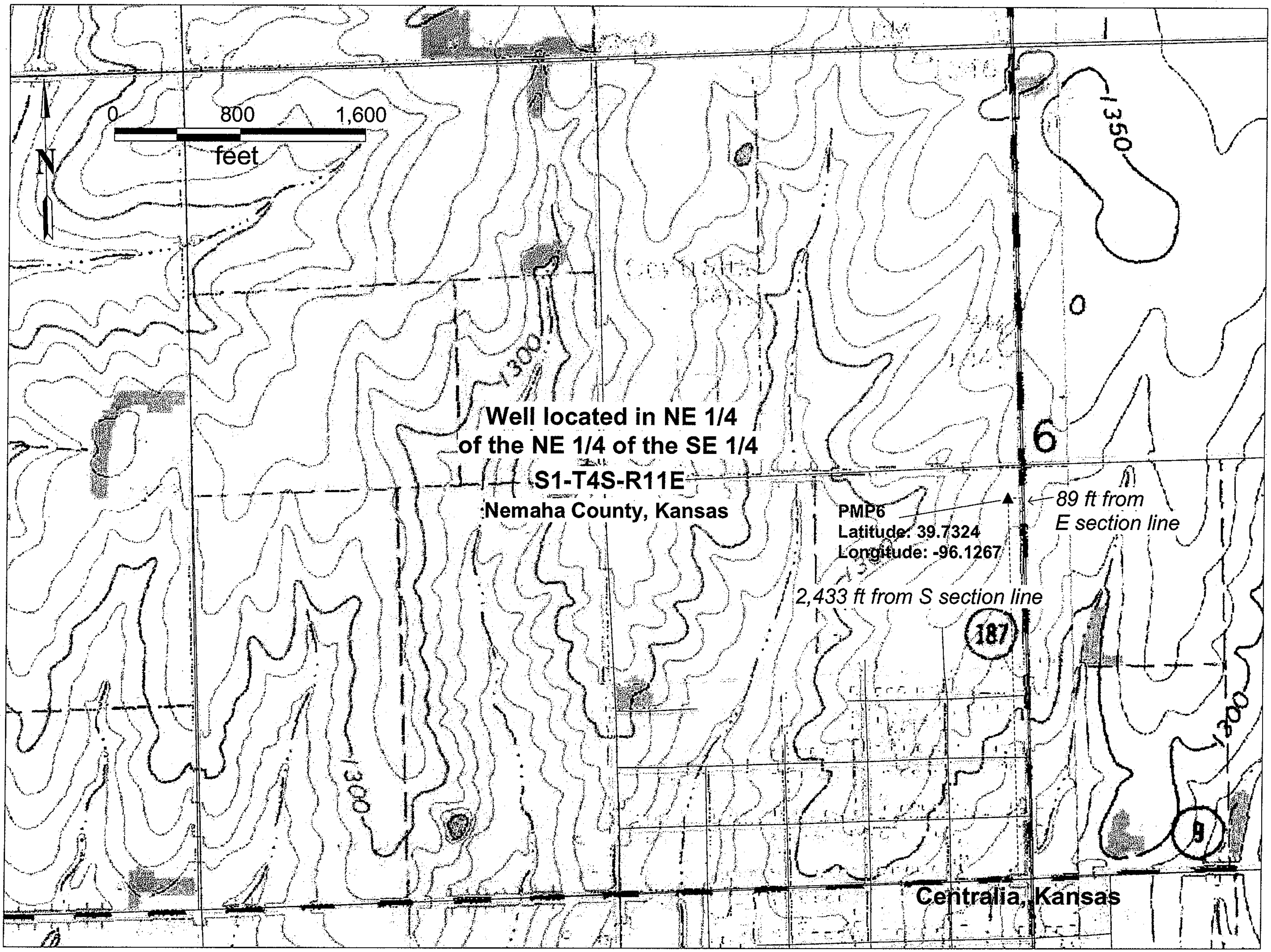
6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other BenSeal Chips
Grout Intervals From 48 (#3) ft. to 0.5 ft. From 48 (#4) ft. to 45 ft. From N/A ft. to N/A ft.
What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/ Gas well 16 Other (specify below)
Direction from well? How many feet? 1000' East

FROM	TO	CODE	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2'		Top Soil			
2'	46'		Silt and Clay			
46'	47'		Silty Clay			
47'	48'		Silty Clay with some Sand			
48'	51'		Silty Clay and Sand			
51'	60'		Sand & Silt			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/yr) 09/23/08 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 680 This Water Well Record was completed on (mo/day/yr) 09/27/08 under the business name of Delta Environmental by (signature)

INSTRUCTIONS: Please fill in blanks and circle the correct answers. Send three copies to Kansas Department of Health and Environment, Bureau of Water, 1000 S W Jackson St., Ste. 420, Topeka, Kansas 66612-1367. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.

OFFICE USE ONLY T R SEC



N
0
800
1,600
feet
1350
1300
6
Well located in NE 1/4
of the NE 1/4 of the SE 1/4
S1-T4S-R11E
Nemaha County, Kansas
PMP6
Latitude: 39.7324
Longitude: -96.1267
89 ft from
E section line
2,433 ft from S section line
187
9
Centralia, Kansas

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. PMP-7

1 LOCATION OF WATER WELL: County: Nemaha | Fraction: NE ¼ NE ¼ SE ¼ | Section Number: 1 | Township Number: T 4 S/N | Range Number: R 11 E/W

Distance and direction from nearest town or city street address of well if located within city?

2 WATER WELL OWNER: USDA/CCC
RR#, St. Address, Box # : Stop 0513, Room 4717-S/ 1400 Independence Ave SW
City, State, ZIP Code : Washington, DC 20250-0513
Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:

N / W / E / S — NW, NE, SW, SE — X — 1 Mile

4 DEPTH OF COMPLETED WELL 60 ft. ELEVATION: 1,334.76
Depth(s) Groundwater Encountered 1 51 ft. 2 N/A ft. 3 N/A ft.
WELL'S STATIC WATER LEVEL 20.1 ft. below land surface measured on mo/day/yr 09/23/08
Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm
Est. Yield N/A gpm: Well water was N/A ft. after N/A hours pumping N/A gpm
Bore Hole Diameter 4.25 in. to 21 ft. and 3.25 Pilot in. to 60 ft.
WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feed lot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden (domestic) 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below) Sand Point MW
Was a chemical/bacteriological sample submitted to Department? Yes ___ No X If yes, mo/day/yr sample was submitted N/A
Water Well Disinfected? Yes ___ No X

OFFICE USE ONLY

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought Iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued ___ Clamped ___ Welded ___ Threaded X
Blank casing diameter 1/2" in. to 60 ft., Dia N/A in. to N/A ft., Dia N/A in. to N/A ft.
Casing height above land surface Flush Mount in., weight Schedule 40 lbs./ft. Wall thickness or gauge No. .109"
TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)
SCREEN-PERFORATED INTERVALS: From 50 ft. to 60 ft. From ___ ft. to ___ ft.
From ___ ft. to ___ ft. From ___ ft. to ___ ft.
GRAVEL PACK INTERVALS: From 48 ft. to 60 ft. From ___ ft. to ___ ft.
From ___ ft. to ___ ft. From ___ ft. to ___ ft.

T

R

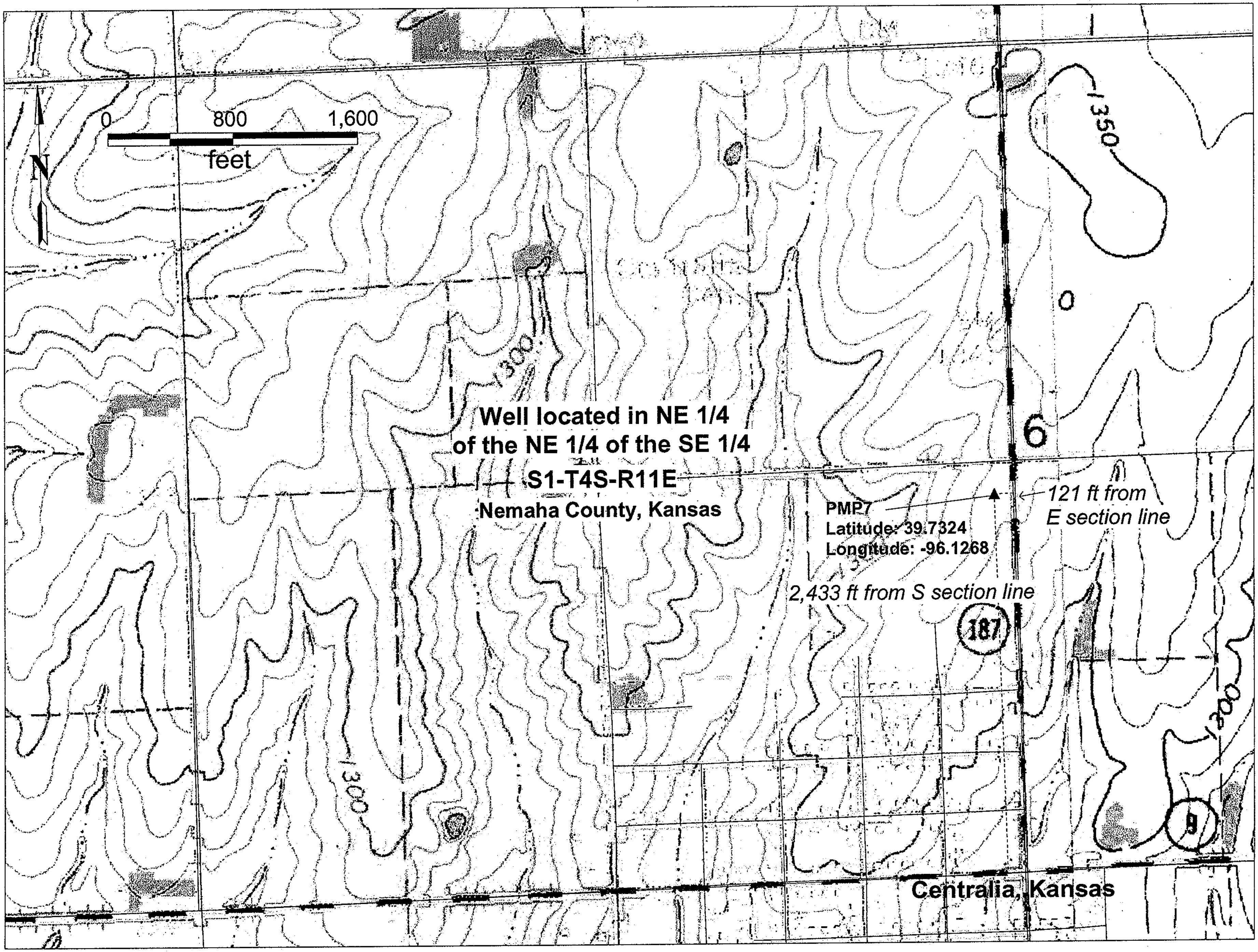
6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other BenSeal Chips
Grout Intervals From 48 (#3) ft. to 0.5 ft. From 48 (#4) ft. to 45 ft. From N/A ft. to N/A ft.
What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/ Gas well 16 Other (specify below)
Direction from well? How many feet? 1000' East

SEC

FROM	TO	CODE	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2'		Top Soil			
2'	46'		Silt and Clay			
46'	47'		Silty Clay			
47'	48'		Silty Clay with some Sand			
48'	51'		Silty Clay and Sand			
51'	60'		Sand & Silt			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/yr) 09/23/08 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 680 This Water Well Record was completed on (mo/day/yr) 09/27/08 under the business name of Delta Environmental by (signature)

INSTRUCTIONS: Please fill in blanks and circle the correct answers. Send three copies to Kansas Department of Health and Environment, Bureau of Water, 1000 S W Jackson St., Ste. 420, Topeka, Kansas 66612-1367. Telephone: 913-296-5545. Send one to WATER WELL OWNER and retain one for your records.



0
800
1,600
feet
N
Well located in NE 1/4
of the NE 1/4 of the SE 1/4
S1-T4S-R11E
Nemaha County, Kansas
PMP7
Latitude: 39.7324
Longitude: -96.1268
121 ft from
E section line
2,433 ft from S section line
187
9
6
1350
1300
Centralia, Kansas

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. PMP-8

1 LOCATION OF WATER WELL: County: Nemaha | Fraction: NE ¼ NE ¼ SE ¼ | Section Number: 1 | Township Number: T 4 S/N | Range Number: R 11 E/W

Distance and direction from nearest town or city street address of well if located within city?

2 WATER WELL OWNER: USDA/CCC

RR#, St. Address, Box # : Stop 0513, Room 4717-S/ 1400 Independence Ave SW

City, State, ZIP Code : Washington, DC 20250-0513

Board of Agriculture, Division of Water Resources

Application Number:

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:

N / W / E / S — NW, NE, SW, SE — X — 1 Mile

4 DEPTH OF COMPLETED WELL 60 ft. ELEVATION: 1,333.62

Depth(s) Groundwater Encountered 1 51 ft. 2 N/A ft. 3 N/A ft.

WELL'S STATIC WATER LEVEL 20.1 ft. below land surface measured on mo/day/yr 09/23/08

Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm

Est. Yield N/A gpm: Well water was N/A ft. after N/A hours pumping N/A gpm

Bore Hole Diameter 4.25 in. to 21 ft. and 3.25 Pilot in. to 60 ft.

WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feed lot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden (domestic) 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below) Sand Point MW

Was a chemical/bacteriological sample submitted to Department? Yes ____ No X If yes, mo/day/yr sample was submitted N/A

Water Well Disinfected? Yes ____ No X

5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought Iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)

CASING JOINTS: Glued ____ Clamped ____ Welded ____ Threaded X

Blank casing diameter 1/2" in. to 60 ft., Dia N/A in. to N/A ft., Dia N/A in. to N/A ft.

Casing height above land surface Flush Mount in., weight Schedule 40 lbs./ft. Wall thickness or gauge No. .109"

TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)

SCREEN-PERFORATED INTERVALS: From 50 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.

GRAVEL PACK INTERVALS: From 48 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other BenSeal Chips

Grout Intervals From 48 (#3) ft. to 0.5 ft. From 48 (#4) ft. to 45 ft. From N/A ft. to N/A ft.

What is the nearest source of possible contamination: 1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/ Gas well 16 Other (specify below)

Direction from well? How many feet? 1000' East

FROM	TO	CODE	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2'		Top Soil			
2'	46'		Silt and Clay			
46'	47'		Silty Clay			
47'	48'		Silty Clay with some Sand			
48'	51'		Silty Clay and Sand			
51'	60'		Sand & Silt			

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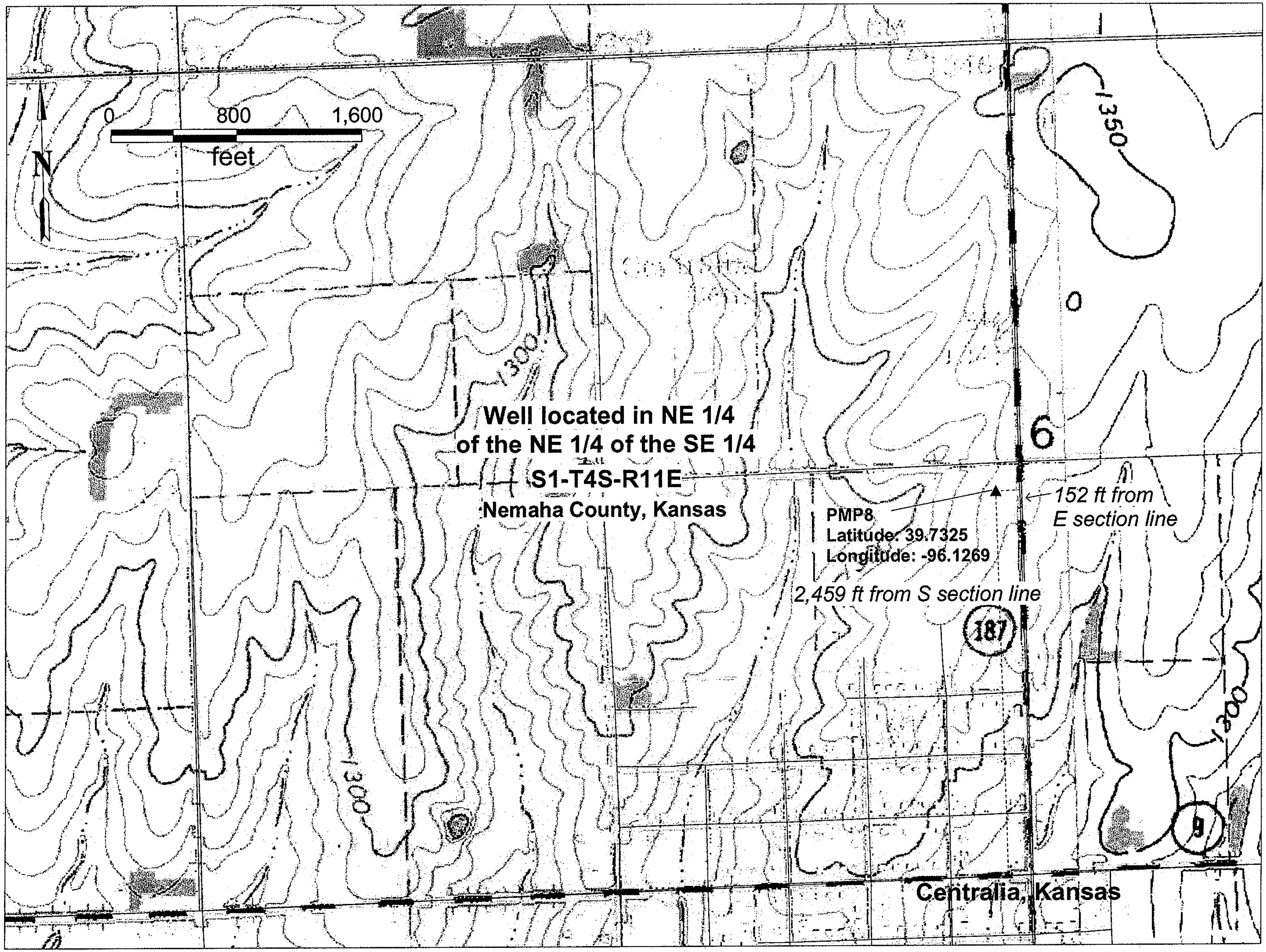
0
800
1,600
feet
N
Well located in NE 1/4
of the NE 1/4 of the SE 1/4
S1-T4S-R11E
Nemaha County, Kansas
PMP8
Latitude: 39.7325
Longitude: -96.1269
152 ft from
E section line
2,459 ft from S section line
1350
1300
1300
1300
1300
6
187
9
Centralia, Kansas

WATER WELL RECORD Form WWC-5 KSA 82a-1212 ID No. PMP-9

1 LOCATION OF WATER WELL: County: Nemaha | Fraction: NE ¼ NE ¼ SE ¼ | Section Number: 1 | Township Number: T 4 S/N | Range Number: R 11 E/W

Distance and direction from nearest town or city street address of well if located within city?

2 WATER WELL OWNER: USDA/CCC
RR#, St. Address, Box # : Stop 0513, Room 4717-S/ 1400 Independence Ave SW
City, State, ZIP Code : Washington, DC 20250-0513

Board of Agriculture, Division of Water Resources
Application Number:

3 LOCATE WELL'S LOCATON WITH AN "X" IN SECTION BOX:

N / W / E / S — NW, NE, SW, SE — 1 Mile — X

4 DEPTH OF COMPLETED WELL 60 ft. ELEVATION: 1,332.63
Depth(s) Groundwater Encountered 1 51 ft. 2 N/A ft. 3 N/A ft.
WELL'S STATIC WATER LEVEL 15.1 ft. below land surface measured on mo/day/yr 09/23/08
Pump test data: Well water was N/A ft. after N/A hours pumping N/A gpm
Est. Yield N/A gpm: Well water was N/A ft. after N/A hours pumping N/A gpm
Bore Hole Diameter 4.25 in. to 21 ft. and 3.25 Pilot in. to 60 ft.

WELL WATER TO BE USED AS: 1 Domestic 2 Irrigation 3 Feed lot 4 Industrial 5 Public water supply 6 Oil field water supply 7 Lawn and garden (domestic) 8 Air conditioning 9 Dewatering 10 Monitoring well 11 Injection well 12 Other (Specify below) Sand Point MW

Was a chemical/bacteriological sample submitted to Department? Yes ____ No X ; If yes, mo/day/yr sample was submitted N/A
Water Well Disinfected? Yes ____ No X

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5 TYPE OF BLANK CASING USED: 1 Steel 2 PVC 3 RMP (SR) 4 ABS 5 Wrought Iron 6 Asbestos-Cement 7 Fiberglass 8 Concrete tile 9 Other (specify below)
CASING JOINTS: Glued ____ Clamped ____ Welded ____ Threaded X
Blank casing diameter 1/2" in. to 60 ft., Dia N/A in. to N/A ft., Dia N/A in. to N/A ft.
Casing height above land surface Flush Mount in., weight Schedule 40 lbs./ft. Wall thickness or gauge No. .109"

TYPE OF SCREEN OR PERFORATION MATERIAL: 1 Steel 2 Brass 3 Stainless steel 4 Galvanized steel 5 Fiberglass 6 Concrete tile 7 PVC 8 RMP (SR) 9 ABS 10 Asbestos-cement 11 Other (specify) 12 None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE: 1 Continuous slot 2 Louvered shutter 3 Mill slot 4 Key punched 5 Gauzed wrapped 6 Wire wrapped 7 Torch cut 8 Saw cut 9 Drilled holes 10 Other (specify) 11 None (open hole)

SCREEN-PERFORATED INTERVALS: From 50 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.
GRAVEL PACK INTERVALS: From 48 ft. to 60 ft. From ____ ft. to ____ ft.
From ____ ft. to ____ ft. From ____ ft. to ____ ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other BenSeal Chips
Grout Intervals From 48 (#3) ft. to 0.5 ft. From 48 (#4) ft. to 45 ft. From N/A ft. to N/A ft.

What is the nearest source of possible contamination:
1 Septic tank 2 Sewer lines 3 Watertight sewer lines 4 Lateral lines 5 Cess pool 6 Seepage pit 7 Pit privy 8 Sewage lagoon 9 Feedyard 10 Livestock pens 11 Fuel storage 12 Fertilizer storage 13 Insecticide storage 14 Abandoned water well 15 Oil well/ Gas well 16 Other (specify below)
Direction from well? How many feet? 1000' East

FROM	TO	CODE	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
0	2'		Top Soil			
2'	46'		Silt and Clay			
46'	47'		Silty Clay			
47'	48'		Silty Clay with some Sand			
48'	51'		Silty Clay and Sand			
51'	60'		Sand & Silt			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/yr) 09/23/08 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 680 This Water Well Record was completed on (mo/day/yr) 09/27/08 under the business name of Delta Environmental by (signature)

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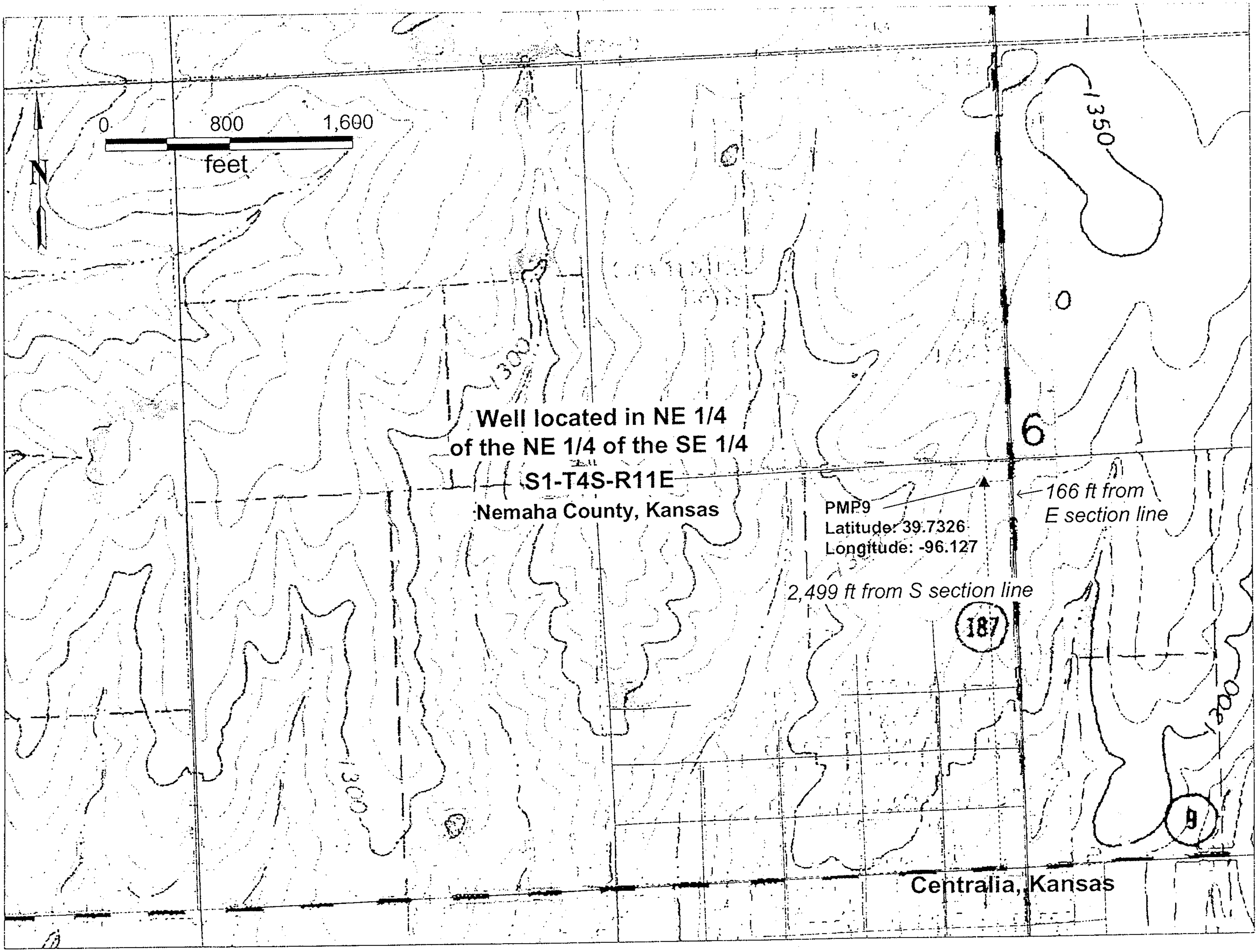
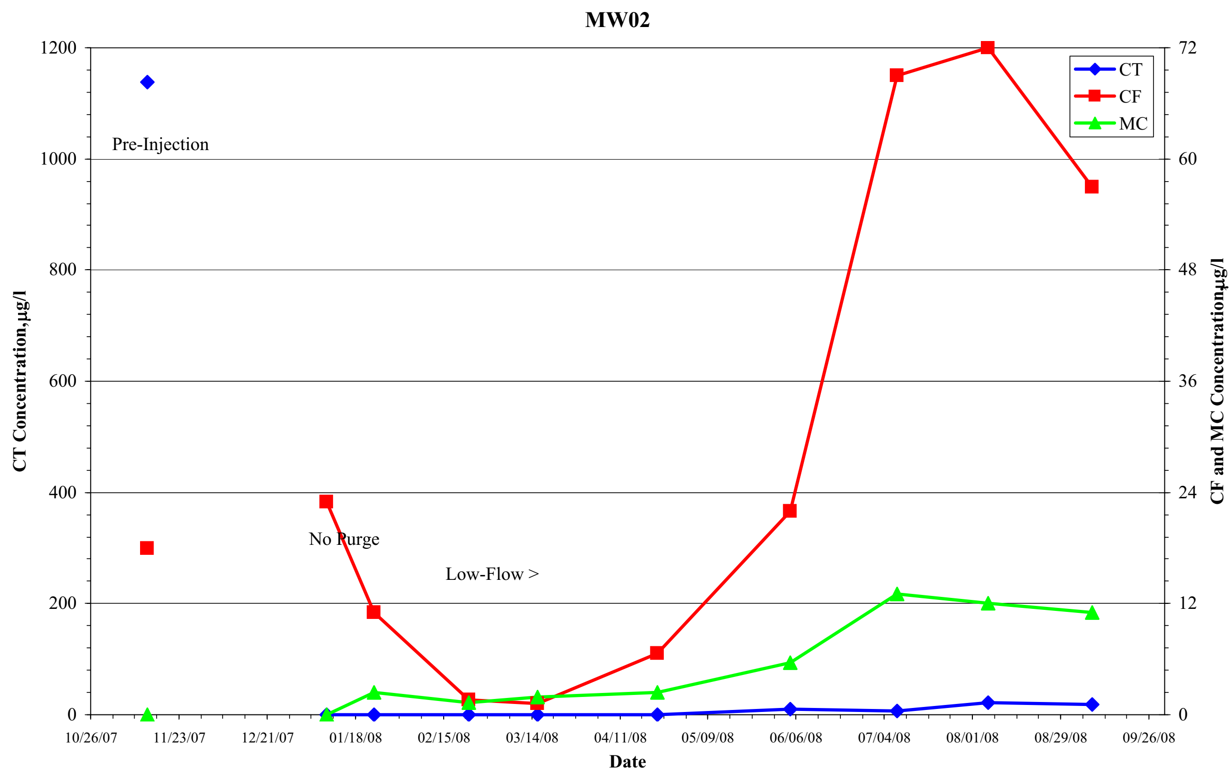


N
0
800
1,600
feet
1350
1300
1300
1300
6
Well located in NE 1/4
of the NE 1/4 of the SE 1/4
S1-T4S-R11E
Nemaha County, Kansas
PMP9
Latitude: 39.7326
Longitude: -96.127
166 ft from
E section line
2,499 ft from S section line
187
9
Centralia, Kansas

Appendix D:

Time Series Diagrams Presenting the Results of VOCs, DO, and ORP Analyses for Groundwater Monitoring Samples Collected during the ISCR Pilot Test



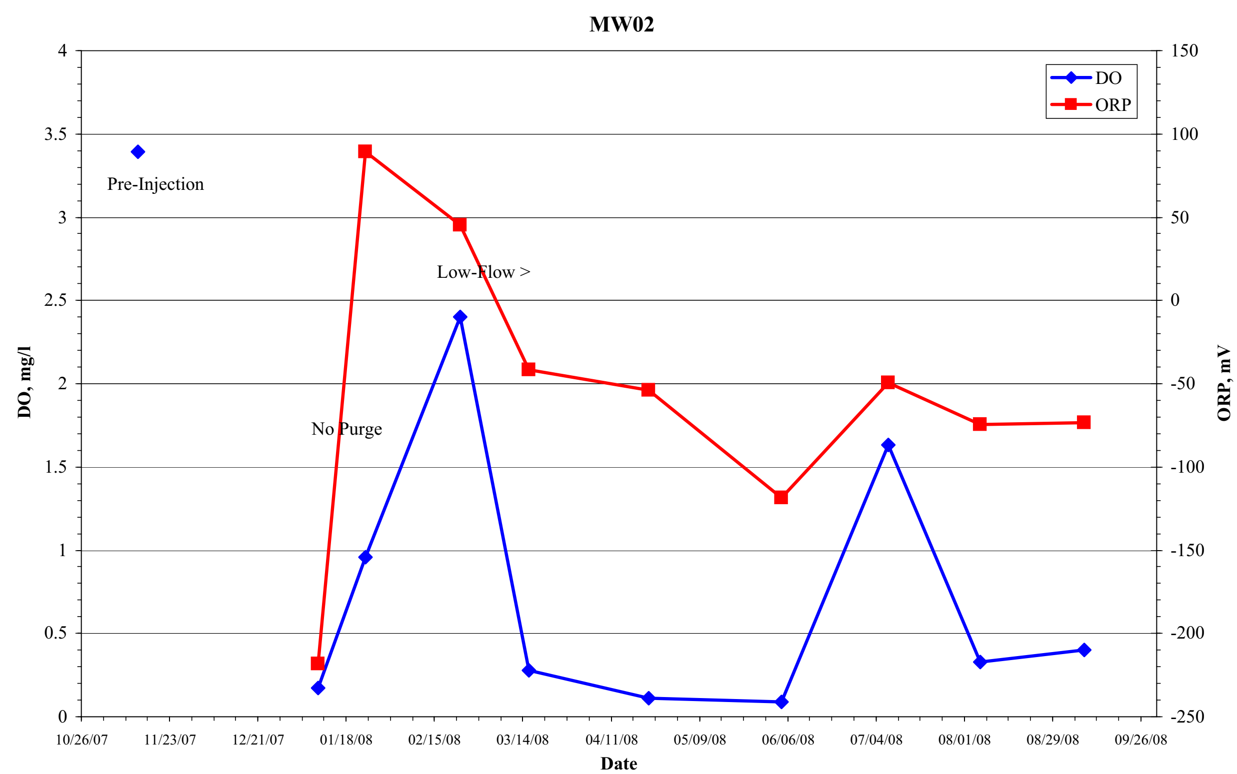
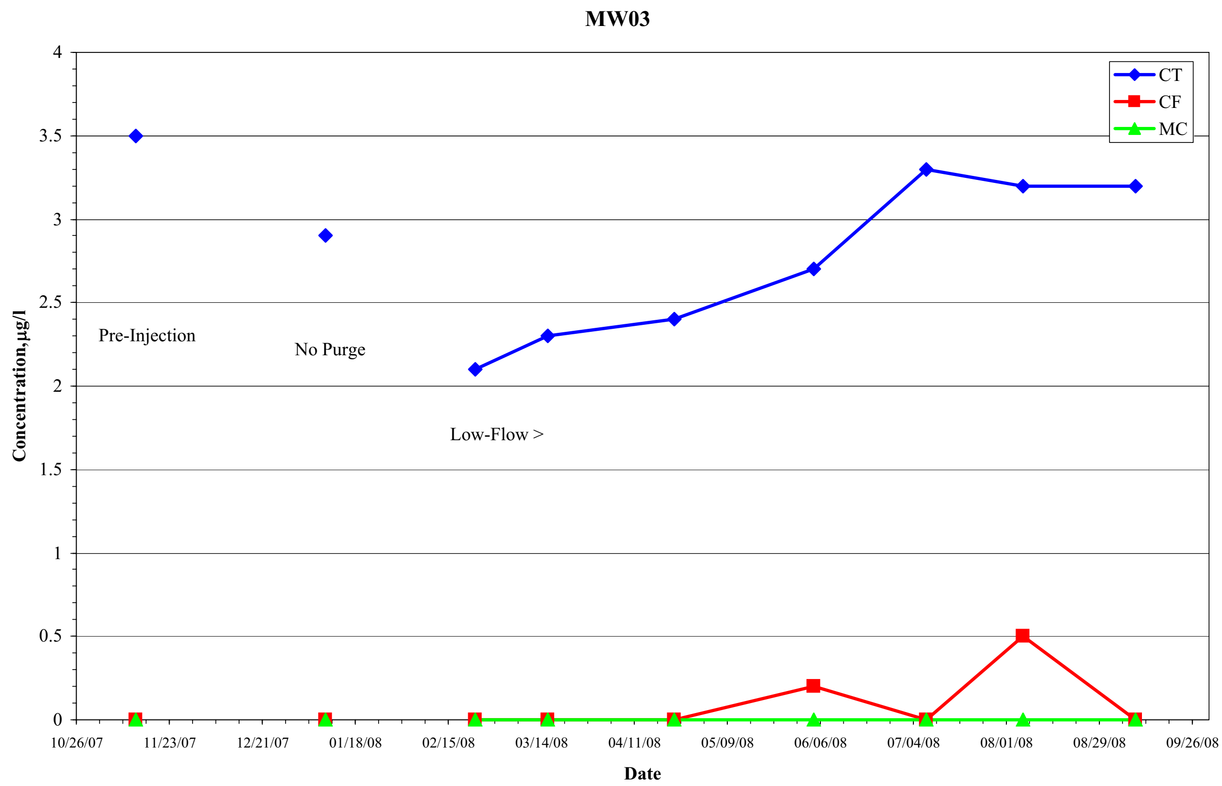


FIGURE D.1 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at location MW02, November 2007 to September 2008.



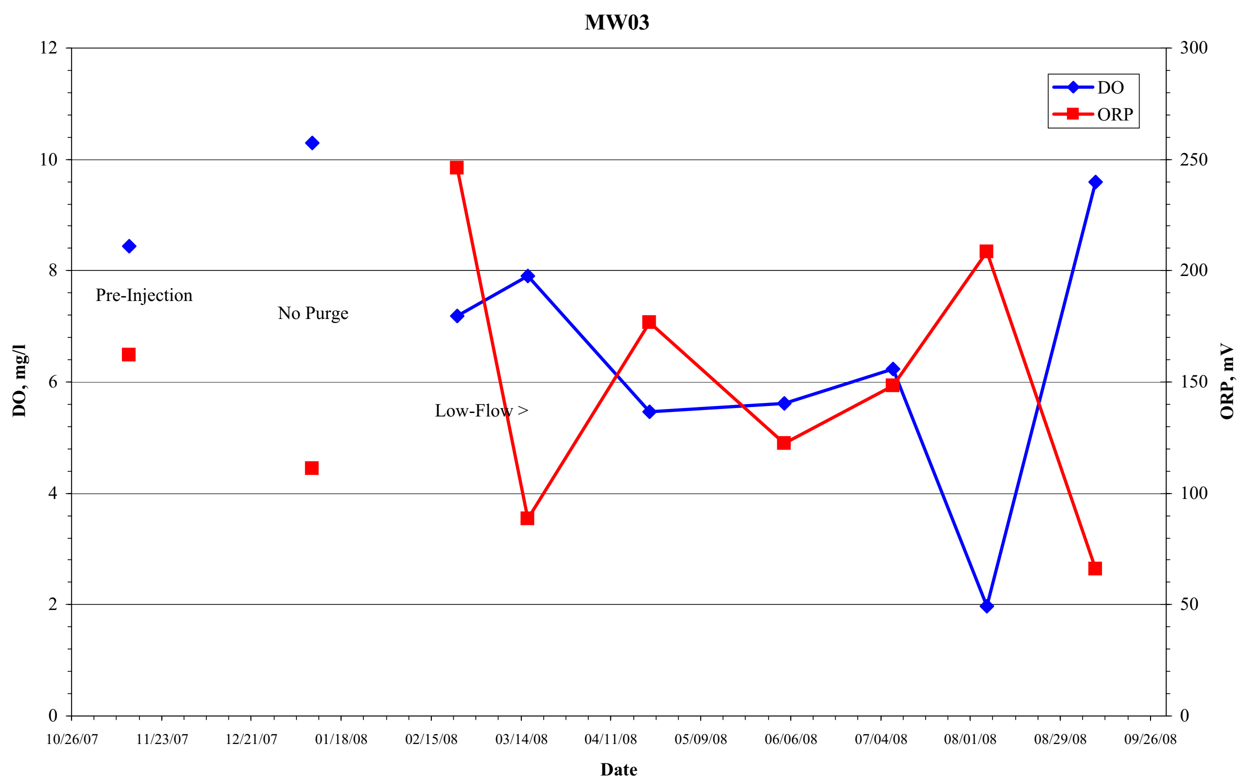
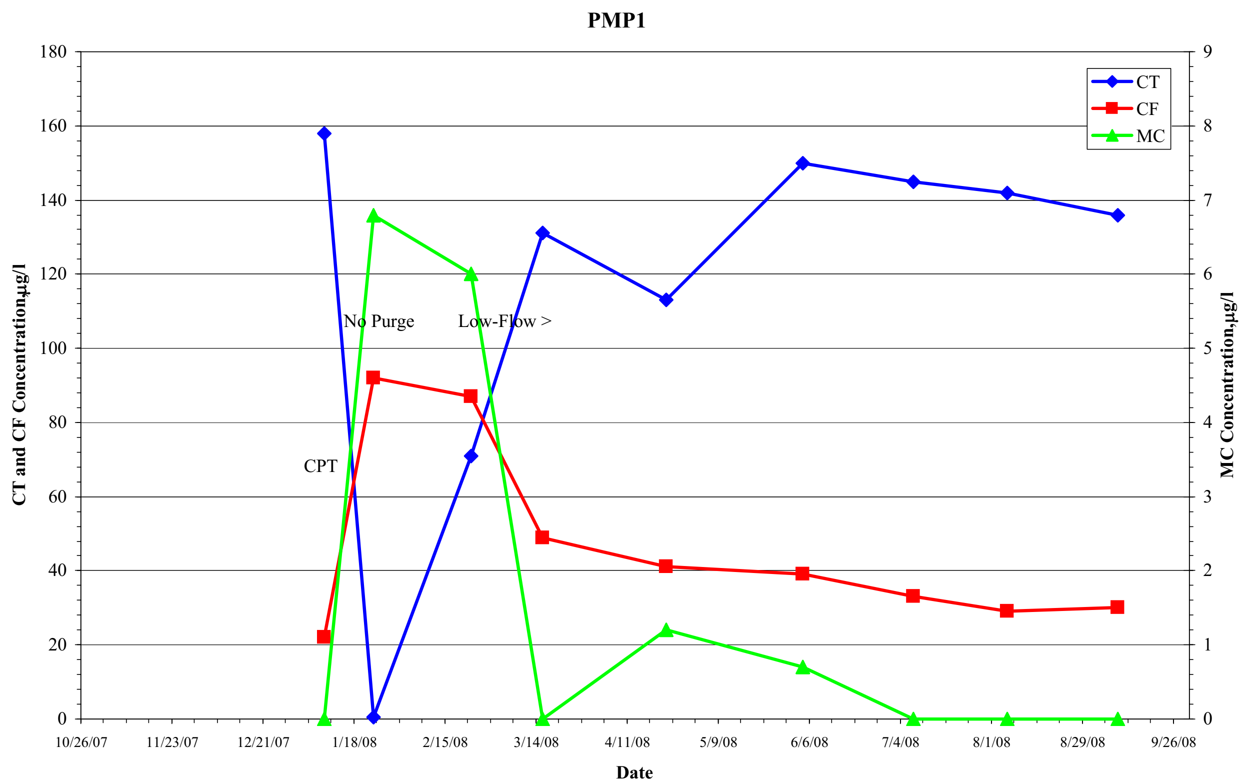


FIGURE D.2 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at location MW03, November 2007 to September 2008.



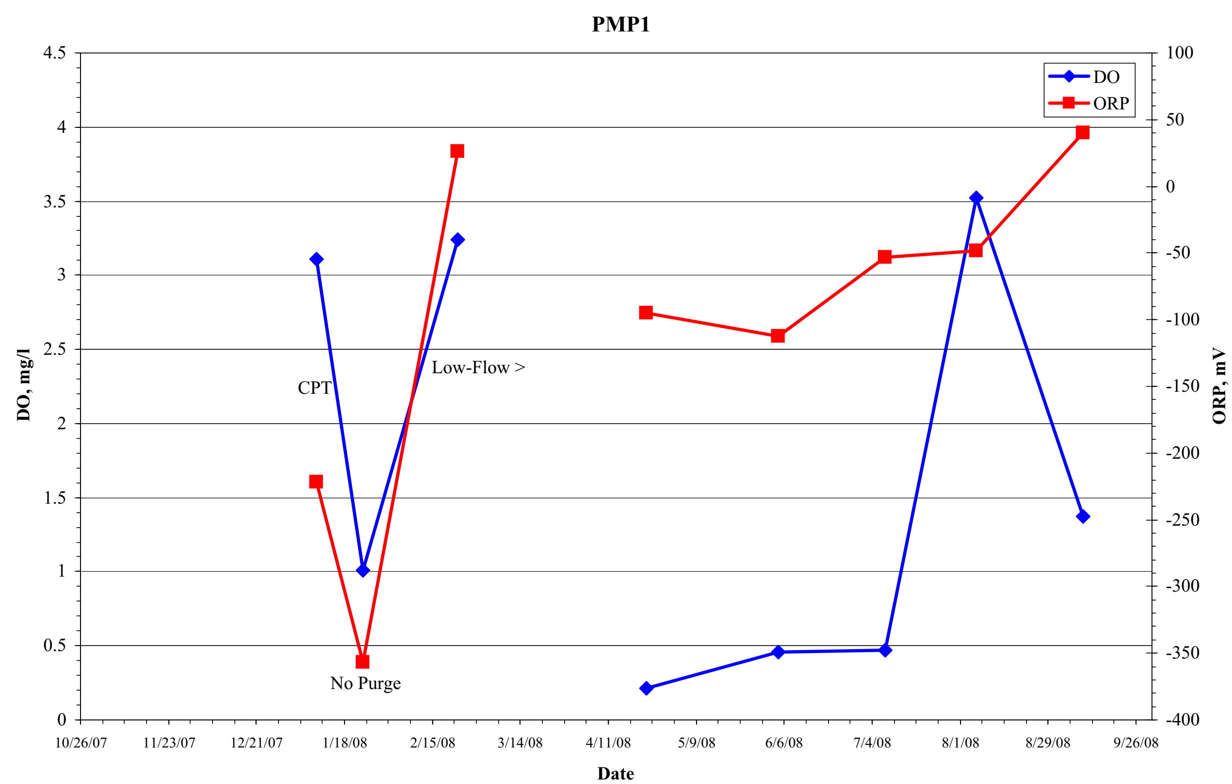
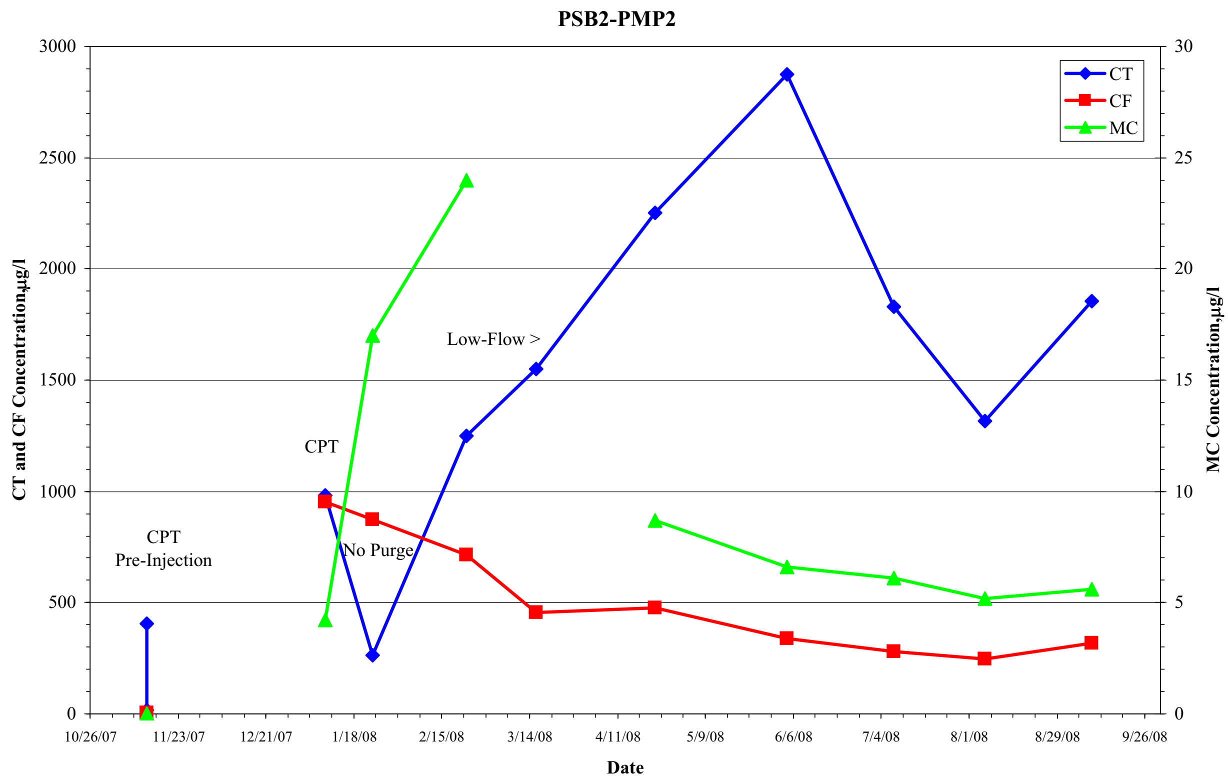


FIGURE D.3 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at location PMP1, January 2008 to September 2008.



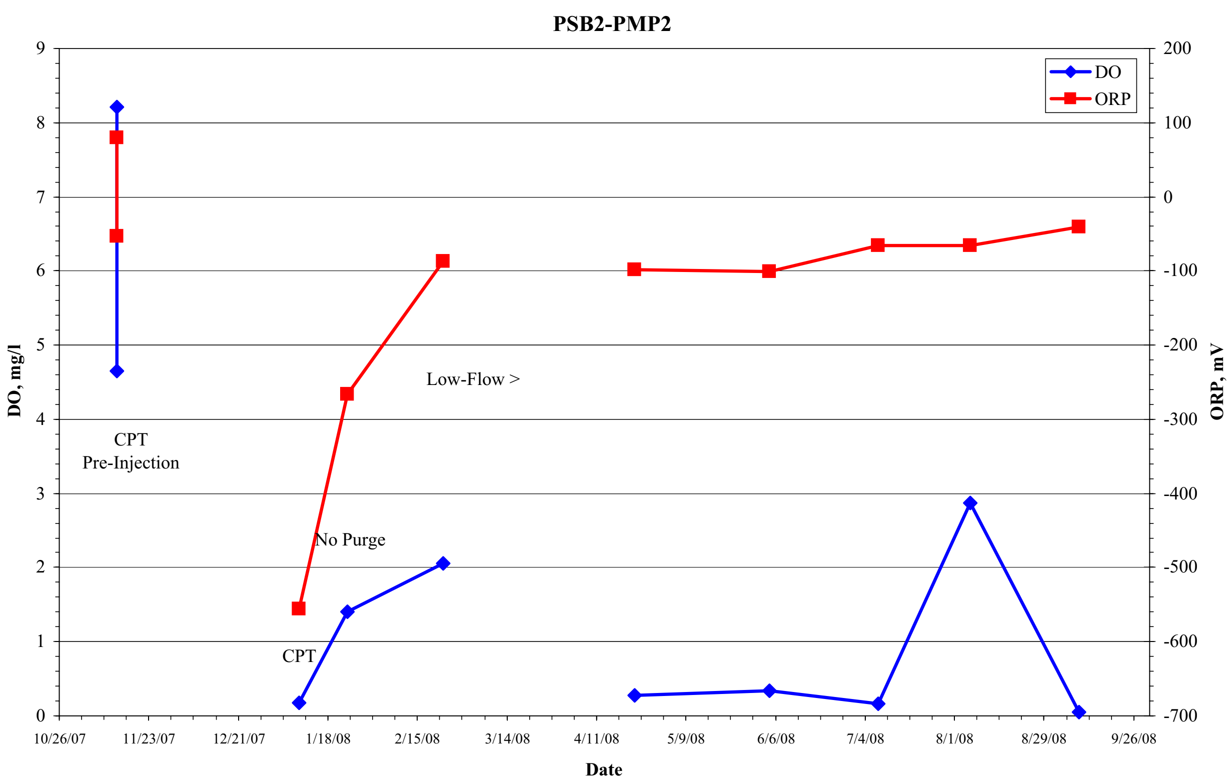
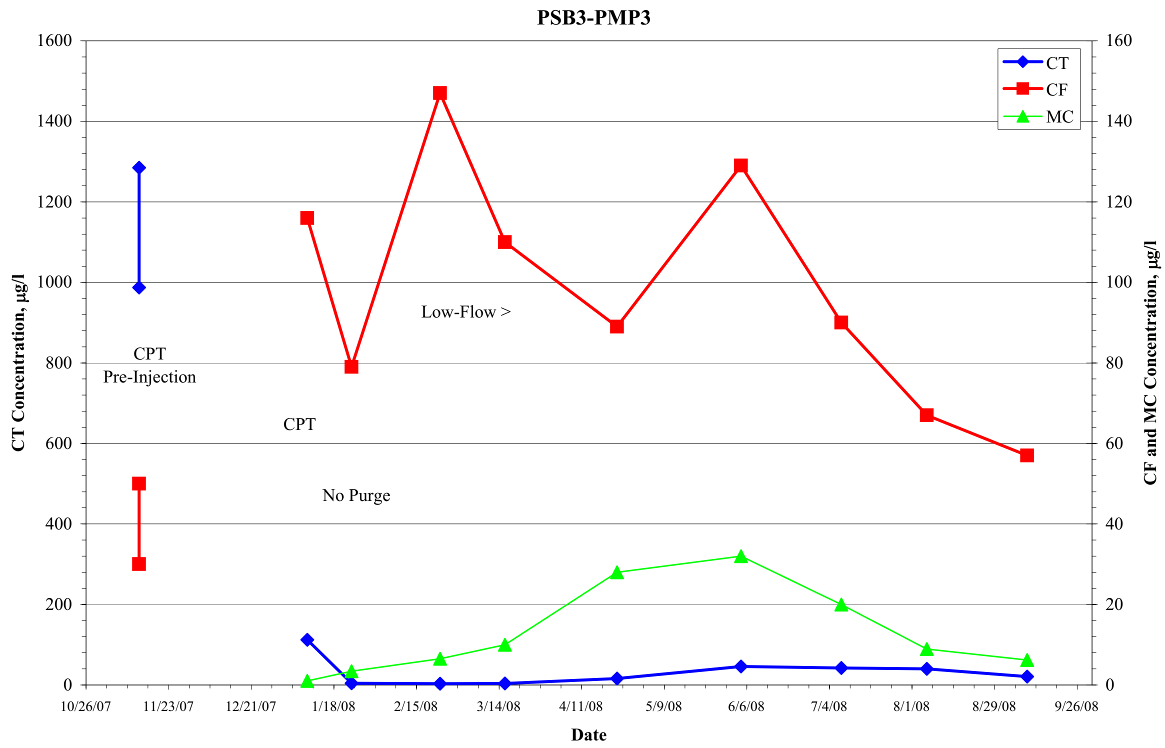


FIGURE D.4 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at locations PSB2 and PMP2, November 2007 to September 2008.



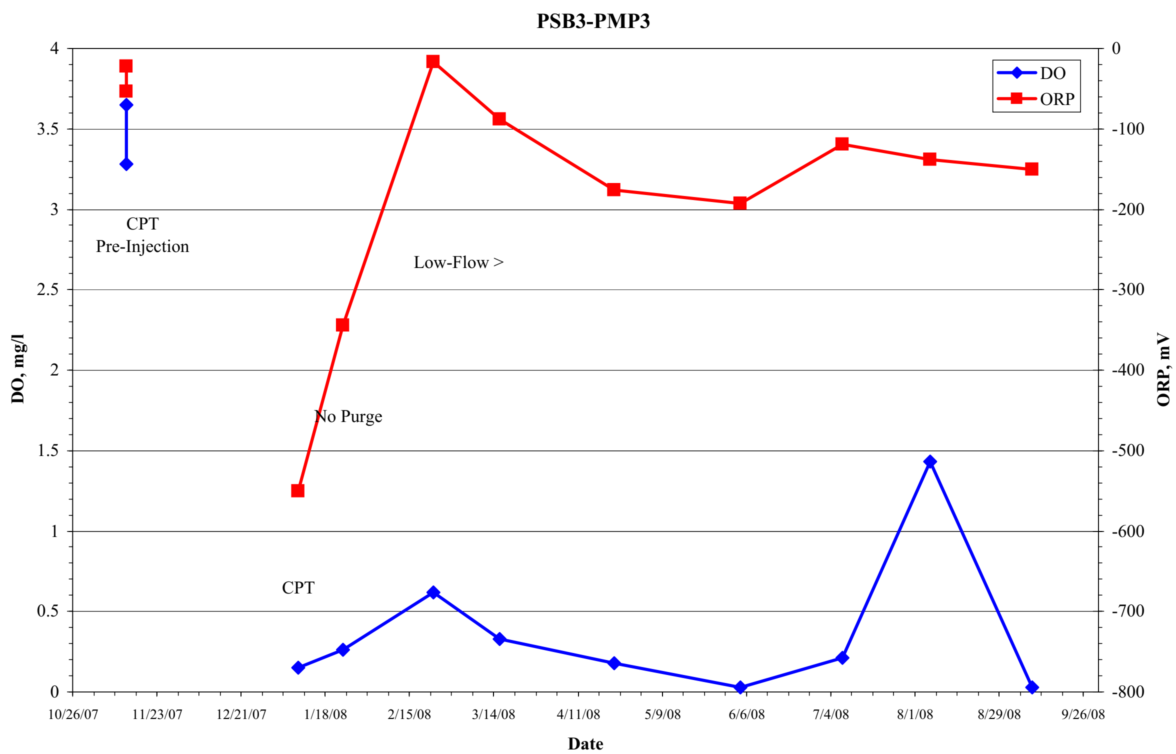
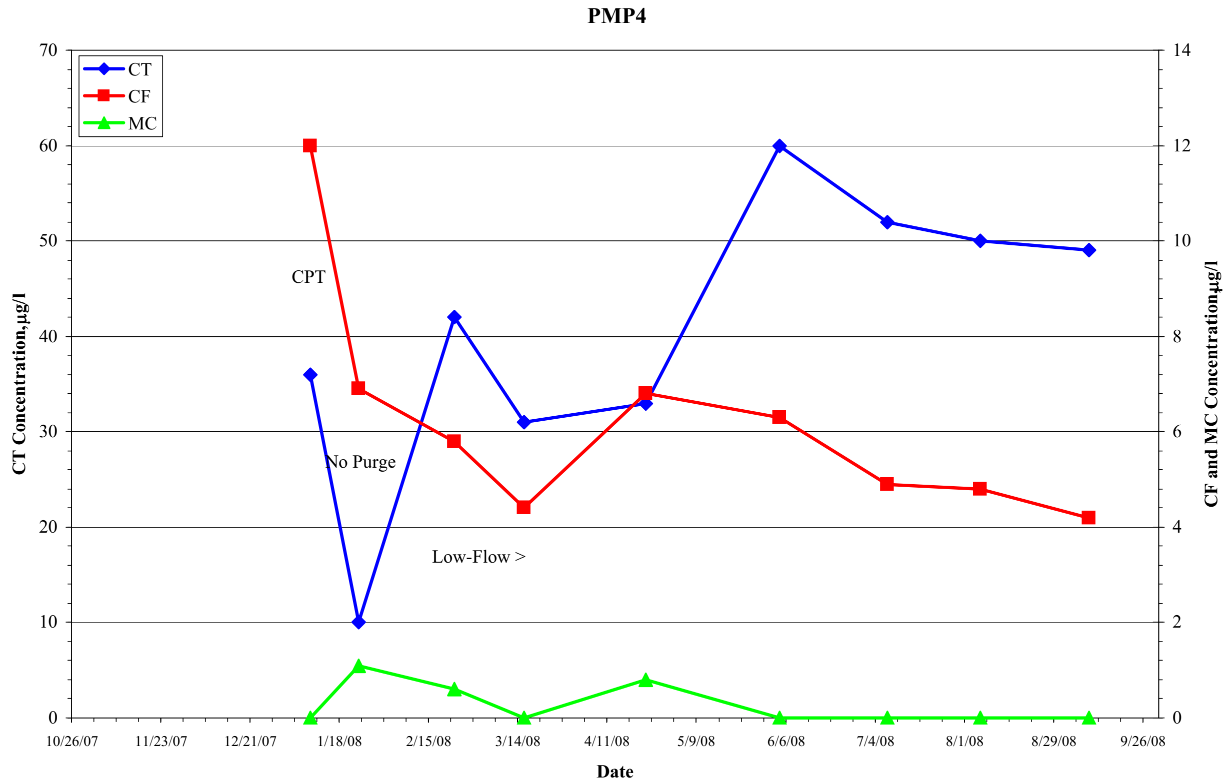


FIGURE D.5 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at locations PSB3 and PMP3, November 2007 to September 2008.



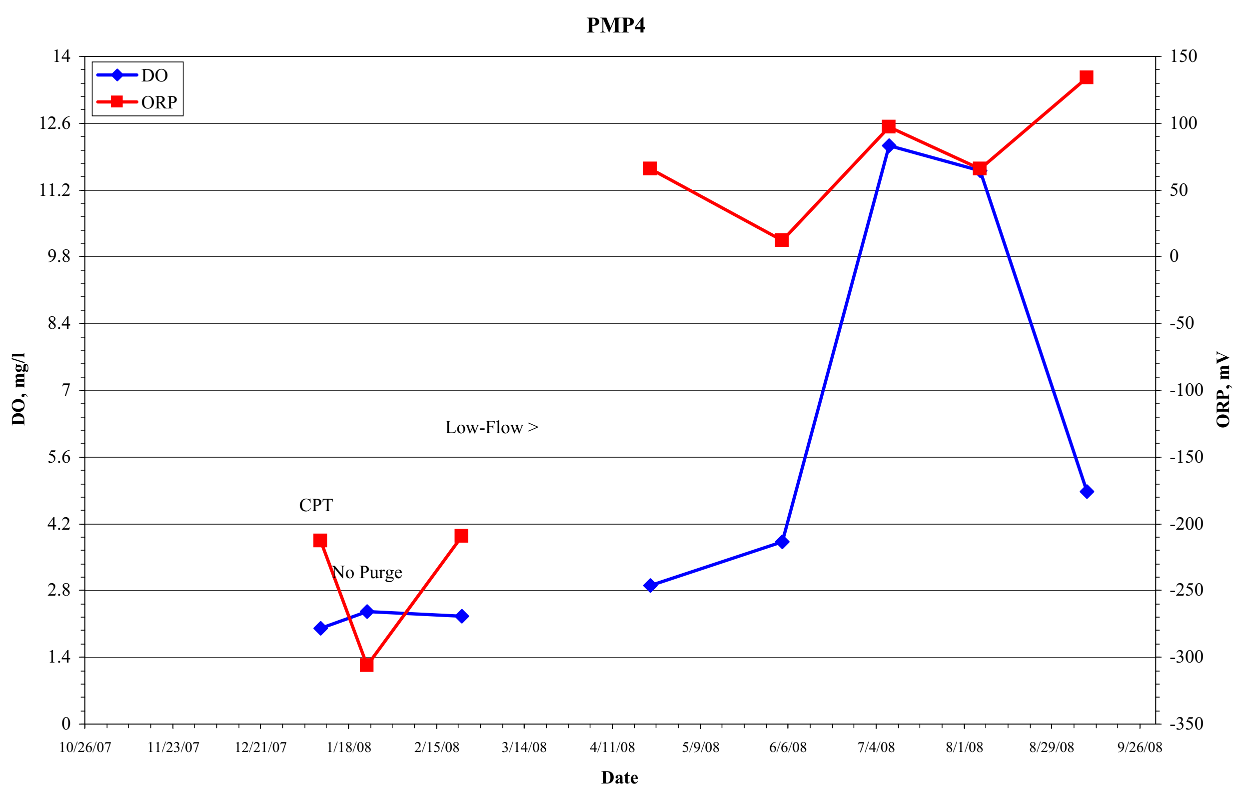
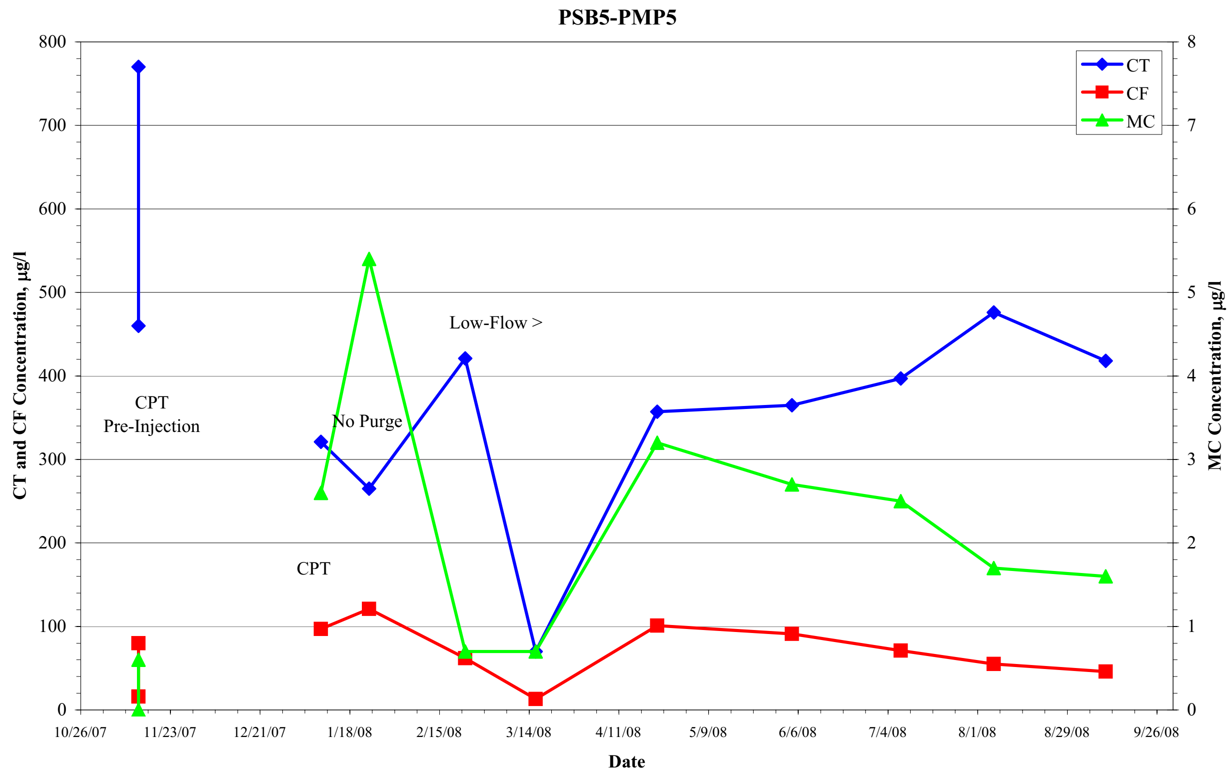


FIGURE D.6 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at location PMP4, January 2008 to September 2008.



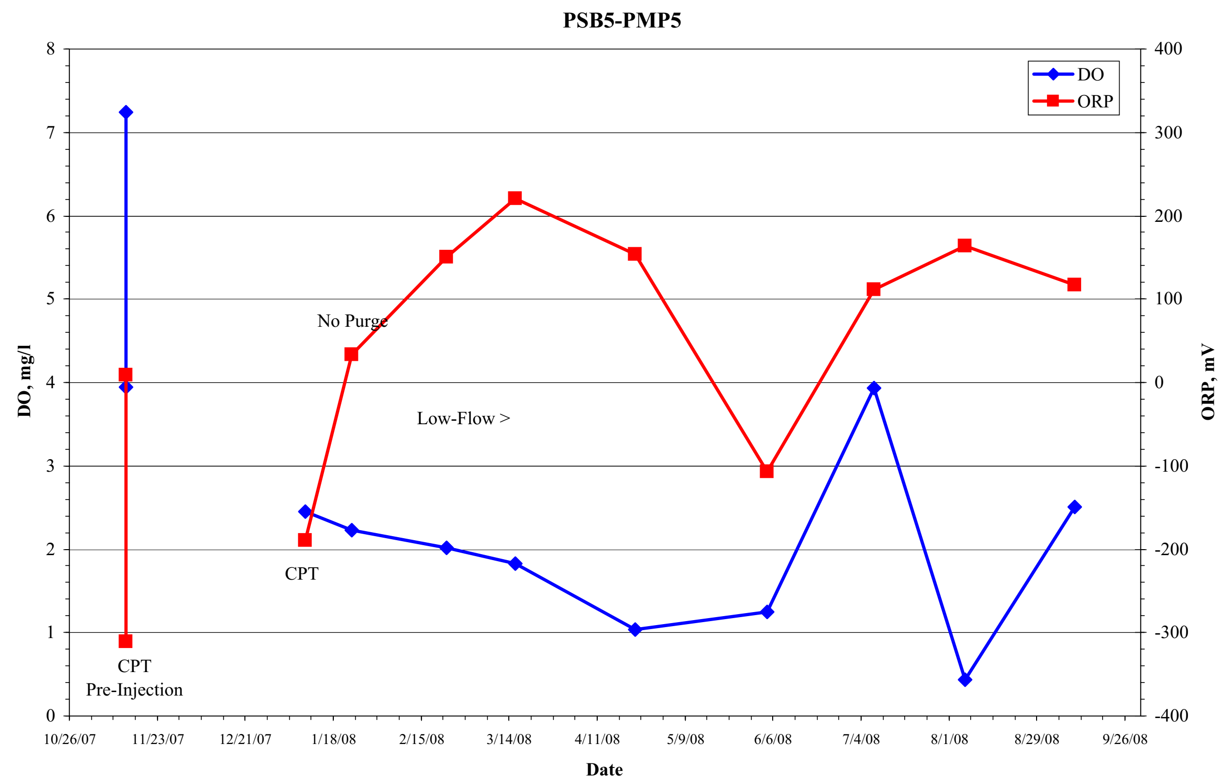
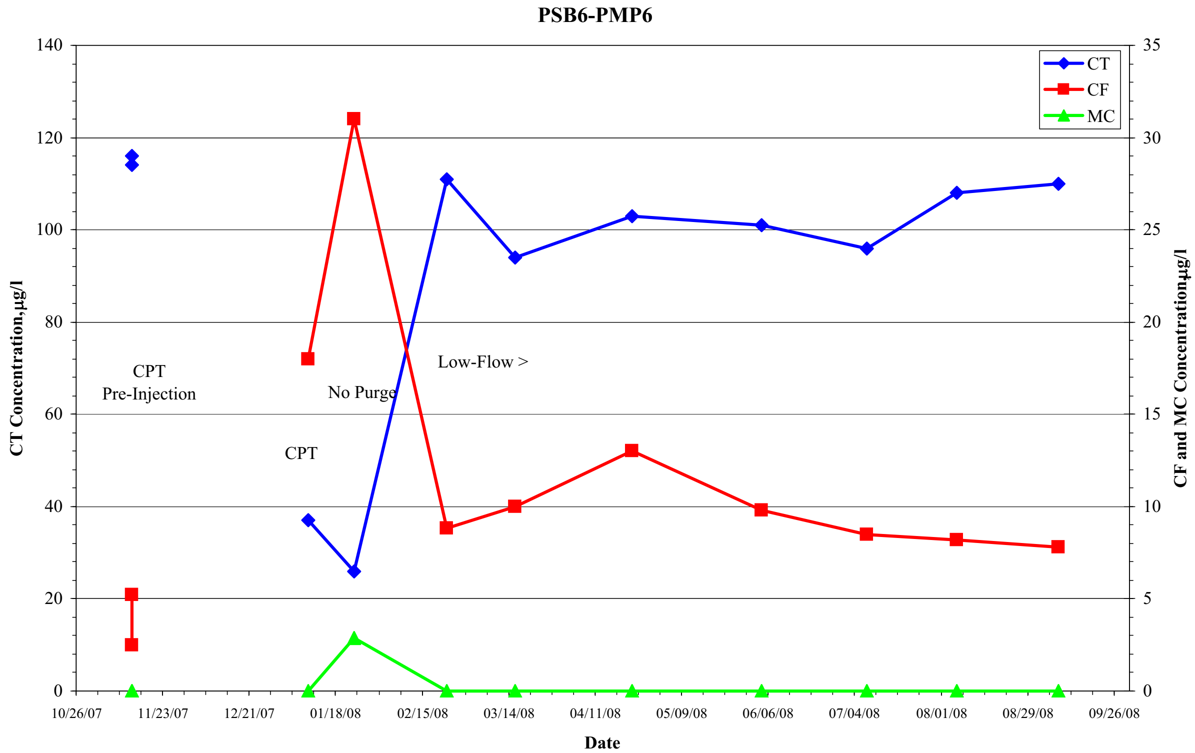


FIGURE D.7 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at locations PSB5 and PMP5, November 2007 to September 2008.



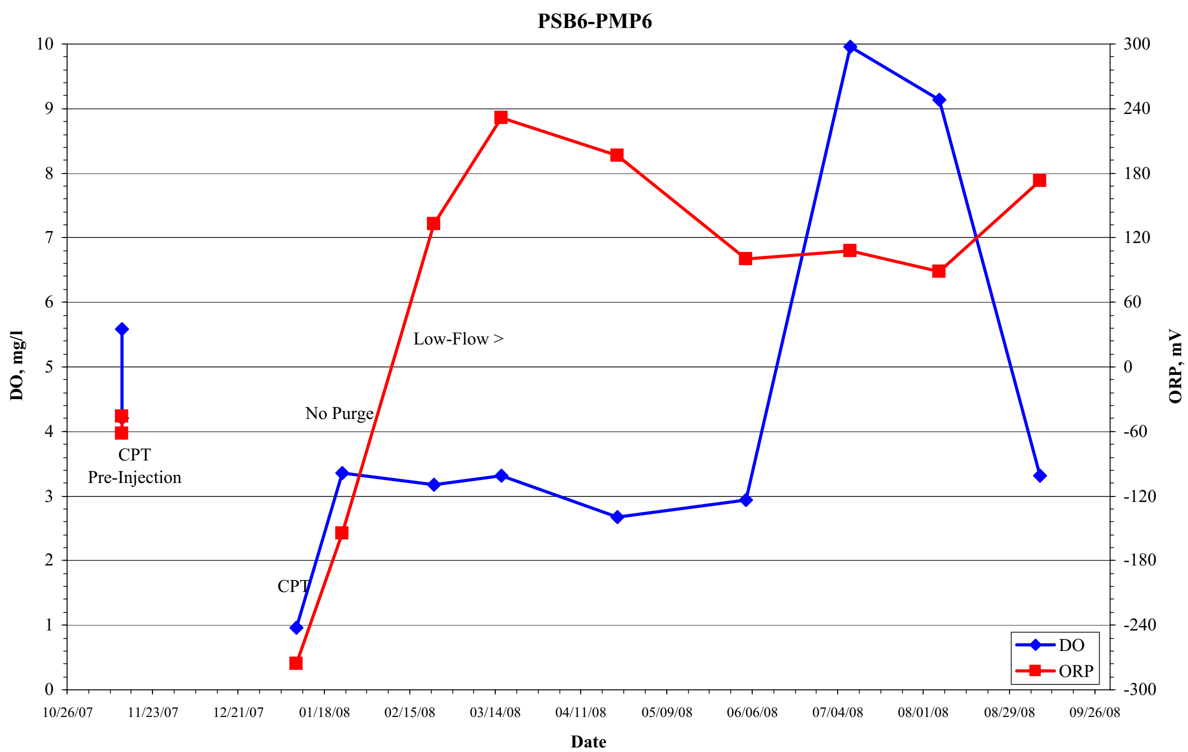
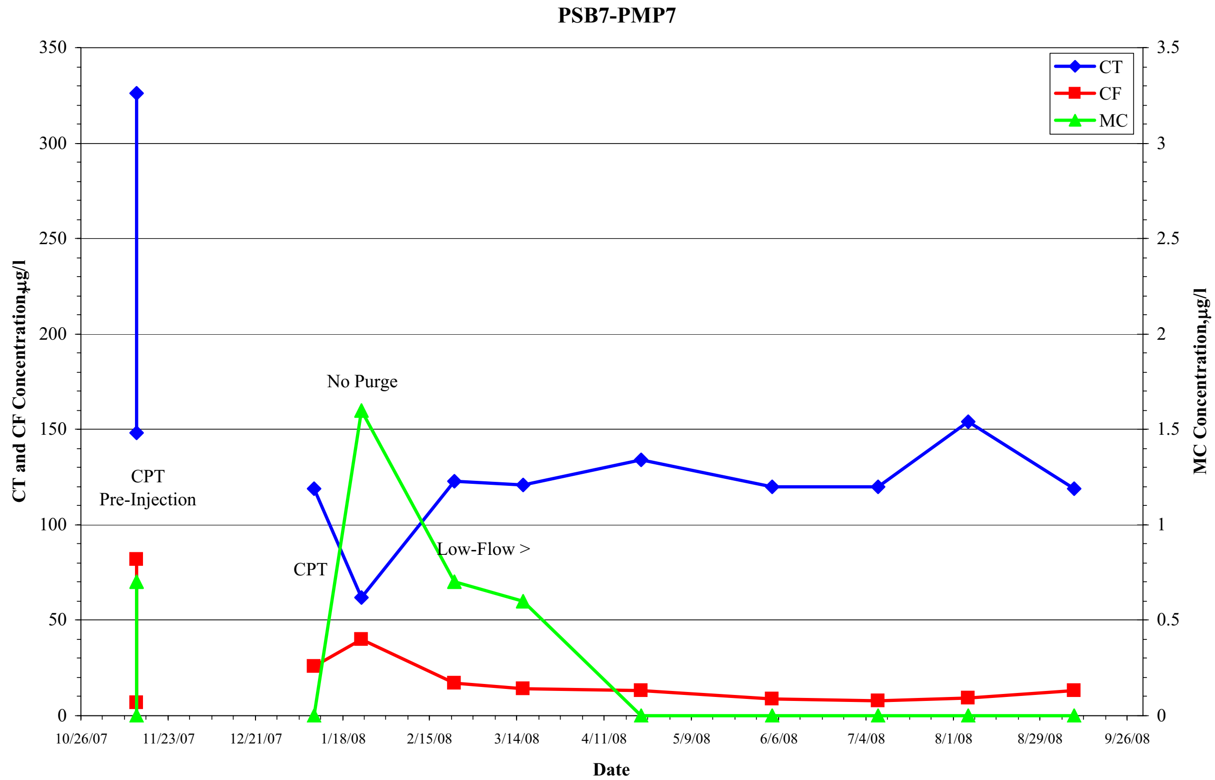


FIGURE D.8 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at locations PSB6 and PMP6, November 2007 to September 2008.



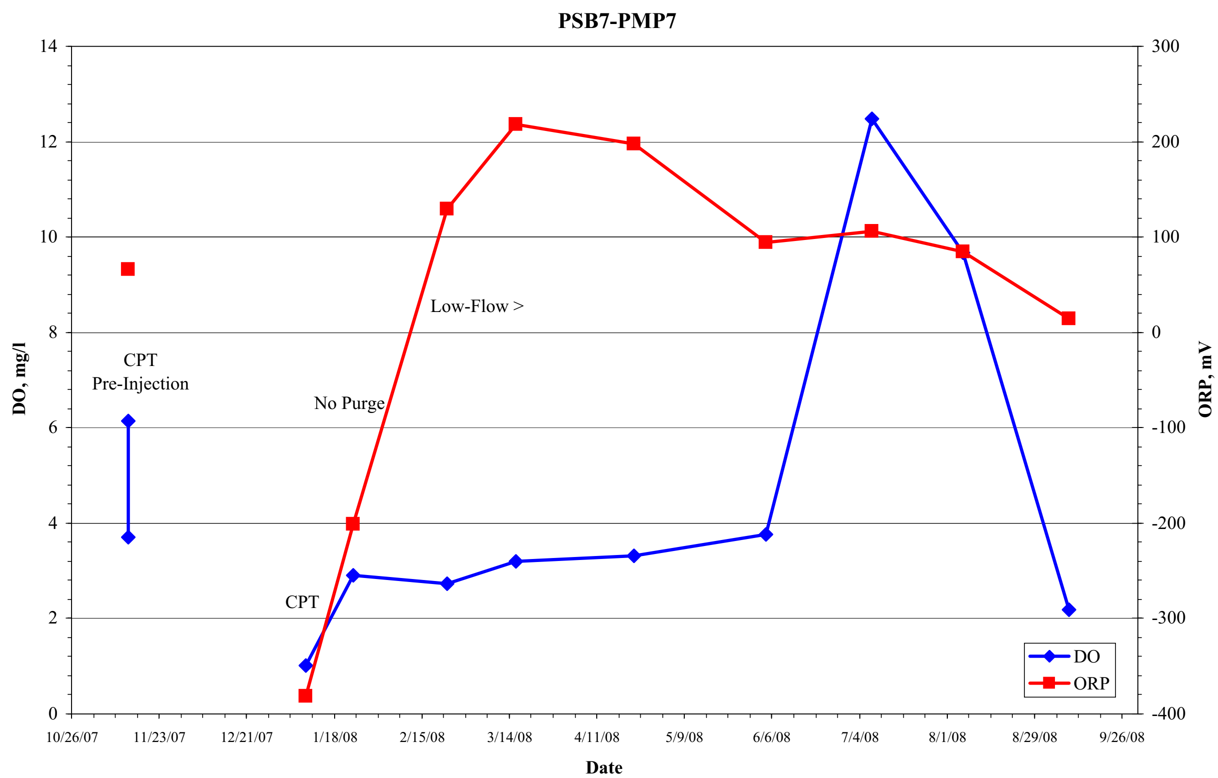
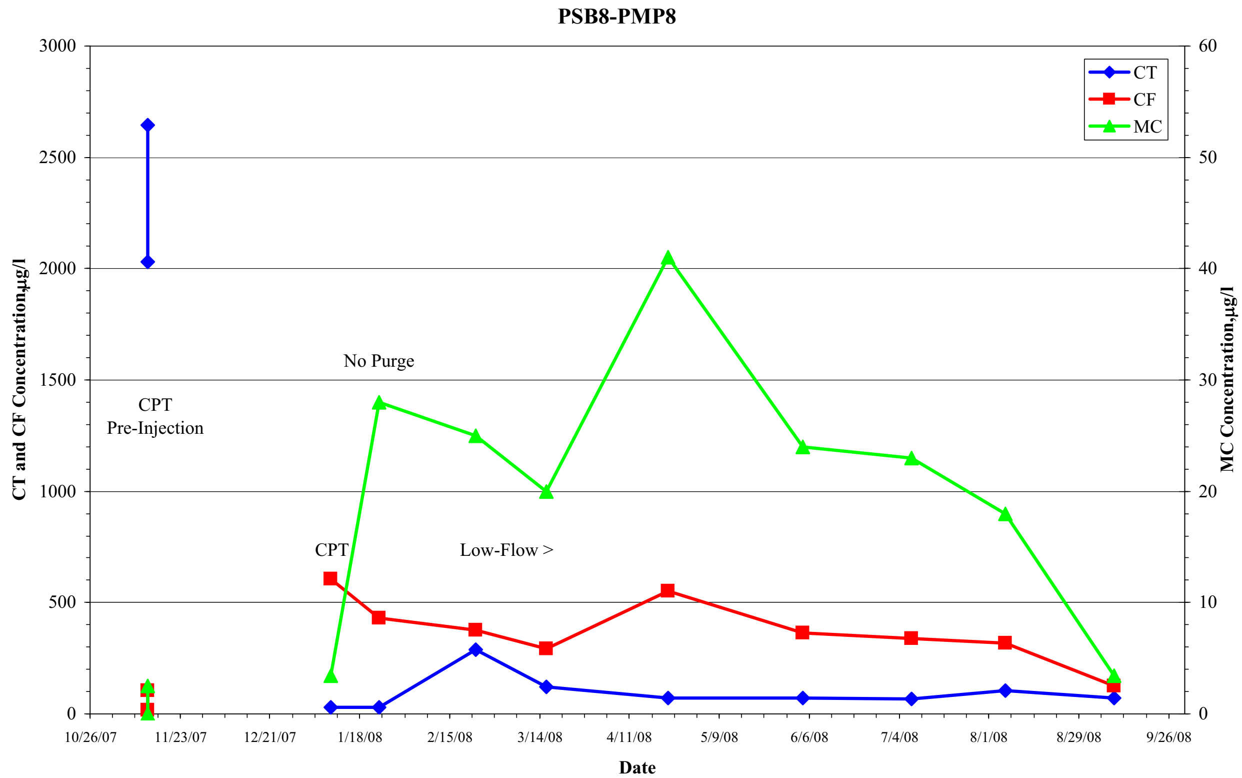


FIGURE D.9 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at locations PSB7 and PMP7, November 2007 to September 2008.



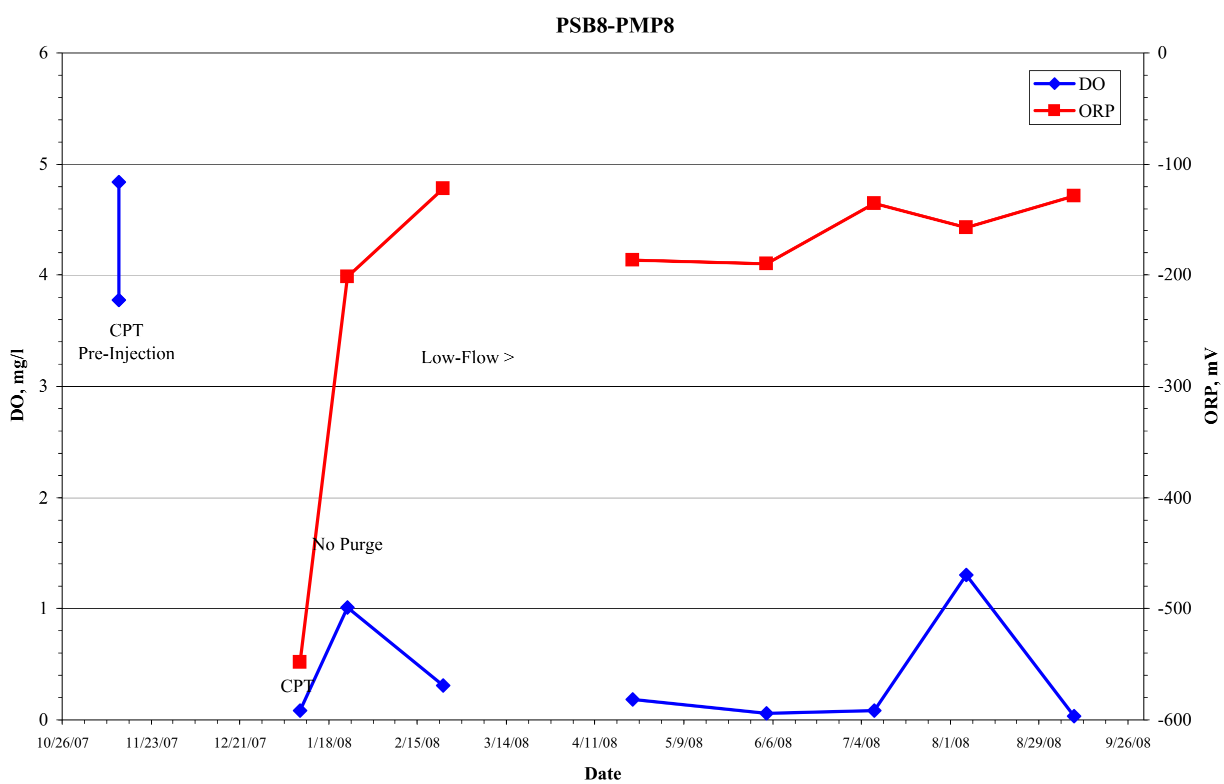
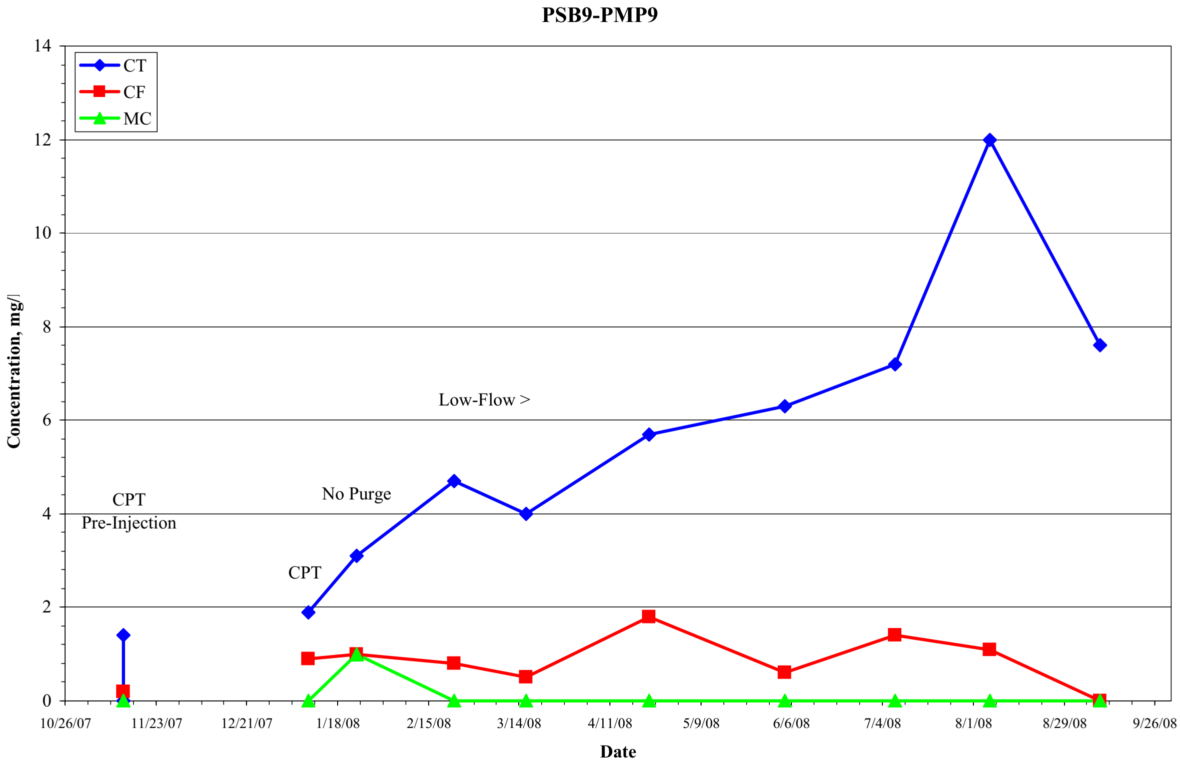


FIGURE D.10 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at locations PSB8 and PMP8, November 2007 to September 2008.



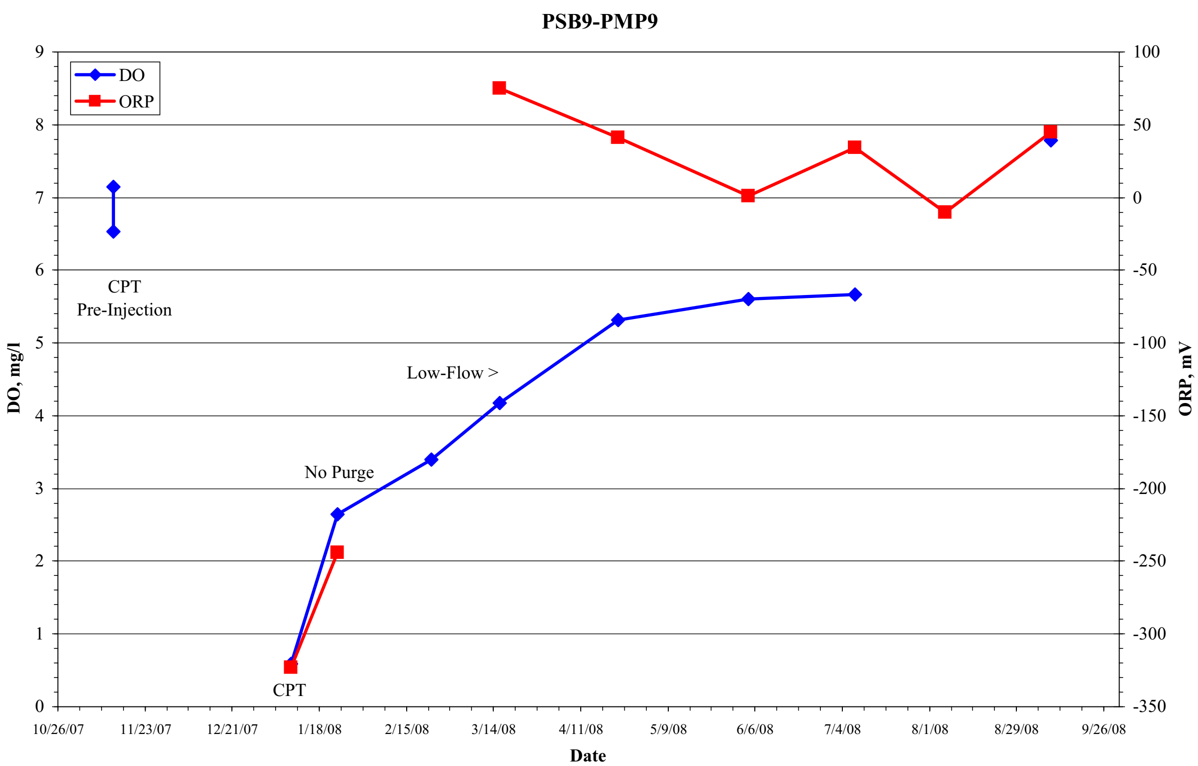
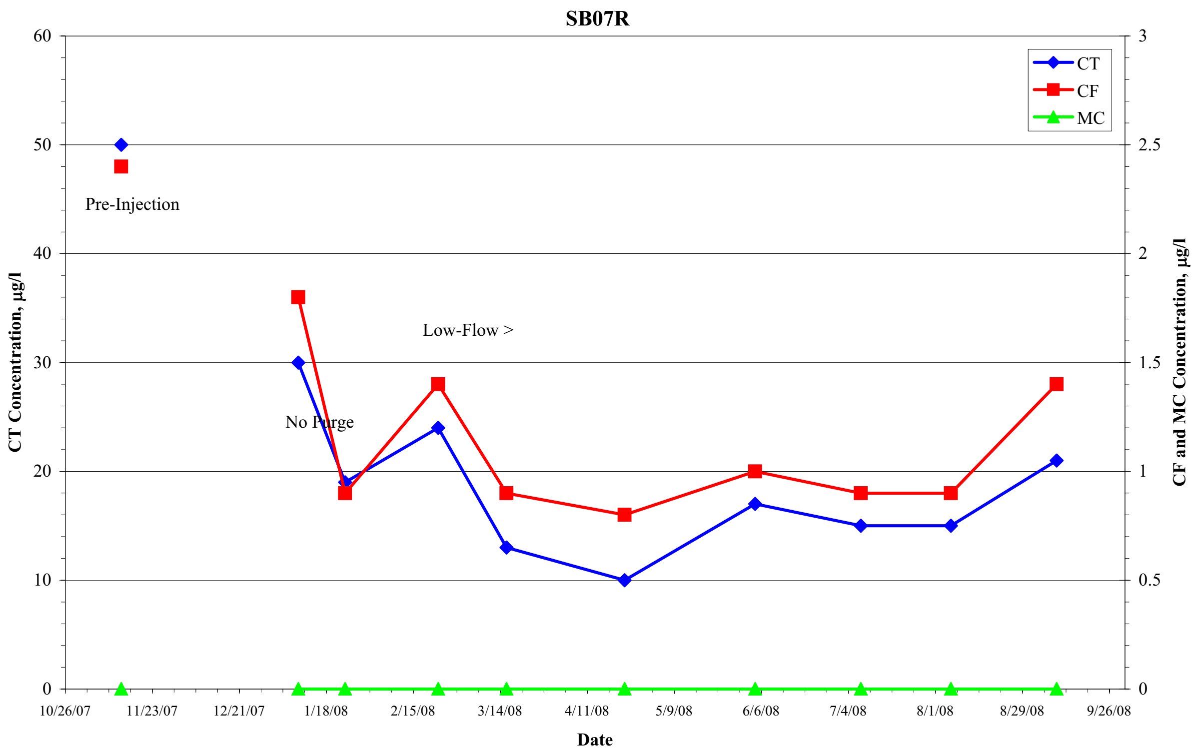


FIGURE D.11 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at locations PSB9 and PMP9, November 2007 to September 2008.

FIGURE D.12 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at location SB04, November 2007 to September 2008.



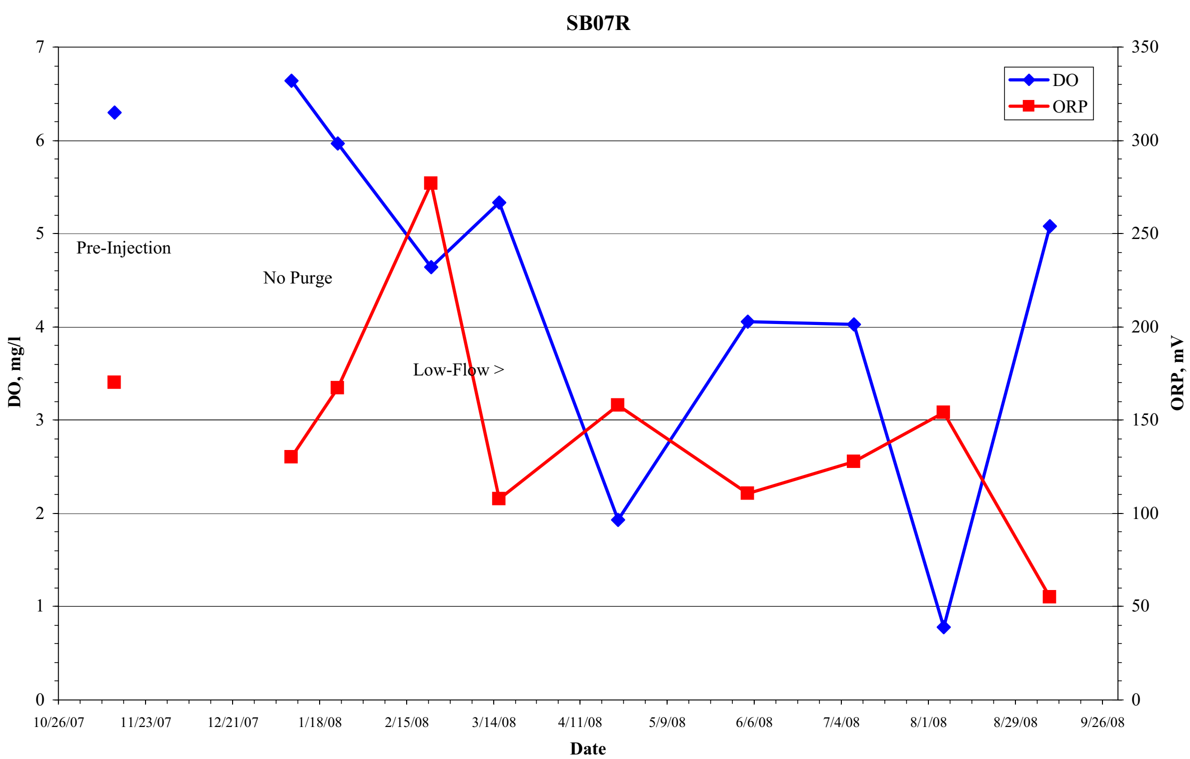
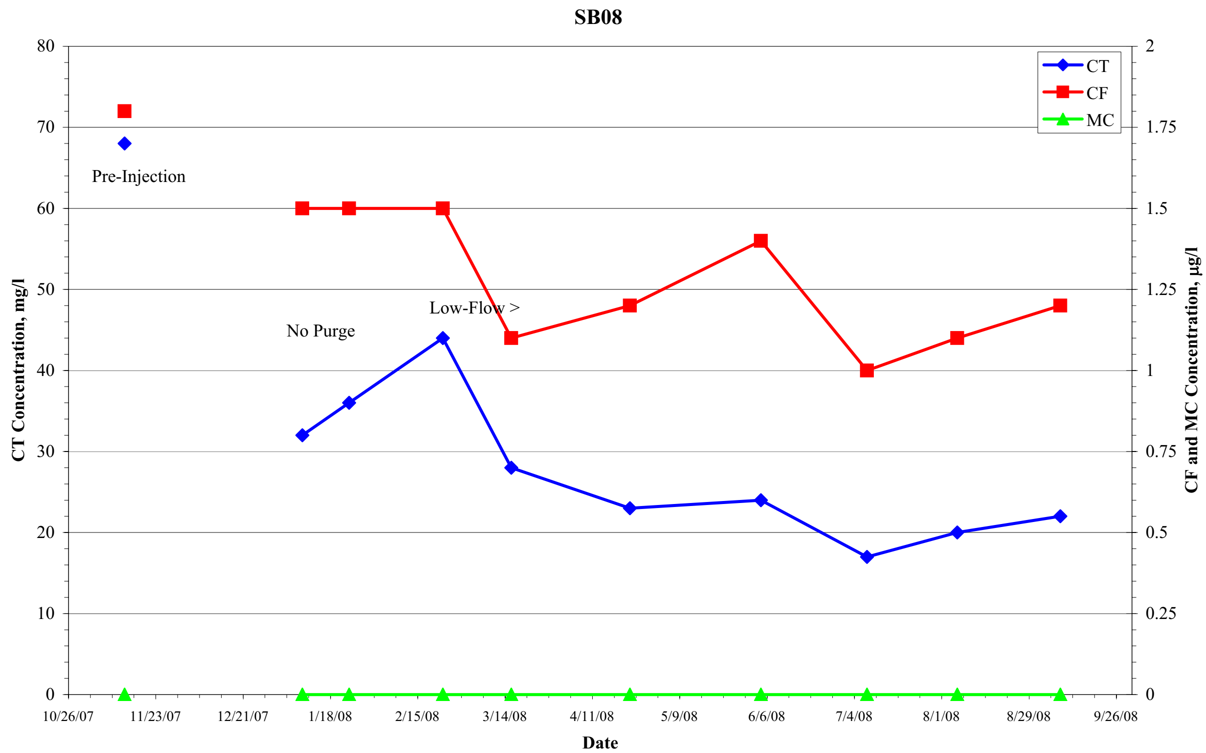


FIGURE D.13 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at location SB07R, November 2007 to September 2008.



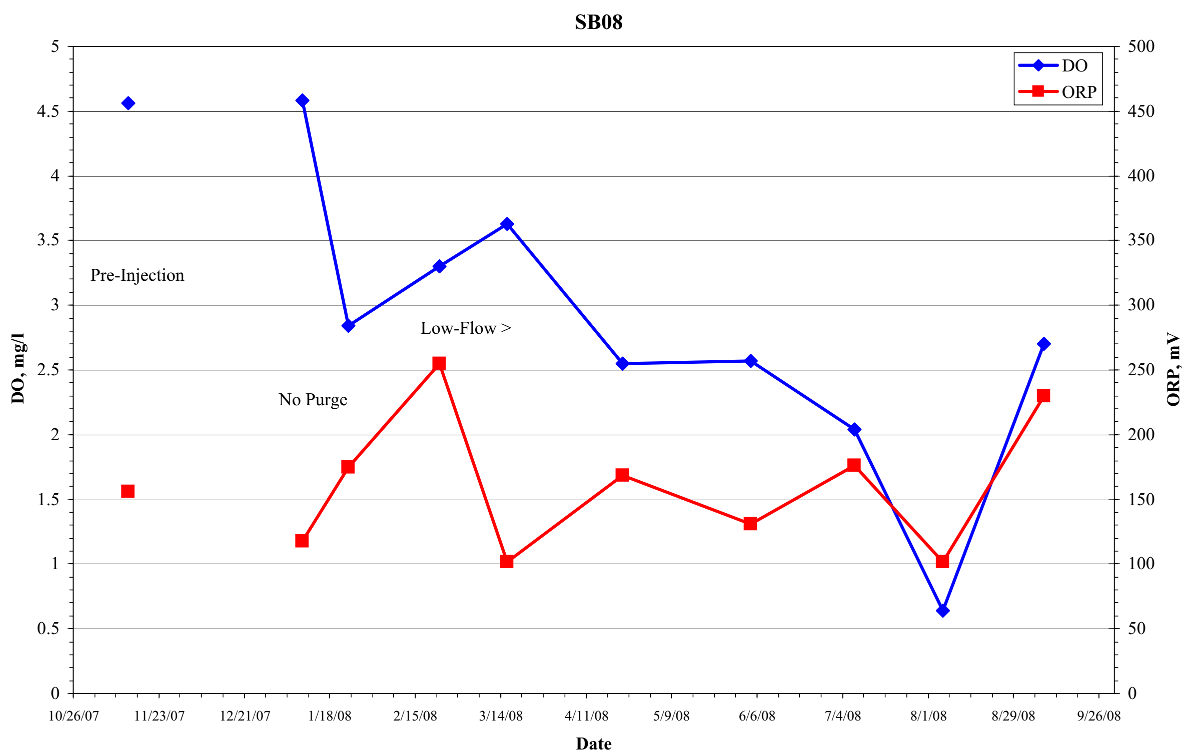


FIGURE D.14 Analytical results for volatile organic compounds, dissolved oxygen, and oxidation-reduction potential in groundwater samples collected at location SB08, November 2007 to September 2008.

Progress Report and Technical Evaluation of the ISCR Pilot Test Conducted at the Former CCC/USDA Grain Storage Facility in Centralia, Kansas

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Contents:

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Supplement 1:

Waste Handling, Characterization, and Disposal and Quality Control for Sample Collection, Handling, and Analysis

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Waste Handling, Characterization, and Disposal and Quality Control for Sample Collection, Handling, and Analysis

S1.1 Handling, Characterization, and Disposal of Investigation-Derived Waste

With the approval of the KDHE/BER, sampling during the two monitoring events in January 2008 was performed without purging to preclude possible remobilization of the injected ISCR fluids near pumping monitoring wells. Subsequent monitoring events were performed by using a low-flow purging and sampling technique. Purge water generated as potentially contaminated investigation-derived waste during the periodic monitoring events since January 2008 has been containerized on-site for subsequent sampling. The accumulated purge water was sampled on two occasions and analyzed by Pace Analytical Services, Inc., Lenexa, Kansas, with EPA Method 5030/8260 for VOCs, EPA Method 504.1 for ethylene dibromide (EDB), and EPA Method 300 for nitrate as nitrogen. Results were as follows:

- In sampling of accumulated wastewater on March 19, 2008, after the February and March 2008 monitoring events, carbon tetrachloride was detected at 6.6 μg/L and chloroform at 20 μg/L. No EDB was detected. Nitrate was present at 1.2 mg/L. With the approval of the KDHE (2008b), the wastewater was taken to the Sabetha publicly owned treatment works on May 21, 2008, for disposal.

- In sampling of accumulated wastewater on July 16, 2008, following the April, June, and July 2008 monitoring events, carbon tetrachloride was detected at 12.6 μg/L and chloroform at 22.2 μg/L. Nitrate and EDB were not detected. With the approval of the KDHE (2008c), the wastewater was taken to the Sabetha publicly owned treatment works on August 1, 2008, for disposal.

Wastewater generated during the August and September monitoring events has been containerized and remains on-site. This wastewater will be sampled for analysis, and the results will be transmitted to KDHE after the next monitoring event. Subsequent disposal of the wastewater will be subject to KDHE authorization.

S1.2 Quality Control for Sample Collection, Handling, and Analysis

Quality control/quality assurance (QA/QC) procedures followed during the Centralia pilot study were described in detail in the *Master Work Plan* (Argonne 2002b). The results of the QA/AC activities are summarized as follows:

- Sample collection and handling activities were monitored by the documentation of samples as they were collected and the use of chain-of-custody (COC) forms and custody seals to ensure sample integrity during the handling and shipment of samples for analysis.

- Samples collected for VOCs analyses were received at the laboratory with custody seals intact and at the appropriate preservation temperature. All samples were analyzed within required holding times.

- The QC samples collected to monitor sample collection and handling activities included field blanks, equipment rinsates, and trip blanks. Method blanks were analyzed with the samples to monitor analytical methodologies. Chloroform was present at low concentrations (< 2.6 μg/L) in waters used during the pilot study. Carbon tetrachloride was present at low concentration (< 2 μg/L) in 2 of 17 equipment rinsates collected. Qualification of associated samples was not warranted. Trip blanks were free of carbon tetrachloride contamination. Methylene chloride present in some method blanks associated with verification organic analyses by Envirosystems, Inc., resulted in qualification of the associated data. Analytical results for the samples collected to monitor sample collection and handling activities are in Table S1.1. These samples are described in Appendix A, Table A.1.

- Groundwater and soil samples were analyzed for VOCs at the AGEM Laboratory by the purge-and-trap method on a gas chromatograph-mass spectrometer system. Calibration checks with each sample delivery group were required to be within ±20% of the standard. Surrogate standard determinations performed on samples and blanks were within the specified range of 80-120% for all samples in either the initial analysis or a successful reanalysis.

- To monitor sample collection and analytical methodologies, replicate samples were collected, and samples were selected by the AGEM Laboratory for duplicate analyses. The analytical results for these secondary QA/QC samples (Table S1.2) compare well overall, with an average relative percent difference values between the primary and secondary QC analyses of 14.5% for carbon tetrachloride, 22.6% for chloroform, and 2.5% for methylene chloride. Some heterogeneity is evident in discrete pre-injection groundwater samples collected within the contaminant zone and in the initial samples collected from the monitoring wells without purging.

- In accordance with the QA/QC procedures defined in the *Master Work Plan* (Argonne 2002b), the analyses of samples at the AGEM Laboratory were verified at a second laboratory. The results for these verification organic analyses (Table S1.3) support the results from the AGEM Laboratory, with average relative percent difference values of 39.4% for carbon tetrachloride, 18.3% for chloroform, and 10.1% for methylene chloride. Summary pages for the verification organic analyses are in Supplement 5 (on CD).

- Samples shipped to TestAmerica for geochemical and attenuation parameter analyses were received with custody seals intact and at the appropriate preservation conditions. Results for laboratory QC samples prepared and analyzed with the samples to evaluate accuracy and precision were within acceptable limits. In the bromide analysis of two samples from monitoring well MW02 (CNMW02-W-26099 collected on 2/23/08 and CNMW02-W-26639 collected on 7/8/08), interfering peaks eluting where bromide would normally elute prevented detection of bromide. Matrix spike/matrix spike duplicate recoveries did not meet QC criteria. Reported bromide concentrations for samples collected in April, June, and August exceeded the maximum initial bromide concentration (150 mg/L) in the injected ISCR fluids, and hence they are also questionable.

TABLE S1.1 Results for quality control samples analyzed to monitor sample collection and handling activities during the pilot test at Centralia.

Sample	Sample Date	Medium	Sample Type[a]	Analysis Date	EPA Analytical Method	Lab[b]	Concentration: Carbon Tetrachloride	Chloroform	Methylene Chloride	Methane	Bromide	Units
CNQCTB-S-16347	11/12/07	Soil	TB	11/20/07	SW8260B	AGEM	ND[c]	ND	ND	–	–	µg/kg
CNQCTB-W-19947	11/13/07	Water	TB	11/14/07	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-19948	11/13/07	Water	TB	11/14/07	RSK-175	STL	–	–	–	ND	–	µg/L
CNQCBR-W-19962	11/14/07	Water	RI	11/15/07	524.2	AGEM	2.2	ND	ND	–	–	µg/L
CNQCTB-W-19959	11/14/07	Water	TB	11/15/07	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-19960	11/14/07	Water	TB	11/15/07	RSK-175	STL	–	–	–	ND	–	µg/L
CNQCTB-W-19961	11/14/07	Water	TB	11/16/07	SW8260	ESIC	ND	ND	ND	–	–	µg/L
CNPUBL-W-26062	11/15/07	Water	FB	11/19/07	415.1	STL	–	–	–	–	0.29	µg/L
CNQCFB-W-19965	11/15/07	Water	FB	11/16/07	524.2	AGEM	ND	0.2 J[d]	ND	–	–	µg/L
CNQCTB-W-19963	11/15/07	Water	TB	11/16/07	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNPUBL-W-26062	11/15/07	Water	FB	11/19/07	RSK-175	STL	–	–	–	ND	–	µg/L
CNQCTB-W-19964	11/15/07	Water	TB	11/15/07	RSK-175	STL	–	–	–	ND	–	µg/L
CNPUBL-W-26062	11/15/07	Water	FB	11/16/07	SW8260	ESIC	ND	2.6	ND	–	–	µg/L
CNQCTB-S-19969	11/16/07	Soil	TB	11/20/07	SW8260B	AGEM	ND	ND	ND	–	–	µg/kg
CN-S-Meohblank-27Nov07	11/27/07	Soil	TB	11/27/07	SW8260B	STL	ND	ND	ND	–	–	µg/kg
CNQCBR-W-25974	1/8/08	Water	RI	1/14/08	524.2	AGEM	1.1	3.2	ND	–	–	µg/L
CNQCBR-W-25977	1/9/08	Water	RI	1/14/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-25975	1/9/08	Water	TB	1/14/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-25976	1/9/08	Water	TB	1/16/08	SW8260	ESIC	ND	ND	ND	–	–	µg/L
CNQCRI-W-25982	1/24/08	Water	RI	1/28/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-25980	1/24/08	Water	TB	1/28/08	524.2	AGEM	ND	5.3	ND	–	–	µg/L
CNQCTB-W-25981	1/24/08	Water	TB	2/7/08	SW8260	ESIC	ND	ND	ND	–	–	µg/L
CNQCPR-W-26119	2/24/08	Water	RI	2/27/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-26118	2/24/08	Water	TB	2/27/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-25983	2/24/08	Water	TB	2/26/08	SW8260	ESIC	ND	ND	4.6 B[e]	–	–	µg/L
CNQCIR-W-26017	3/12/08	Water	RI	3/14/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCIR-W-26018	3/13/08	Water	RI	3/17/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-26014	3/13/08	Water	TB	3/14/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-26016	3/13/08	Water	TB	3/14/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-26014a	3/13/08	Water	TB	3/14/08	SW8260	ESIC	ND	ND	3.9 B	–	–	µg/L
CNQCIR-W-26034	3/19/08	Water	RI	3/20/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-26035	3/19/08	Water	TB	3/20/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-26035a	3/19/08	Water	TB	3/21/08	SW8260	ESIC	ND	ND	6.6 B	–	–	µg/L
CNQCIR-W-26039	3/20/08	Water	RI	3/25/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-26038	3/20/08	Water	TB	3/25/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCIR-W-26060	4/24/08	Water	RI	4/25/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCIR-W-26061	4/24/08	Water	RI	4/25/08	524.2	AGEM	ND	ND	ND	–	–	µg/L
CNQCTB-W-26059	4/24/08	Water	TB	4/25/08	524.2	AGEM	ND	ND	ND	–	–	µg/L

TABLE S1.1 (Cont.)

Sample	Sample Date	Medium	Sample Type[a]	Analysis Date	EPA Analytical Method	Lab[b]	Concentration: Carbon Tetrachloride	Chloroform	Methylene Chloride	Methane	Bromide	Units
CNQCTB-W-26059a	4/24/08	Water	TB	5/5/08	SW8260	ESIC	ND	ND	7.7 B	–	–	μg/L
CNQCIR-W-26634	6/4/08	Water	RI	6/6/08	524.2	AGEM	ND	ND	ND	–	–	μg/L
CNQCIR-W-26635	6/4/08	Water	RI	6/6/08	524.2	AGEM	ND	ND	ND	–	–	μg/L
CNQCTB-W-26638	6/5/08	Water	TB	6/9/08	524.2	AGEM	ND	ND	ND	–	–	μg/L
CNQCTB-W-26638a	6/5/08	Water	TB	7/11/08	SW8260	ESIC	ND	ND	ND	–	–	μg/L
CNQCIR-W-26653	7/8/08	Water	RI	7/10/08	524.2	AGEM	ND	ND	ND	–	–	μg/L
CNQCIR-W-26654	7/8/08	Water	RI	7/10/08	524.2	AGEM	ND	ND	ND	–	–	μg/L
CNQCTB-W-26657	7/8/08	Water	TB	7/10/08	524.2	AGEM	ND	0.5 J	ND	–	–	μg/L
CNQCTB-W-26657a	7/8/08	Water	TB	7/14/08	SW8260	STL	ND	ND	ND	–	–	μg/L
CNQCTB-W-26672	8/6/08	Water	TB	8/11/08	524.2	AGEM	ND	ND	ND	–	–	μg/L
CNQCTB-W-26672a	8/6/08	Water	TB	8/11/08	SW8260	STL	ND	ND	ND	–	–	μg/L
CNQCIR-W-26700	9/10/08	Water	RI	9/17/08	524.2	AGEM	ND	ND	ND	–	–	μg/L
CNQCIR-W-26701	9/10/08	Water	RI	9/18/08	524.2	AGEM	ND	ND	ND	–	–	μg/L
CNQCTB-W-26702	9/10/08	Water	TB	9/18/08	524.2	AGEM	ND	ND	ND	–	–	μg/L
CNQCTB-W-26702a	9/10/08	Water	TB	9/12/08	SW8260	STL	ND	ND	ND	–	–	μg/L

[a] Sample types: FB, field blank; RI, rinsate; TB, trip blank.

[b] Laboratories: AGEM, Applied Geosciences and Environmental Management; ESIC, Envirosystems; STL, Severn-Trent/TestAmerica.

[c] ND, not detected.

[d] Qualifier J indicates an estimated concentration below the method quantitation limit.

[e] Qualifier B indicates that methylene chloride was present in the associated method blank.

TABLE S1.2 Results from the AGEM Laboratory for primary soil and groundwater samples and associated replicate samples and duplicate analyses.

Sample Date	Location	Sample Depth (ft BGL)	Sample Medium	Sample Type	EPA Analytical Method	Sample	Analysis Type	Concentration			
								Carbon Tetrachloride	Chloroform	Methylene Chloride	Units
11/12/07	PSB1	40	Soil	CPT	SW8260B	CNPSB1-S-19946	Primary	44	4.6 J[a]	ND[b]	μg/kg
						CNPSB1-S-19946DUP	Duplicate	53	5.3 J	ND	μg/kg
11/13/07	PSB2	24	Soil	CPT	SW8260B	CNPSB2-S-19954	Primary	103	6.1 J	ND	μg/kg
						CNPSB2-S-19954REP	Replicate	76	12	ND	μg/kg
11/13/07	PSB1	55-60	Water	CPT	524.2	CNPSB1-W-16246	Primary	309	11	ND	μg/L
						CNPSB1-W-16246REP	Replicate	627	25	ND	μg/L
11/14/07	PSB3	55-60	Water	CPT	524.2	CNPSB3-W-16250	Primary	1285	30	ND	μg/L
						CNPSB3-W-16250REP	Replicate	1397	26	ND	μg/L
11/15/07	PSB8	55-60	Water	CPT	524.2	CNPSB8-W-26061	Primary	2029	18	ND	μg/L
						CNPSB8-W-26061REP	Replicate	1835	41	ND	μg/L
11/16/07	PSB3	8	Soil	CPT	SW8260B	CNPSB3-S-25961	Primary	ND	ND	ND	μg/kg
						CNPSB3-S-25961DUP	Duplicate	ND	ND	ND	μg/kg
11/16/07	PSB3	28	Soil	CPT	SW8260B	CNPSB3-S-25966	Primary	2.7 J	1.2 J	ND	μg/kg
						CNPSB3-S-25966REP	Replicate	5.4 J	1.1 J	ND	μg/kg
11/16/07	PSB3	32	Soil	CPT	SW8260B	CNPSB3-S-25967	Primary	13	1.7 J	ND	μg/kg
						CNPSB3-S-25967DUP	Duplicate	12	1.2 J	ND	μg/kg
11/16/07	PSB4	24	Soil	CPT	SW8260B	CNPSB4-S-19972	Primary	1.4 J	1.4 J	ND	μg/kg
						CNPSB4-S-19972REP	Replicate	2.7 J	1.1 J	ND	μg/kg
1/8/08	PMP7	50-60	Water	MW	524.2	CNPMP7-W-26066	Primary	119	26	ND	μg/L
						CNPMP7-W-26067	Replicate	121	17	ND	μg/L
1/9/08	PMP3	50-60	Water	MW	524.2	CNPMP3-W-26071	Primary	112	116	1.0	μg/L
						CNPMP3-W-26072	Replicate	52	115	1.0	μg/L
1/9/08	SB08	52-62	Water	MW	524.2	CNSB08-W-26070	Primary	32	1.5	ND	μg/L
						CNSB08-W-26070DUP	Duplicate	33	1.2	ND	μg/L
1/10/08	PMP1	50-60	Water	MW	524.2	CNPMP1-W-26079	Primary	158	22	ND	μg/L
						CNPMP1-W-26080	Replicate	171	26	ND	μg/L
1/10/08	PMP2	50-60	Water	MW	524.2	CNPMP2-W-26081	Primary	980	951	4.2	μg/L
						CNPMP2-W-26081DUP	Duplicate	860	816	3.9	μg/L
1/24/08	MW02	49.5-59.5	Water	MW	524.2	CNMW02-W-26097	Primary	ND	11	1.8	μg/L
						CNMW02-W-26098	Replicate	ND	11	2.4	μg/L
1/24/08	PMP2	50-60	Water	MW	524.2	CNPMP2-W-26084	Primary	265	875	17	μg/L
						CNPMP2-W-26085	Replicate	256	816	17	μg/L
1/24/08	PMP5	50-60	Water	MW	524.2	CNPMP5-W-26088	Primary	265	121	4.6	μg/L
						CNPMP5-W-26089	Replicate	229	140	5.4	μg/L

TABLE S1.2 (Cont.)

Sample Date	Location	Sample Depth (ft BGL)	Sample Medium	Sample Type	EPA Analytical Method	Sample	Analysis Type	Concentration: Carbon Tetrachloride	Concentration: Chloroform	Concentration: Methylene Chloride	Units
1/24/08	PMP6	50-60	Water	MW	524.2	CNPMP6-W-26090	Primary	26	31	2.9	µg/L
						CNPMP6-W-26090DUP	Duplicate	24	25	2.4	µg/L
2/24/08	PMP2	50-60	Water	MW	524.2	CNPMP2-W-25986	Primary	1249	715	24	µg/L
						CNPMP2-W-25988	Replicate	934	662	25	µg/L
2/24/08	PMP9	50-60	Water	MW	524.2	CNPMP9-W-25989	Primary	4.7	0.8 J	ND	µg/L
						CNPMP9-W-25989DUP	Duplicate	4.6	0.8 J	ND	µg/L
2/24/08	SB08	52-62	Water	MW	524.2	CNSB08-W-25978	Primary	44	1.5	ND	µg/L
						CNSB08-W-25979	Replicate	43	1.4	ND	µg/L
3/12/08	MW03	50.5-60.5	Water	MW	524.2	CNMW03-W-26001	Primary	2.3	ND	ND	µg/L
						CNMW03DUP-W-26021	Replicate	2.1	ND	ND	µg/L
3/13/08	PMP3	50-60	Water	MW	524.2	CNPMP3-W-26007	Primary	3.9	110	10	µg/L
						CNPMP3-W-26007DUP	Duplicate	3.9	114	11	µg/L
						CNPMP3DUP-W-26022	Replicate	4.2	109	9.2	µg/L
3/13/08	PMP4	48.75-58.75	Water	MW	524.2	CNPMP4-W-26008	Primary	31	4.4	ND	µg/L
						CNPMP4-W-26008DUP	Duplicate	28	4.0	ND	µg/L
3/19/08	MW04	37.5-47.5	Water	MW	524.2	CNMW04-W-26024	Primary	1.3	ND	ND	µg/L
						CNMW04DUP-W-26036	Replicate	1.5	ND	ND	µg/L
3/19/08	MW06	46.5-56.5	Water	MW	524.2	CNMW06-W-26026	Primary	ND	ND	ND	µg/L
						CNMW06DUP-W-26037	Replicate	ND	ND	ND	µg/L
4/23/08	SB08	52-62	Water	MW	524.2	CNSB08-W-26049	Primary	23	1.2	ND	µg/L
						CNSB08-W-26049DUP	Duplicate	24	1.4	ND	µg/L
4/24/08	PMP2	50-60	Water	MW	524.2	CNPMP2-W-26051	Primary	2254	476	8.7	µg/L
						CNPMP2-W-26051DUP	Duplicate	2739	515	8.4	µg/L
4/24/08	PMP5	50-60	Water	MW	524.2	CNPMP5-W-26054	Primary	357	101	2.9	µg/L
						CNPMP5DUP-W-26063	Replicate	391	105	3.2	µg/L
4/24/08	PMP9	50-60	Water	MW	524.2	CNPMP9-W-26058	Primary	5.7	1.8	ND	µg/L
						CNPMP9-W-26058DUP	Duplicate	5.7	0.5 J	ND	µg/L
4/24/08	SB04	51-61	Water	MW	524.2	CNSB04-W-26047	Primary	16	0.3 J	ND	µg/L
						CNSB04DUP-W-26062	Replicate	22	0.3 J	ND	µg/L
6/4/08	SB07R	45-60	Water	MW	524.2	CNSB07R-W-26623	Primary	17	1.0	ND	µg/L
						CNSB07RDUP-W-26636	Replicate	13	0.8 J	ND	µg/L
6/5/08	PMP2	50-60	Water	MW	524.2	CNPMP2-W-26626	Primary	2873	340	6.6	µg/L
						CNPMP2DUP-W-26637	Replicate	2155	272	6.1	µg/L
6/5/08	PMP3	50-60	Water	MW	524.2	CNPMP3-W-26627	Primary	46	129	32	µg/L
						CNPMP3-W-26627DUP	Duplicate	45	127	34	µg/L

TABLE S1.2 (Cont.)

Sample Date	Location	Sample Depth (ft BGL)	Sample Medium	Sample Type	EPA Analytical Method	Sample	Analysis Type	Concentration: Carbon Tetrachloride	Chloroform	Methylene Chloride	Units
6/5/08	PMP7	50-60	Water	MW	524.2	CNPMP7-W-26631	Primary	120	8.8	ND	μg/L
						CNPMP7-W-26631DUP	Duplicate	129	9.7	ND	μg/L
7/7/08	SB04	51-61	Water	MW	524.2	CNSB04-W-26641	Primary	14	0.2 J	ND	μg/L
						CNSB04DUP-W-26655	Replicate	13	0.2 J	ND	μg/L
7/7/08	SB08	52-62	Water	MW	524.2	CNSB08-W-26643	Primary	17	1	ND	μg/L
						CNSB08-W-26643DUP	Duplicate	15	1	ND	μg/L
7/8/08	PMP9	50-60	Water	MW	524.2	CNPMP9-W-26652	Primary	7.2	1.4	ND	μg/L
						CNPMP9DUP-W-26656	Replicate	8.7	0.6 J	ND	μg/L
8/6/08	PMP6	50-60	Water	MW	524.2	CNPMP6-W-26668	Primary	108	8.2	ND	μg/L
						CNPMP6-W-26668DUP	Duplicate	107	8.9	ND	μg/L
8/21/08	PSB13	32	Soil	CPT	SW8260B	CNPSB13-S-27135	Primary	ND	17	ND	μg/kg
						CNPSB13-S-27135DUP	Duplicate	ND	15	ND	μg/kg
8/21/08	PSB13	36	Soil	CPT	SW8260B	CNPSB13-S-27137	Primary	61	9.6 J	ND	μg/kg
						CNPSB13-S-27137DUP	Duplicate	62	10	ND	μg/kg
9/9/08	PMP9	50-60	Water	MW	524.2	CNPMP9-W-26697	Primary	7.6	0.4 J	ND	μg/L
						CNPMP9-W-26697DUP	Duplicate	7.8	0.4 J	ND	μg/L
9/9/08	SB04	51-61	Water	MW	524.2	CNSB04-W-26684	Primary	15	0.3 J	ND	μg/L
						CNSB04-W-26684DUP	Duplicate	14	0.2 J	ND	μg/L
9/10/08	MW05	34.5-44.5	Water	MW	524.2	CNMW05-W-26677	Primary	13	0.7 J	ND	μg/L
						CNMW05DUP-W-26698	Replicate	12	0.6 J	ND	μg/L
9/10/08	MW08	38-53	Water	MW	524.2	CNMW08-W-26680	Primary	ND	ND	ND	μg/L
						CNMW08DUP-W-26699	Replicate	ND	ND	ND	μg/L

[a] Qualifier J indicates an estimated concentration below the method quantitation limit of 10 μg/kg for soil samples or 1.0 μg/L for water samples.

[b] ND, not detected at an instrument detection limit of 1.0 μg/kg for soil samples or 0.1 μg/L for water samples.

TABLE S1.3 Results for verification organic analyses of soil and groundwater samples collected during the pilot test at Centralia.

					Concentration								
					AGEM Laboratory				Secondary Laboratory				
Sample Date	Location	Sample Depth (ft Bgl)	Sample Medium	Sample	Carbon Tetrachloride	Chloroform	Methylene Chloride	Quantification Limit	Carbon Tetrachloride	Chloroform	Methylene Chloride	Quantification Limit	Units
11/12/07	PSB1	20	Soil	CNPSB1-S-16342	84	14	ND[a]	10	180	7 J[b]	ND	8.8	µg/kg
11/13/07	PSB2	8	Soil	CNPSB2-S-19950	ND	ND	ND	10	2.2 J	2.8 J	23	7.8	µg/kg
11/13/07	PSB1	55-60	Water	CNPSB1-W-16246	309	11	ND	1.0	570	28	ND	5	µg/L
11/14/07	PSB3	55-60	Water	CNPSB3-W-16250	1285	30	ND	1.0	1200	25	ND	5	µg/L
11/14/07	PSB6	55-60	Water	CNPSB6-W-16254	116	5.2	ND	1.0	57	5.6	ND	5	µg/L
11/16/07	PSB3	28	Soil	CNPSB3-S-25966REP	5.4 J	1.1 J	ND	10	8.2 J	ND	ND	8.4	µg/kg
11/16/07	PSB4	24	Soil	CNPSB4-S-19972	1.4 J	1.4 J	ND	10	4.2 J	ND	ND	8.3	µg/kg
1/9/08	PMP3	55-60	Water	CNPMP3-W-26071	112	116	1	1.0	ND	150	ND	5	µg/L
1/9/08	PMP4	48.75-58.75	Water	CNPMP4-W-26068	36	12	ND	1.0	7.9	22	ND	5	µg/L
1/9/08	PMP8	55-60	Water	CNPMP8-W-26075	30	606	3.4	1.0	5.1	720	4.1 J	5	µg/L
1/24/08	PMP2	50-60	Water	CNPMP2-W-26084	265	875	17	1.0	140	930 E[c]	11	5	µg/L
1/24/08	PMP5	50-60	Water	CNPMP5-W-26088	265	121	4.6	1.0	ND	100	3.2 J	5	µg/L
2/24/08	SB08	52-62	Water	CNSB08-W-25978	44	1.5	ND	1.0	43	ND	3 J B[d]	5	µg/L
2/24/08	PMP2	50-60	Water	CNPMP2-W-25986	1249	715	24	1.0	720 E	570 E	13	5	µg/L
3/12/08	MW03	50.5-60.5	Water	CNMW03-W-26001	2.3	ND	ND	1.0	ND	ND	3.5 JB	5	µg/L
3/13/08	PMP3	50-60	Water	CNPMP3-W-26007	3.9	110	10	1.0	ND	140	8.9	5	µg/L
3/13/08	PMP7	50-60	Water	CNPMP7-W-26011	121	14	0.6 J	1.0	67	16	4.4 J B	5	µg/L
3/19/08	MW04	37.5-47.4	Water	CNMW04-W-26024	1.3	ND	ND	1.0	ND	ND	6.8 B	5	µg/L
3/19/08	MW06	46.5-56.5	Water	CNMW06-W-26026	ND	ND	ND	1.0	ND	ND	7 B	5	µg/L
4/24/08	PMP5	50-60	Water	CNPMP5-W-26054	357	101	2.9	1.0	280	81	20 B	5	µg/L
4/24/08	SB04	51-61	Water	CNSB04-W-26047	16	0.3 J	ND	1.0	ND	ND	9 J B	5	µg/L
6/4/08	SB04	51-61	Water	CNSB04-W-26622	25	0.4 J	ND	1.0	16	ND	ND	5	µg/L
6/5/08	PMP7	50-60	Water	CNPMP7-W-26631	120	8.8	ND	1.0	130	9.1	ND	5	µg/L
7/7/08	MW03	50.5-60.5	Water	CNMW03-W-26640	3.3	ND	ND	1.0	2.5	ND	ND	0.5	µg/L
7/8/08	PMP3	50-60	Water	CNPMP3-W-26646	42	90	20	1.0	33	92	17	0.5	µg/L
8/6/08	PMP6	50-60	Water	CNPMP6-W-26668	108	8.2	ND	1.0	110	8.5	0.29 J	0.5	µg/L
8/6/08	SB07R	45-60	Water	CNSB07R-W-26661	15	0.9 J	ND	1.0	15	1.1	ND	0.5	µg/L
9/9/08	MW01	54.5-64.5	Water	CNMW01-W-26673	ND	ND	ND	1.0	ND	ND	ND	0.5	µg/L
9/9/08	MW04	37.5-47.4	Water	CNMW04-W-26676	2	ND	ND	1.0	1.8	ND	ND	0.5	µg/L
9/9/08	PMP1	50-60	Water	CNPMP1-W-26689	136	30	ND	1.0	120	24	0.3 J	0.5	µg/L

[a] ND, contaminant not detected.

[b] J, estimated concentraion below indicated quantification limit.

[c] E, concentration exceeded calibration range for analysis.

[d] B, methylene chloride was present in the associated laboratory blank.

Supplement 2:

Analytical Results for Groundwater and Soil Samples Collected during the Pre-Injection Baseline Sampling Activities

TABLE S2.1 Baseline characterization: Field measurements made prior to collection of groundwater samples within and adjacent to the pilot test area.

							Concentration (mg/L)			
Location	Sample	Sample Date	Depth (ft BGL)	Temperature (°C)	pH	Conductivity (μS/cm)	Dissolved Oxygen	Carbon Dioxide	Iron(II)	ORP (mV)
Samples from existing monitoring wells within and adjacent to the treatment zone										
MW02	CNMW02-W-16227	9/26/07	49.5-59.5	15.4	7.04	763	3.39	25	0	156
MW03	CNMW03-W-16223	9/25/07	50.5-60.5	14.3	6.97	738	8.44	30	0	162
SB04	CNSB04-W-16230	9/26/07	51-61	19.8	7.03	760	6.61	30	0	202
SB07R	CNSB07R-W-16225	9/25/07	45-60	17.4	7.06	642	6.30	35	0.11	170
SB08	CNSB08-W-16229	9/26/07	52-62	17.4	7.11	617	4.56	40	0.77	156
Direct-push samples collected within and adjacent to the treatment zone										
PSB1	CNPSB1-W-16245	11/12/07	50-55	18.0	6.89	630	–	65	0	34
PSB1	CNPSB1-W-16246	11/13/07	55-60	13.4	6.93	703	7.65	55	0.25	-70
PSB2	CNPSB2-W-16247	11/13/07	50-55	18.3	6.89	611	8.31	50	0	80
PSB2	CNPSB2-W-16248	11/13/07	55-60	17.1	6.97	625	4.65	35	0	-53
PSB3	CNPSB3-W-16249	11/13/07	50-55	17.2	6.88	708	3.65	–	0	-53
PSB3	CNPSB3-W-16250	11/14/07	55-60	16.7	6.87	699	3.28	65	0.50	-22
PSB4	CNPSB4-W-16251	11/14/07	50-55	16.2	6.88	702	5.00	50	0.26	-53
PSB4	CNPSB4-W-16252	11/14/07	55-60	16.8	6.90	712	2.88	50	0.20	-64
PSB5	CNPSB5-W-16255	11/14/07	50-55	16.9	6.85	729	7.24	50	0	9
PSB5	CNPSB5-W-16256	11/14/07	55-60	17.3	6.94	811	3.94	45	0.98	-311
PSB6	CNPSB6-W-16253	11/14/07	50-55	17.3	6.86	705	5.59	60	0.73	-46
PSB6	CNPSB6-W-16254	11/14/07	55-60	17.0	6.92	717	4.20	50	0	-62
PSB7	CNPSB7-W-16258	11/15/07	50-55	15.3	6.88	685	3.70	45	1.31	-343
PSB7	CNPSB7-W-16257	11/15/07	55-60	16.9	6.85	706	–	55	2.69	66
PSB8	CNPSB8-W-26060	11/15/07	50-55	15.9	6.95	678	3.78	30	0.54	–
PSB8	CNPSB8-W-26061	11/15/07	55-60	16.7	6.87	649	4.84	50	0.77	–
PSB9	CNPSB9-W-26063	11/15/07	50-55	16.9	6.94	534	6.53	55	0	–
PSB9	CNPSB9-W-26064	11/15/07	55-60	17.7	6.92	531	7.14	35	0.25	–

TABLE S2.2 Baseline characterization: Results of organic analyses of groundwater and soil samples collected within and adjacent to the pilot test area.

					Concentration			
Location	Sample	Sample Date	Depth (ft BGL)	Medium	Carbon Tetrachloride	Chloroform	Methylene Chloride	Units
Samples from existing monitoring wells within and adjacent to the treatment zone								
MW02	CNMW02-W-16227	9/26/07	49.5-59.5	Water	1138	18	ND[a]	µg/L
MW03	CNMW03-W-16223	9/25/07	50.5-60.5	Water	3.5	ND	ND	µg/L
SB04	CNSB04-W-16230	9/26/07	51-61	Water	36	0.4 J	ND	µg/L
SB07R	CNSB07R-W-16225	9/25/07	45-60	Water	50	2.4	ND	µg/L
SB08	CNSB08-W-16229	9/26/07	52-62	Water	68	1.8	ND	µg/L
Direct-push samples collected within and adjacent to the treatment zone								
PSB1	CNPSB1-S-16338	11/12/07	4	Soil	ND	ND	ND	µg/kg
PSB1	CNPSB1-S-16339	11/12/07	8	Soil	1.7 J	1.2 J	ND	µg/kg
PSB1	CNPSB1-S-16340	11/12/07	12	Soil	4.4 J	3 J	ND	µg/kg
PSB1	CNPSB1-S-16341	11/12/07	16	Soil	42	6.4 J	ND	µg/kg
PSB1	CNPSB1-S-16342	11/12/07	20	Soil	84	14	ND	µg/kg
PSB1	CNPSB1-S-16343	11/12/07	24	Soil	219	3.7 J	ND	µg/kg
PSB1	CNPSB1-S-16344	11/12/07	28	Soil	112	11	ND	µg/kg
PSB1	CNPSB1-S-16345	11/12/07	32	Soil	91	8.3 J	ND	µg/kg
PSB1	CNPSB1-S-16346	11/12/07	36	Soil	122	3 J	ND	µg/kg
PSB1	CNPSB1-S-19946	11/12/07	40	Soil	44	4.6 J	ND	µg/kg
PSB1	CNPSB1-W-16245	11/12/07	50-55	Water	782	27	ND	µg/L
PSB1	CNPSB1-W-16246	11/13/07	55-60	Water	309	11	ND	µg/L
PSB2	CNPSB2-S-19949	11/13/07	3.8	Soil	ND	ND	ND	µg/kg
PSB2	CNPSB2-S-19950	11/13/07	8	Soil	ND	ND	ND	µg/kg
PSB2	CNPSB2-S-19951	11/13/07	12	Soil	ND	ND	ND	µg/kg
PSB2	CNPSB2-S-19952	11/13/07	16	Soil	ND	ND	ND	µg/kg
PSB2	CNPSB2-S-19953	11/13/07	20	Soil	9 J	3.5 J	ND	µg/kg
PSB2	CNPSB2-S-19954	11/13/07	24	Soil	103	6.1 J	ND	µg/kg
PSB2	CNPSB2-S-19955	11/13/07	28	Soil	66	8.8 J	ND	µg/kg
PSB2	CNPSB2-S-19956	11/13/07	32	Soil	152	5.3 J	ND	µg/kg
PSB2	CNPSB2-S-19957	11/13/07	36	Soil	173	3.5 J	ND	µg/kg
PSB2	CNPSB2-S-19958	11/13/07	40	Soil	62	2.9 J	ND	µg/kg
PSB2	CNPSB2-W-16247	11/13/07	50-55	Water	405	3.4	ND	µg/L
PSB2	CNPSB2-W-16248	11/13/07	55-60	Water	16	2.2	ND	µg/L
PSB3	CNPSB3-S-25970	11/16/07	4	Soil	ND	ND	ND	µg/kg
PSB3	CNPSB3-S-25961	11/16/07	8	Soil	ND	ND	ND	µg/kg
PSB3	CNPSB3-S-25962	11/16/07	12	Soil	ND	ND	ND	µg/kg
PSB3	CNPSB3-S-25963	11/16/07	16	Soil	ND	ND	ND	µg/kg
PSB3	CNPSB3-S-25964	11/16/07	20	Soil	ND	ND	ND	µg/kg
PSB3	CNPSB3-S-25965	11/16/07	24	Soil	1.2 J	ND	ND	µg/kg
PSB3	CNPSB3-S-25966	11/16/07	28	Soil	2.7 J	1.2 J	ND	µg/kg
PSB3	CNPSB3-S-25967	11/16/07	32	Soil	13	1.7 J	ND	µg/kg
PSB3	CNPSB3-S-25968	11/16/07	36	Soil	20	2.4 J	ND	µg/kg
PSB3	CNPSB3-S-25969	11/16/07	40	Soil	15	4.3 J	ND	µg/kg
PSB3	CNPSB3-W-16249	11/13/07	50-55	Water	987	50	ND	µg/L
PSB3	CNPSB3-W-16250	11/14/07	55-60	Water	1285	30	ND	µg/L
PSB4	CNPSB4-S-19966	11/16/07	4	Soil	ND	ND	ND	µg/kg
PSB4	CNPSB4-S-19967	11/16/07	8	Soil	ND	ND	ND	µg/kg
PSB4	CNPSB4-S-19968	11/16/07	12	Soil	ND	ND	ND	µg/kg
PSB4	CNPSB4-S-19970	11/16/07	16	Soil	ND	ND	ND	µg/kg
PSB4	CNPSB4-S-19971	11/16/07	20	Soil	ND	ND	ND	µg/kg
PSB4	CNPSB4-S-19972	11/16/07	24	Soil	1.4 J	1.4 J	ND	µg/kg
PSB4	CNPSB4-S-19973	11/16/07	28	Soil	24	4.7 J	ND	µg/kg

TABLE S2.2 (Cont.).

Location	Sample	Sample Date	Depth (ft BGL)	Medium	Concentration Carbon Tetrachloride	Chloroform	Methylene Chloride	Units
Direct-push samples collected within and adjacent to the treatment zone (cont.)								
PSB4	CNPSB4-S-19974	11/16/07	32	Soil	89	7.8 J	ND	μg/kg
PSB4	CNPSB4-S-19975	11/16/07	36	Soil	58	6 J	ND	μg/kg
PSB4	CNPSB4-S-25960	11/16/07	40	Soil	57	9.7 J	ND	μg/kg
PSB4	CNPSB4-W-16251	11/14/07	50-55	Water	908	17	ND	μg/L
PSB4	CNPSB4-W-16252	11/14/07	55-60	Water	830	25	ND	μg/L
PSB5	CNPSB5-W-16255	11/14/07	50-55	Water	770	16	ND	μg/L
PSB5	CNPSB5-W-16256	11/14/07	55-60	Water	460	80	0.6 J	μg/L
PSB6	CNPSB6-W-16253	11/14/07	50-55	Water	114	2.5	ND	μg/L
PSB6	CNPSB6-W-16254	11/14/07	55-60	Water	116	5.2	ND	μg/L
PSB7	CNPSB7-W-16258	11/15/07	50-55	Water	326	82	0.7 J	μg/L
PSB7	CNPSB7-W-16257	11/15/07	55-60	Water	148	6.6	ND	μg/L
PSB8	CNPSB8-W-26060	11/15/07	50-55	Water	2646	103	2.5	μg/L
PSB8	CNPSB8-W-26061	11/15/07	55-60	Water	2029	18	ND	μg/L
PSB9	CNPSB9-W-26063	11/15/07	50-55	Water	ND	0.2 J	ND	μg/L
PSB9	CNPSB9-W-26064	11/15/07	55-60	Water	1.4	0.2 J	ND	μg/L

[a] ND, not detected at instrument detection limits of 0.1 μg/L for water samples and 1.0 μg/kg for soil samples.

[b] Qualifier J indicates an estimated concentration below the purge-and-trap method quantitation limit of 1.0 μg/L for water samples or 10 μg/kg for soil samples.

TABLE S2.3 Baseline characterization: Results for geochemical and attenuation parameter analyses of groundwater samples collected within and adjacent to the treatment zone.

				Concentration[a] (mg/L)									
Location	Sample	Sample Date	Depth (ft BGL)	Alkalinity	Aluminum	Bromide	Calcium	Chloride	Iron	Magnesium	Manganese	Nitrate as N	Nitrate-Nitrite Nitrogen
Samples from existing monitoring wells within and adjacent to the treatment zone													
MW02	CNMW02-W-16227	9/26/07	49.5-59.5	340	0.2 U	–	69.4	7.5	0.1 U	26.6	0.015 U	8.0	9.1
MW03	CNMW03-W-16223	9/25/07	50.5-60.5	330	0.2 U	–	77.9	25	0.1 U	30.0	0.015 U	7.9	–
SB04	CNSB04-W-16230	9/26/07	51-61	370	0.2 U	–	77.4	42	0.1 U	29.5	0.015 U	1.3	2.0
SB07R	CNSB07R-W-16225	9/25/07	45-60	300	0.2 U	–	69.8	27	0.1 U	27.1	0.015 U	1.1	–
SB08	CNSB08-W-16229	9/26/07	52-62	300	0.2 U	–	71.7	14	0.1 U	30.1	0.015 U	0.94	1.1
Direct-push samples collected within and adjacent to the treatment zone													
PSB1	CNPSB1-W-16245	11/12/07	50-55	530	0.2 U	0.24	73	13	0.1 U	26.5	0.147	7.6	7.8
PSB1	CNPSB1-W-16246	11/13/07	55-60	340	0.2 U	0.14	72.5	12	0.1 U	27.9	0.0816	8.4	8.3
PSB2	CNPSB2-W-16247	11/13/07	50-55	330	0.2 U	0.19	77.8	15	0.1 U	27.7	0.0523	6.7	5.8
PSB2	CNPSB2-W-16248	11/13/07	55-60	340	0.2 U	0.40	72.3	21	0.1 U	28.4	0.595	3.3	2.8
PSB3	CNPSB3-W-16249	11/13/07	50-55	–	0.2 U	0.49	84.5	25	0.2 U	30.0	0.19	8.9	9.1
PSB3	CNPSB3-W-16250	11/14/07	55-60	360	0.2 U	0.49	79.7	17	0.2 U	29.7	0.299	11	10
PSB4	CNPSB4-W-16251	11/14/07	50-55	350	0.2 U	0.16	85.4	9.7	0.2 U	30.0	0.0913	9.9	11
PSB4	CNPSB4-W-16252	11/14/07	55-60	350	0.2 U	0.31	80.8	14	0.2 U	30.3	0.69	10	11
PSB5	CNPSB5-W-16255	11/14/07	50-55	350	0.2 U	0.95	78.6	51	0.2 U	28.5	0.0763	3.4	3.1
PSB5	CNPSB5-W-16256	11/14/07	55-60	340	0.2 U	2.0	80.9	96	0.2 U	30.9	1.29	2.4	2.5
PSB6	CNPSB6-W-16253	11/14/07	50-55	330	0.2 U	0.72	92.4	41	0.2 U	33.6	0.35	8.1	8.6
PSB6	CNPSB6-W-16254	11/14/07	55-60	350	0.2 U	0.26	88.3	19	0.2 U	33.6	0.506	11	12
PSB7	CNPSB7-W-16258	11/15/07	50-55	340	0.2 U	0.49	77.1	24	0.2 U	28.2	1.05	8.7	8.5
PSB7	CNPSB7-W-16257	11/15/07	55-60	400	0.2 U	0.43	85.1	19	0.2 U	30.8	0.015 U	11	10
PSB8	CNPSB8-W-26060	11/15/07	50-55	360	0.2 U	1.0	81.8	36	0.2 U	29.5	0.219	5.0	4.4
PSB8	CNPSB8-W-26061	11/15/07	55-60	350	0.2 U	0.78	78.4	37	0.2 U	30.6	0.704	4.1	3.4
PSB9	CNPSB9-W-26063	11/15/07	50-55	330	0.2 U	0.15	71.4	9.2	0.2 U	27.6	0.0795	0.27	0.15
PSB9	CNPSB9-W-26064	11/15/07	55-60	330	0.2 U	0.15	70.4	8.7	0.2 U	28.1	0.015 U	0.21	0.12
Water used for preparation of EHC injection mixture													
QC	CNPUBL-W-26062	11/15/07	–	350	0.2 U	0.29	74.4	12	0.14 B	26.7	0.0981	0.15	–

TABLE S2.3 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Concentration[a] (mg/L)									Methane (μg/L)
				Phosphate	Phosphorus	Potassium	Silicon	Sodium	Sulfate	Sulfide	Zinc	TOC[b]	
Sample from existing monitoring wells within and adjacent to the treatment zone													
MW02	CNMW02-W-16227	9/26/07	49.5-59.5	0.2 U	0.25 U	5 U	14.4	57.0	17	0.02 U	0.02 U	1.3	13
MW03	CNMW03-W-16223	9/25/07	50.5-60.5	0.2 U	0.25 U	5 U	15.6	44.2	7.6	0.02 U	0.02 U	1.5	<2[c]
SB04	CNSB04-W-16230	9/26/07	51-61	0.2 U	0.25 U	5 U	16.4	58.0	8.5	0.02 U	0.02 U	1.2	<2
SB07R	CNSB07R-W-16225	9/25/07	45-60	0.2 U	0.25 U	5 U	14.9	33.7	14	0.02 U	0.0546	1.0	<2
SB08	CNSB08-W-16229	9/26/07	52-62	0.2 U	0.25 U	5 U	16.7	26.8	6.9	0.02 U	0.02 U	1.3	<2
Direct-push samples collected within and adjacent to the treatment zone													
PSB1	CNPSB1-W-16245	11/12/07	50-55	0.2 U	0.25 U	5 U	13.8	59.6	8.3	0.082	0.02 U	10.4	<2
PSB1	CNPSB1-W-16246	11/13/07	55-60	0.2 U	0.25 U	5 U	14.5	57.6	6.6	0.02 U	0.02 U	11	2
PSB2	CNPSB2-W-16247	11/13/07	50-55	0.2 U	0.25 U	5 U	15.3	46.2	3.8	0.02 U	0.02 U	5.2	<2
PSB2	CNPSB2-W-16248	11/13/07	55-60	0.2 U	0.25 U	5 U	13.8	40.9	4.7	0.19	0.02 U	2.4	2.7
PSB3	CNPSB3-W-16249	11/13/07	50-55	0.2 U	0.25 U	5 U	12.0	53.7	21	0.02 U	0.02 U	2.8	<2
PSB3	CNPSB3-W-16250	11/14/07	55-60	0.2 U	0.25 U	5 U	14.7	65.8	20	0.02 U	0.02 U	4.1	<2
PSB4	CNPSB4-W-16251	11/14/07	50-55	0.2 U	0.25 U	5 U	15.8	56.9	22	0.024	0.02 U	1.7	<2
PSB4	CNPSB4-W-16252	11/14/07	55-60	0.2 U	0.25 U	5 U	12.6	66.4	23	0.026	0.02 U	2.2	3.8
PSB5	CNPSB5-W-16255	11/14/07	50-55	0.2 U	0.25 U	5 U	16.1	72.9	6.1	0.02 U	0.02 U	1.8	<2
PSB5	CNPSB5-W-16256	11/14/07	55-60	0.2 U	0.25 U	5 U	11.7	74.6	10	0.02 U	0.02 U	2.2	<2
PSB6	CNPSB6-W-16253	11/14/07	50-55	0.2 U	0.25 U	5 U	13.4	40.1	9.3	0.02 U	0.02 U	3.6	<2
PSB6	CNPSB6-W-16254	11/14/07	55-60	0.2 U	0.25 U	5 U	15.6	52.1	16	0.02 U	0.02 U	5.1	4.1
PSB7	CNPSB7-W-16258	11/15/07	50-55	0.2 U	0.25 U	5.98	13.2	54.5	13	0.02 U	0.02 U	3.6	3.4
PSB7	CNPSB7-W-16257	11/15/07	55-60	0.2 U	0.25 U	5 U	14.7	58.6	16	0.02 U	0.02 U	4.8	<2
PSB8	CNPSB8-W-26060	11/15/07	50-55	0.2 U	0.25 U	5 U	14.0	56.5	18	0.02 U	0.02 U	2.3	2.5
PSB8	CNPSB8-W-26061	11/15/07	55-60	0.2 U	0.25 U	5 U	12.6	45.0	5.1	0.02 U	0.02 U	2.6	<2
PSB9	CNPSB9-W-26063	11/15/07	50-55	0.2 U	0.25 U	5 U	14.5	32.4	1.8	0.02 U	0.02 U	5.7	<2
PSB9	CNPSB9-W-26064	11/15/07	55-60	0.2 U	0.25 U	5 U	14.6	31.8	1.7	0.02 U	0.02 U	1.0	<2
Water used for preparation of EHC injection mixture													
QC	CNPUBL-W-26062	11/15/07	–	0.2 U	0.377	11.7	12.7	45.6	40	0.02 U	0.02 U	2.0	<2

[a] Qualifiers: B, constituent detected in associated blank; U, constituent not detected at the indicated reporting limit.

[b] TOC, total organic carbon.

[c] Not detected at the reporting limit of 2.0 μg/L.

Supplement 3:

Injection Program Summary Report for the Centralia ISCR Pilot Test, Prepared by Adventus Americas, Inc., March 4, 2008

Lorraine M. LaFreniere, Ph.D.
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April 23, 2008

Kirk Hoeffner, Professional Geologist
Underground Injection Control Program
Geology Section, Bureau of Water
Kansas Department of Health and Environment
1000 SW Jackson
Topeka, KS 66612-1367

Subject: Field Pilot Study Report for Remediation at the Former CCC/USDA Grain Storage Facility at Centralia, Kansas, ANL/EVS/AGEM/CHRON-1135

Dear Mr. Hoeffner:

Attached, at the request of Caroline Roe of the Commodity Credit Corporation, U.S. Department of Agriculture (CCC/USDA), is the document *Remediation at the Former CCC/USDA Grain Storage Facility at Centralia, Kansas — Field Pilot Study Report: Treatment of Carbon Tetrachloride in Soil and Groundwater Using EHC and EHC-A™ ISCR Technology*. This report was prepared by the Adventus Group for Argonne National Laboratory, which provides technical support for the CCC/USDA's remediation project at Centralia. The work is reported as Adventus Project No. AA16-083b.

The attached report is part of the permitting process related to the remediation project at Centralia. Please direct questions and comments to me. Let me know if we can do anything to facilitate your review.

Sincerely,

Lorraine M. LaFreniere

Lorraine M. LaFreniere

LML:rs

Attachment: Adventus Field Pilot Study Report and Appendices

cc (with attachment):
C. Roe (CCC/USDA)
G. Fremerman (CCC/USDA)
S. Gilmore (CCC/USDA)
D. Steck (CCC/USDA)
Chron 1135

VIA E-MAIL: lafreniere@anl.gov

March 4, 2008

Lorraine M. LaFreniere
Argonne National Laboratory
9700 South Cass Avenue
Argonne, IL 60439

Subject: **Remediation at the Former CCC/USDA Grain Storage Facility at Centralia, Kansas - Field Pilot Study Report**
Treatment of Carbon Tetrachloride in Soil and Groundwater using EHC and EHC-A ™ ISCR Technology
Adventus Project No. AAI6-083b

Dear Ms. LaFreniere:

This report summarizes pilot-scale field injection activities conducted from November 27 to December 5, 2007. Activities were generally conducted in accordance with the injection permit application, amendment, and KDHE approval letter (**Appendix A**). However, as is generally the case with remedial injection projects, some adjustments to plans are made in the field. Accordingly, this report is intended to provide sufficient information for your files to be complete with regard to the actual activities conducted. As you are aware, we had some email correspondence during the course of the injection work to keep KDHE apprised of observed injection pressures as well as the occurrence of daylighting during the course of the work. In order to make this report complete, this email correspondence is included as **Appendix B**,

SITE BACKGROUND

Investigations conducted on behalf of the CCC/USDA by Argonne National Laboratory (ANL) have demonstrated that groundwater at the Centralia site is contaminated with carbon tetrachloride at levels that exceed the Kansas Tier 2 Risk-Based Screening Level (RBSL) and the U.S. Environmental Protection Agency's maximum contaminant level of 5.0 µg/L for this compound. Groundwater sampling and analyses conducted by Argonne under a monitoring program approved by the Kansas Department of Health and Environment (KDHE) indicated that the carbon tetrachloride levels at several locations in the groundwater plume have increased since twice yearly monitoring of the site began in September 2005. The identified groundwater contamination currently poses no unacceptable health risks, in view of the absence of potential human receptors in the vicinity of the former CCC/USDA facility.

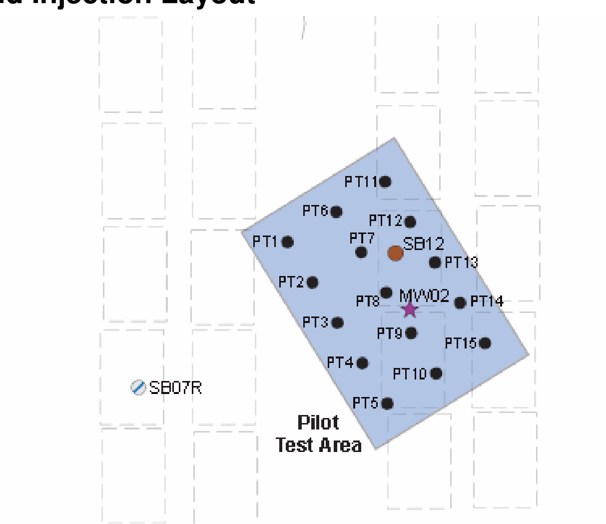
Carbon tetrachloride contamination has also been identified at Centralia in subsurface soils at concentrations on the order of the Kansas Tier 2 RBSL of 200 µg/kg in soil for the soil to-groundwater protection pathway.

PILOT SCALE DESIGN

This section describes the Adventus Group design for the treatment of both soils and groundwater at the site, as planned prior to injection activities being conducted.

The area selected for the short-term field-scale pilot test is approximately centered on the locations of existing monitoring well MW02 and former investigative boring SB12 (**Figure 1**). These two borings penetrated the highest concentrations of carbon tetrachloride identified in both vadose zone soils and groundwater at the Centralia investigation site. The two borings define a hot-spot area that has demonstrated sustained high carbon tetrachloride levels. The pilot test activities were to be confined to a rectangular area around MW02 and SB12. The surface of the rectangular area is approximately 45 ft wide by 75 ft long, oriented approximately orthogonally to the apparent direction of groundwater flow in this portion of the site.

Figure 1. Original Field Injection Layout



Treatment of Groundwater in Saturated Zone

EHC was to be injected in the fifteen borings locations shown in **Figure 1** over the depth interval of 40 to 60 feet bgs, with allowances provided for the grid spacing being adjusted in the field a bit near MW02. EHC was to be applied at an application rate of approximately

0.1% to soil mass. **Table 1** gives the amended injection plan for treatment of contaminants in the saturated zone.

Table 1: EHC Mass Requirements and Injection Details – Pilot Study

	Value	Unit
Treatment Area Dimensions:		
Length of Treatment Area	75	ft
Width of Treatment Area	45	ft
Depth to Top of Treatment Area	50	ft
Depth to Bottom of Treatment Area	60	ft
Treatment Area Thickness	10	ft
Treatment Area Volume	33,750	ft3
Mass of Soil in Treatment Area	1,856	U.S. tons
Volume pore space	10,125	ft3
EHC mass calculations:		
Percentage EHC by soil mass	0.20%	
Mass of EHC Required	7,500	lbs
Preparation of EHC Slurry:		
Percent solids in slurry (can be altered)	23.1%	
Volume Water Required	3,000	U.S. gallons
Slurry Volume to Inject	3,386	U.S. gallons
Injection details:		
Injection spacing	15	ft
Number of injection points	15	points
Mass EHC per point	500	lbs
Slurry volume per point	226	U.S. gallons
Application rates for reference:		
Slurry volume to pore space volume	4.5%	
EHC concentration in groundwater	0.7	lbs/ft3

Treatment of Soil in Vadose Zone

The goal was to reduce the COI mass in the soil to below the treatment standard and reduce leaching to groundwater. This was to be achieved via in-situ reductive dechlorination. For this application an aqueous formulation of EHC, EHC-A, was used. The aqueous formulation was utilized to increase potential contact between the CT-impacted soil and the injected EHC product. to allow for movement in the subsurface. EHC-A is composed of a water soluble organic amendment and soluble iron (Fe(II)). Two design alternatives were provided to ANL with regard to the treatment of site vadose soils (from 20 to 40 feet bgs). The first of these plans was provided in an April 5, 2007 proposal, as reflected in **Table 2**. The targeted area was four borings within a targeted area of approximately 30 ft long x 30 ft wide x 20 ft deep (from 20 to 40 ft bgs). EHC-A was to be applied at an application rate of approximately 0.1% to soil mass.

Table 2. EHC-A mass requirements and injection volumes.

	Value	Unit
Treatment Area Dimensions:		
Length of Treatment Area	30	ft
Width of Treatment Area	30	ft
Depth to Top of Treatment Area	20	ft
Depth to Bottom of Treatment Area	40	ft
Treatment Area Thickness	20	ft
Treatment Area Volume	18,000	ft3
Mass of Soil in Treatment Area	990	U.S. tons
Volume pore space	5,400	ft3
EHC mass calculations:		
Percentage EHC-A by soil mass	0.10%	
Mass of EHC-A Required	2,000	lbs
Preparation of EHC Slurry:		
Percent solids in slurry (can be altered)	10%	
Volume Water Required	2,160	U.S. gallons
Slurry Volume to Inject	2,222	U.S. gallons
Injection details:		
Injection spacing	15	ft
Number of injection points	4	points
Mass EHC per point	500	lbs
Slurry volume per point	556	U.S. gallons
Application rates for reference:		
Slurry volume to pore space volume	5.5%	

The second of these was provided in an April 6, 2007 proposal, is reflected in the injection permit application, and presented as **Table 3**.

Table 3. EHC-A mass requirements and injection volumes.

	Value	Unit
Treatment Area Dimensions:		
Length of Treatment Area	50	ft
Width of Treatment Area	45	ft
Depth to Top of Treatment Area	20	ft
Depth to Bottom of Treatment Area	40	ft
Treatment Area Thickness	20	ft
Treatment Area Volume	45,000	ft3
Mass of Soil in Treatment Area	2,475	U.S. tons
Volume pore space	13,500	ft3
EHC mass calculations:		
Percentage EHC by soil mass	0.10%	
Mass of EHC Required	5,000	lbs
Preparation of EHC Slurry:		
Percent solids in slurry (can be altered)	10%	

Volume Water Required	5,399	U.S. gallons
Slurry Volume to Inject	5,555	U.S. gallons
Injection details:		
Injection spacing	15	ft
Number of injection points	9	points
Mass EHC per point	556	lbs
Slurry volume per point	617	U.S. gallons
Application rates for reference:		
Slurry volume to pore space volume	5.5%	
EHC concentration in groundwater	0.4	lbs/ft3

Field Design Modifications

Prior to the start of pilot injection work, ANL conducted some pre-injection boring activities to develop current site data. These activities will be reported elsewhere. However, as a consequence of these data collection activities, the following general observations were made:

- Although the water table elevation is much shallower, the target saturated zone is confined and permeable from 50 to 60 feet. (The initial design basis was to inject within a saturated zone from 40 to 60 feet.)
- The extent of carbon tetrachloride in groundwater is greater in concentration and extent than previously observed.
- The extent of carbon tetrachloride in vadose soils is essentially the same as previously observed.

Based on these observations, the injection approach and mass requirements were modified in the field in order to fulfill the requirements of the KDHE Bureau of Environmental Remediation (BER). The modified injection layout is shown in **Figure 2** where the injection points from the original plan have been modified to account for hot spots in both vadose and saturated zones. According the modified area of injections, PT 1, 6, and 11 shown on **Figure 1** were moved around pre-injection boring PSB8 due to the higher concentrations of carbon tetrachloride detected there. The final injection design plans were divided into borings where only saturated zone (i.e., groundwater) injections were to be performed and borings where both vadose (i.e., soil) and groundwater injections were to be performed. The divisions are as listed below:

Soil and Groundwater borings (Vadose (20-50 ft) and saturated zone (50-60 ft)

PT 1, 2, 6, 7, 8, 11, 12, and 13

- EHC-A was to be applied at an application rate of 0.1% to soil mass in the vadose zone (20-40 ft) (**Table 4**).
- EHC was to be applied at an application rate of 0.06% to soil mass in the lower vadose zone between 40 and 50 feet, using a thin slurry to enhance distribution efficiency (**Table 5**).

- EHC was to be applied at an application rate of 0.14% to soil mass in the more permeable saturated zone (50 -60 ft) (**Table 6**).

Figure 2. Field-Modified Injection Layout

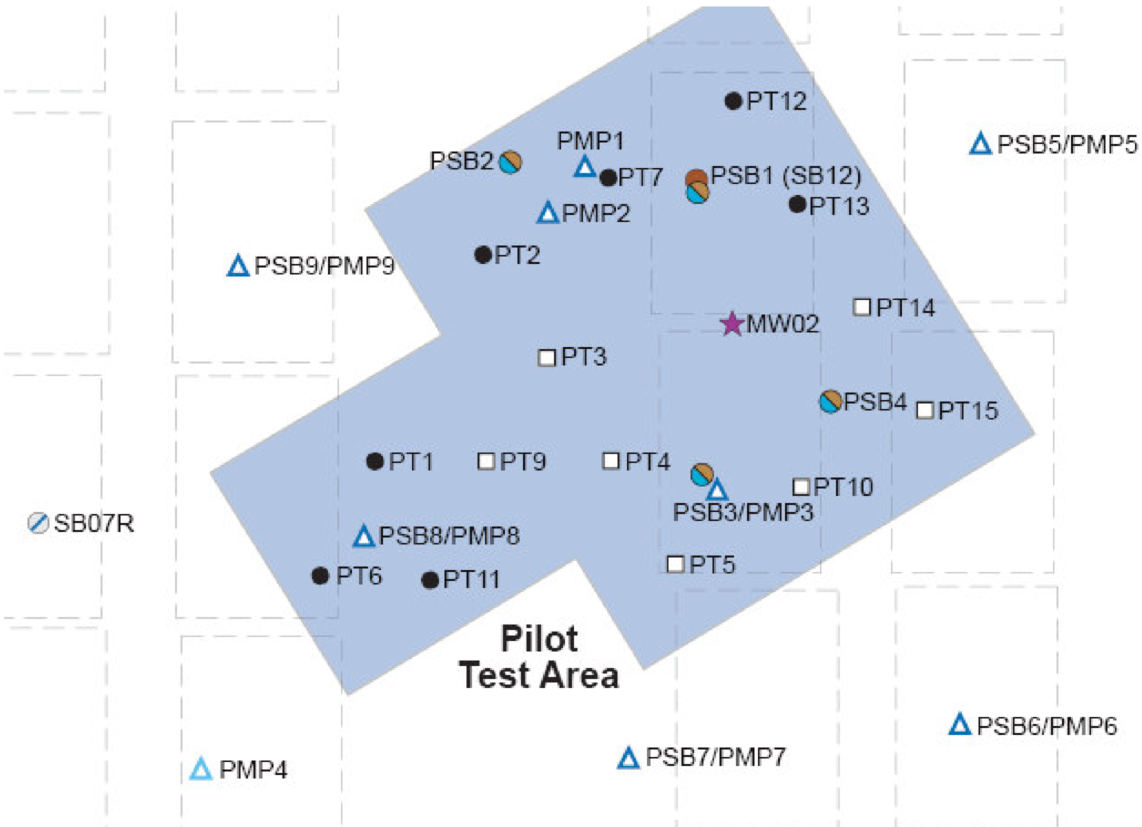


Table 4: EHC-A – 8 borings from 20 to 40 feet

Injected depth (feet)	EHC-A Mass/Interval (lbs)
21	50
23	50
25	50
27	50
29	50
31	50
33	50
35	50
37	50
39	50
Total	**500**

* Target water to material ratio is 54 Gallons / 50 lbs which is approximately 10 wt%

Table 5: EHC – 8 borings from 40 to 50 feet

Injected depth (feet)	EHC Mass/Interval (lbs)
42	50
45	50
48	50
Total	**150**

* Target water to material ratio is 54 Gallons / 50 lbs which is approximately 10 wt%

Table 6: EHC – 8 borings from 50 to 60 feet

Injected depth (feet)	EHC Mass/Interval (lbs)
51	50
53	100
55	50
57	**100**
59	**50**
Total	**350**

*Target water to material ratio is 20 Gallons / 50 lbs which is approximately 23 wt%

Groundwater borings (Saturated zone 50-60 ft)

PT 3, 4, 5, 9, 10, 14, and 15

- EHC was to be applied at an application rate of 0.2% to soil mass to treat the saturated zone (50 -60 ft) (**Table 7**).

Table 7: EHC – 7 borings from 50 to 60 feet

Injected depth (feet)	EHC Mass/Interval (lbs)
51	100
53	100
55	100
57	**100**
59	**100**
Total	**500**

*Target water to material ratio is 20 Gallons / 50 lbs which is approximately 23 wt%

Field Observations

The EHC and EHC-A were delivered as a dry powder in 50-lb bags (**Figure 3**), and mixed with water on site into a slurry (**Figure 4**), to be injected via direct push technology (**Figure 5**) by Redox Tech, LLC using a Chem-Grout pump **(Figure 6).** Field observations are summarized by way of both daily and general observations (below), as well as by detailed injection interval information (**Appendix C**).

Figure 3. EHC Pallets on Site

Figure 4. Mixing of EHC and EHC-A on Site

Figure 5. Direct Push Rig Used for EHC Injections

Figure 6. Chem Grout Pump

November 27, 2007

Initially, Redox Tech had planned to use an expendable injection tip to perform bottom-up injections, as reflected in the injection permit (see bottom-out injection diagram, page 4 of the October 30, 2007 permit application in Appendix A). However, KDHE BER requested that injections be performed from the top-down. Accordingly, Redox Tech utilized the expendable tip in top-down fashion while a Geoprobe™ tool designed for top-down injections was obtained. Information on the Geoprobe™ pressure-activated tip is available on their website: http://www.geoprobe.com/products/geoprobe_accessories/injprobedesc.htm. Use of the expendable tip necessarily required 'tripping' in and out of the borehole to replace the tip for each successive injection interval.

Initially, the EHC slurry (~40 gallons water to 100# EHC) was injected at PT-5 for treating the saturated zone. With increasing depth in injections, there was significant back pressure in the injections rods which could be attributed to the tight formation at the site and/or the thickness of the EHC mix. From this point forward, the Redox Tech injection operators elected to use slightly more than the design water volume of 20 gallons of water to each 50 pound bag of EHC, based on the perception that the mixing equipment may not have adequately broken up all clumps of EHC powder. In addition, Redox Tech routinely flushed water through the injection lines after each injection interval. Because the injection tooling was in the ground when this flushing action was conducted, this additional water volume was injected in to the ground. Accordingly, the water volumes presented in **Appendix C** for each interval are approximations. As a means of avoiding potential EHC powder clump issues, Redox Tech eventually installed a grate in the Chem Grout pump hopper, in order to avoid potential clogging issues (**Figure 7**)

Figure 7. Grate Installed in ChemGrout Pump Hopper

November 28, 2007

The injection intervals remaining at boring PT-5 were completed successfully using the GeoProbe tool. Borings PT-3 (groundwater) and PT-13 (both soil and groundwater treatment) were also conducted on this day. Where additional boreholes were utilized to accomplish this (as occurred at PT-5), **Appendix C** indicates this through addition of a letter after the boring ID. Such additional boreholes were used whenever needed to enable injection at the target zones. Using PT-5 as an example, this occurred when high injection back pressures were observed. Because of challenging drilling conditions for the Redox Tech direct push rig, ANL staff utilized the ANL cone penetrometer (CPT) rig (**Figure 8**) to advance a borehole to 50 feet bgs for some of the groundwater only borings (such as PT-3).

Given the proximity of PT-13 to MW-02, the well was protected through the use of a packer assembly to decrease the potential for entry of injected material into the well screen (**Figure 9**). The injections at PT-13 were successfully completed through a depth of 42 feet with injection pressures less than 250 psi. When a thin EHC slurry was injected at 45 ft (vadose zone), EHC material started coming around the annulus of MW-02 (**Figure 10**). Use of a thicker slurry was attempted at 48 and 51 feet, and additional daylighting occurred, which led to skipping the remaining intervals temporarily at this particular boring. As a corrective measure, the well seal was later repaired (**Figure 11**). No evidence of plugging of the well screen by EHC material was observed in MW-02 when checked by ANL staff.

Figure 8. ANL CPT Rig

Figure 9. Packer Assembly at MW-02

Figure 10. Annular Leakage of Thin EHC Slurry

Figure 11. Well Seal Repair at MW-02

November 29, 2007

Injections were conducted at PT-15 (groundwater) and PT-1 (soil and groundwater). While Injecting at PT-15, there was a need to slightly vary the depths of EHC injections to enable injections into and around tight zones of clay and high back pressures encountered at particular depths. The back pressures may have resulted directly from the formation or from plugging of the Geoprobe tip. In addition, some daylighting of EHC product occurred to the surface while injecting at PT-15-57’ and 59’. This was effectively addressed by slowing the rate of injection and by applying pressure to observed daylighting points at the surface. A variety of means were used to apply pressure at the surface, including use of the CPT rig stabilizer pads and using a ‘spud’. Occurrence of surficial daylighting at shallow depths also occurred and was similarly addressed during injections at PT-1 (**Figure 12**).

When injections were done at a depth of 42 ft at PT-1, there was a rise in pressure apparently due to tip clogging in the tight formation. There was also a need to start a hole adjacent to PT-1 once injections at the saturated zone commenced due to a rise in back pressures. This allowed some time for pressures to dissipate at the one location while injection commenced at the adjacent location. High pressures were also addressed by putting off the deeper intervals to a later date to allow pressure in and around PT-1 to dissipate.

Figure 12. Daylighting of Thin EHC-A Slurry at PT-1

November 30, 2007

Injections were conducted at PT-12, PT-2, and PT-6, and were restricted to the vadose zone (20-50 feet) in all the three borings. Injections at PT-12 were completed to 35 feet due to high back pressures at greater depths. Daylighting of EHC-A occurred near SB07R when injecting at PT-6. This was observed at multiple surficial points beginning at a depth of 25 feet, and fading away with increasing depth. EHC material started coming out of the annulus between the plastic well casing and the flush mount housing when injections were carried out at a depth of 48 feet at PT-6. This could be attributed to a preferential pathway of EHC material in a tight clay formation at the site (**Figure 13**). Daylighting was addressed by discontinuing injection, applying pressure at the surface, and/or slowing the injection flow rate.

Figure 13: Daylighting at SB07R during injection at PT-6

December 1, 2007

No site work was conducted this day due to very unfavorable weather conditions (ice storms).

December 2, 2007

Injections were conducted at PT-7 and PT-10, in both the vadose and saturated zones. Some daylighting occurred during the injections. Daylighting was observed at the surface near MW-02. (**Figure 14**) Again, daylighting was addressed by discontinuing injection, applying pressure at the surface, and/or slowing the injection flow rate. In addition, a slightly thicker EHC slurry was used to minimize injected volume in an effort to minimize daylighting.

Figure 14: Surficial Daylighting near PT-7 and PT-10

December 3, 2007

Injections were conducted at PT-4 and PT-14 (groundwater borings), and PT-2 (completion of prior skipped soil intervals and completion of groundwater intervals).The injection tip was initially advanced without the check valve spring in place at PT-14. This resulted in a clog which was resolved by pulling the drill string out of the ground and correcting the problem. Intervals in the saturated zone between 50-60 feet at PT-2 were altered owing to EHC daylighting. (**Figure 15**). Vertical injection spacing in the saturated zone between 50 and 60 feet was increased as needed as daylighting was observed at the surface.

Figure 15: Daylighting at multiple points around PT-14 and PT-2

December 4, 2007

Injections were conducted at PT-9 and PT-11 (groundwater), at PT-1 (remaining groundwater intervals), and at PT-12 (remaining soil and groundwater intervals). PT-9 was moved from the original location to a point southwest of PT-3 and PT-4 due to its proximity to MW-02. No daylighting was observed, but some evidence of tight formation (high pressures) was seen. Accordingly, vertical injection spacing and injected volumes in the saturated zone between 50 and 60 feet were altered as needed resulting in more material being emplaced at greater depths.

December 5, 2007

Injections were conducted at PT-11 (remaining soil intervals) and at PT-6 (groundwater). Some minimal surficial daylighting was witnessed at shallow depths when injecting at PT-11. This was addressed by adjusting the volumes at each depth to minimize daylighting.

Observations Summary - General Field Observation

- EHC-A and EHC injections were not performed at PT-8 as it was very close to MW-02. ANL consulted with KDHE to determine that sufficient injections had been done and enough material distributed for treatment of carbon tetrachloride in the areas of interest to make for a credible pilot test.

- Upon completion of injection activities and removal of the Geoprobe injection rods, boreholes were abandoned with Holeblok+ (**Figure 16**). HoleBlok+ was poured slowly ensure good filling of boreholes and to avoid bridging. In addition, a small size (#9) HoleBlok+ was used and the HoleBlok+ was compacted with a 'spud' to ensure good compaction. Around 500 lbs of Holeblok+ was used for abandonment of boreholes. Additional information on HoleBlok and HoleBlok+ is included as test reports in **Appendix D**.

Figure 16: Hole Blok$^+$ usage for bore-hole abandonment

- During the entire duration of injection activities, the injection equipment (ChemGrout pump) had to be heated everyday for sometime before commencement due to cold conditions encountered at the site. In addition, ANL staff arranged for off-site storage of the equipment to limit winter weather exposure. Cold weather definitely slowed work progress overall due to freezing conditions, as well as a lost day due to an ice storm.
- The amount of water used for injections was higher in comparison with actual design at every injection point. This resulted in part from the use of additional water to flush out any material present in the line and rods as well as to clear material that might clog the injection tip at the next interval. In addition, the water used in the 50 to 60 foot interval was at higher than the initial design ratio. The design called for a 23.1 wt% slurry, or 20 gallons per 50 pound bag of EHC. As discussed above, more water was generally used in most EHC batches from 50 to 60 feet, in order to avoid EHC

powder clumps from causing injection problems.. Also, water quantities in **Appendix C** are approximations for each interval, although the total volume is also provided.

- Bromide tracer usage was tied to the volume of water injected with EHC. The target bromide concentration of 150 mg/L (223 mg/L KBr) was achieved by adding 84.3 g KBr/ 100 gallons of water used. Given a total water usage of 8650 gallons, this amounts to approximately 7.3 kg of KBr added to the water as a tracer.
- High pressures observed during injection are necessarily not indicative of injection pressures within the formation, especially as observed at the injection tip. Resistances within the injection equipment, pressures required to overcome the check valve, etc, play a role in this, as well as the measurement point for the pressure having been at the ChemGrout pump. Pressure resulting from resistance in the hoses or clogging of injection tip may have played a role in some of the transient high pressures observed at the site.
- EHC and EHC-A were found to daylight out of the annulus of monitoring wells MW-02 and SB07R. There was no observation or evidence of EHC material coming from within the wells.
- Challenges in the form of daylighting during EHC injections were avoided by either skipping an interval, immediately plugging points where surfacing occurred by applying pressure at the surface, or injecting a thicker EHC slurry when possible.
- Redox Tech used expendable injection tips whenever necessary. Typically, this was done when the GeoProbe tip may have been clogged or when the formation was very tight, and high pressures were observed. Regardless, top-down injection were performed throughout as per KDHE BER request.
- Exposure monitoring was assessed through the use of a Photo-ionization Detector, or PID. Periodic checks were made daily in the breathing zone of on-site personnel to check for potential exposure to carbon tetrachloride. Potential exposure to these constituents may arise through contact with the Geoprobe rods that are in contact with the groundwater, or if there is any mixing between groundwater and injection slurry that surfaces at the ground surface. PID measurements corrected for background were always 0 ppm indicating that no carbon tetrachloride was detected in the air around the working zone throughout the injection period.
- Prepunching of selected boring location using the Argonne cone penetrometer (CPT) rig was done at borings (**PT 3, 4, 5, 9, 10, 14 and 15)** where treatment was required in the saturated zone only in order to hasten the injection process.
- The application rate of EHC in the saturated zones of borings where both soil and groundwater treatment was required alternates every interval between 0.06% and 0.14%. This is done to treat the unsaturated zone between 40-50 feet using EHC as per KDHE requirements.

EHC-A and EHC dosages were actually offset by slight variances during field implementation. This occurred in due to a combination of resistance due to tight formations, back pressures in injection tips and daylighting at multiple points. The approximate amount of material injected at various borings is tabulated in **Table 8**, below. Again, more detailed information relating to the injection event is provided in **Appendix C**.

Table 8: Actual Material Injected at Borings

Location (borings	Vadose (20 to 40' bgs) zone EHC-A (lbs)	Vadose (40 to 50' bgs) zone EHC (lbs)	Saturated (50 to 60' bgs) zone EHC (lbs)
PT-1	500	150	350
PT-2	500	150	250
PT-3			500
PT-4			500
PT-5			500
PT-6	500	150	300
PT-7	500	150	350
PT-8			
PT-9			500
PT-10			300
PT-11	650	300	350
PT-12	500	150	350
PT-13	500	150	50
PT-14		100	500
PT-15			500

Based on the injected masses identified in Table 8 (above) and the injected water volumes by interval (**Appendix C**), an estimate of the EHC dosages applied and total pore volumes injected by interval was developed and is presented in **Tables 9 and 10**. The designed area was developed based on the planned boring spacing of 15 borings over a 45 x 75 foot area. Although boring locations were moved about, the assumed area of influence of each boring as part of the design (i.e., one-fifteenth of 45 feet x 75 feet, or 225 square feet) was used to provide a consistent basis for comparing actual versus intended injection mass ratios.

In **Table 9**, the water volumes used for the pore volume calculation do not include the total volume of water used, which is on the order of 1500 gallons more than shown in the table. The reason for this is that the precise volumes and intervals of additional water usage are not definitively known. Thus, the **Table 9** values should be considered as a minimum in evaluating % pore volume versus design. As previously discussed, this additional water was used to flush injection tips between intervals.

Table 9. Estimated EHC Dosage and Injected Pore Volumes

Area	Upper Vadose (20 to 40')	Lower Vadose (40 to 50')	Saturated Zone (50 to 60')
# Borings	7	7	14
Mass Injected (#)	3650	1300	5300
Presumed Area (ft^2)	1575	1575	3150
Presumed Volume (ft^3)	31500	15750	31500
Soil Porosity	30%	30%	30%
Pore Space Volume (ft^3)	9450	4725	9450
Inferred Soil Mass (Tons)	1732.5	866.25	1732.5
Inferred EHC Dosage (wt %)	0.11%	0.08%	0.15%
Estimated Water Dosage* (USG)	3626	942	2555
Total Mass Injected (#, as EHC + water)	33891	9156	26609
Slurry concentration (% wt/wt)	11%	14%	20%
Estimated Slurry Density (#/gal)	8.8	9.2	9.5
Estimated Volume Injected (gallons)	3843	998	2799
Estimated Volume Injected (ft^3)	514	133	374
Estimated % Pore Volume Occupied by Injection	5.4%	2.8%	4.0%

* - Excluding flush water

Alternately, **Table 10** provides the estimated water volume usage assuming a proportional usage of the additional (estimated) injection water volume (1500 gallons) based on the total mass injected with in each categorized zone.

Table 10. Estimated EHC Dosage and Injected Pore Volumes

Area	Upper Vadose (20 to 40')	Lower Vadose (40 to 50')	Saturated Zone (50 to 60')
# Borings	7	7	14
Mass Injected (#)	3650	1300	5300
Presumed Area (ft^2)	1575	1575	3150
Presumed Volume (ft^3)	31500	15750	31500
Soil Porosity	30%	30%	30%

Pore Space Volume (ft^3)	9450	4725	9450
Inferred Soil Mass (Tons)	1732.5	866.25	1732.5
Inferred EHC Dosage (wt %)	0.11%	0.08%	0.15%
Estimated Water Dosage (USG)	3626	942	2555
Estimated Flush Water Dosage (USG)	534	190	776
Estimated Total Water Dosage	4160	1132	3331
Total Mass Injected (#, as EHC + water)	38346	10743	33077
Slurry concentration (% wt/wt)	10%	12%	16%
Estimated Slurry Density (#/gal)	8.8	9.2	9.5
Estimated Volume Injected (gallons)	4376	1165	3479
Estimated Volume Injected (ft^3)	585	156	465
Estimated % Pore Volume Occupied by Injection	6.2%	3.3%	4.9%

On behalf of Adventus, I thank you for your interest in our products and technologies. Please contact us by email at Ravi.Srirangam@adventusgroup.com or John.Valkenburg@Adventusgroup.com if you have any questions regarding this report.

Yours truly,

Adventus Americas, Inc.

Ravikumar Srirangam
Environmental Engineer

cc: Jim Mueller, Adventus

EHC-® is a trademark of Adventus Intellectual Property Inc.

Appendix A:

Proposal to Inject Remedial Compounds into a Class V Underground Injection Control Well (Injection Point): Former CCC/USDA Grain Storage Facility, Centralia, Kansas

Proposal to Inject Remedial Compounds into a Class V Underground Injection Control Well (Injection Point)

Former CCC/USDA Grain Storage Facility, Centralia, Kansas

1. Name of facility and facility owner.

Facility Name: Centralia - USDA (KDHE project C406670940)

The facility was on property formerly leased by the Commodity Credit Corporation of the U.S. Department of Agriculture (CCC/USDA) for grain storage. No structures remain on the property. The proposed treatment area lies within the former CCC/USDA leasehold.

Mrs. Jean Burdett Lackey is the current owner of the contaminated part of the former grain storage facility, while Mr. Bob Cross owns the remainder of the former facility (surrounding and adjacent to the Burdett Lackey property). Injection is proposed on the portion owned by Mrs. Burdett Lackey. Monitoring is proposed on both the portion owned by Mrs. Burdett Lackey and the portion owned by Mr. Cross.

2. Name, address and telephone number of facility owner.

CCC/USDA:

Ms. Caroline Roe
Stop 0513 – Room 4715
1400 Independence Avenue, SW
Washington, DC 20250
202-720-9964

Current Owners:

Bob Cross
105 Main Street
Centralia, KS 66415
785-857-3511

- Permission for monitoring is required from Mr. Cross.

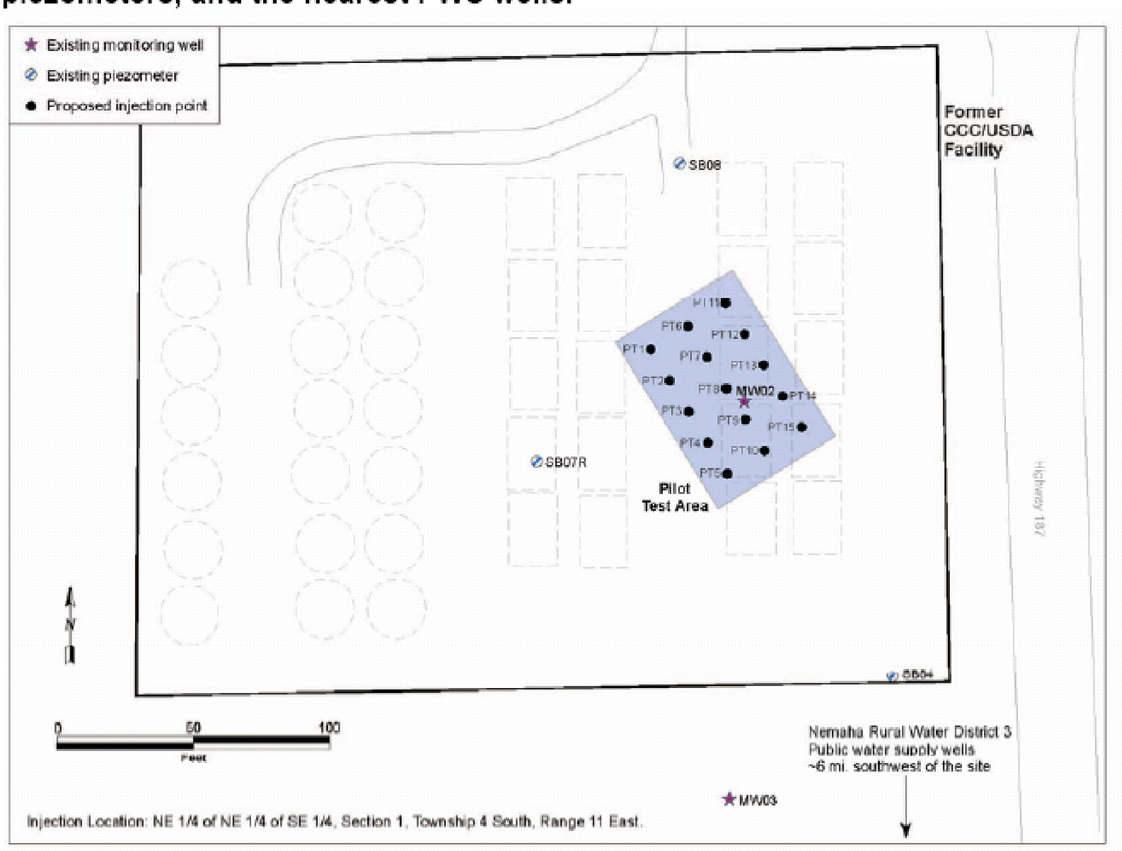
Jean Burdett Lackey
7 E Elk
Seneca, KS 66538
785-336-3698

- Permission for both injection and monitoring is required from Mrs. Burdett Lackey.

3. Site legal description of the injection points, injection point identification numbers and a facility map with the location of the injection points depicted in relation to water supply wells and monitoring wells located at and near the facility.

The proposed 15 injection points, PT01-PT15, are located in the NE quarter of the NE quarter of the SE quarter of Section 1, Township 4 South, Range 11 East. One monitoring well, MW02, lies within the area targeted for injection. The four additional monitoring points nearest to the injection area are MW03, SB04, SB07R, and SB08. All of these locations are shown in **Figure 1**. Nemaha County Rural Water District 3 provides a public water supply to the city of Centralia and surrounding residences. The closest public water supply wells are approximately 6 mi southwest of the former CCC/USDA facility location, as indicated in Figure 1.

Figure 1 Locations of proposed injection points, existing monitoring wells and piezometers, and the nearest PWS wells.



4. Documentation KDHE's Bureau of Environmental Remediation approves the injection of the remedial compounds for the remediation project.

The proposed remediation project, which involves injecting of remediation compounds, has been described in a document that is under review by the KDHE's Bureau of

Environmental Remediation, on an expedited schedule. When approval is received from the KDHE, the documentation will be sent separately to the permitting agency

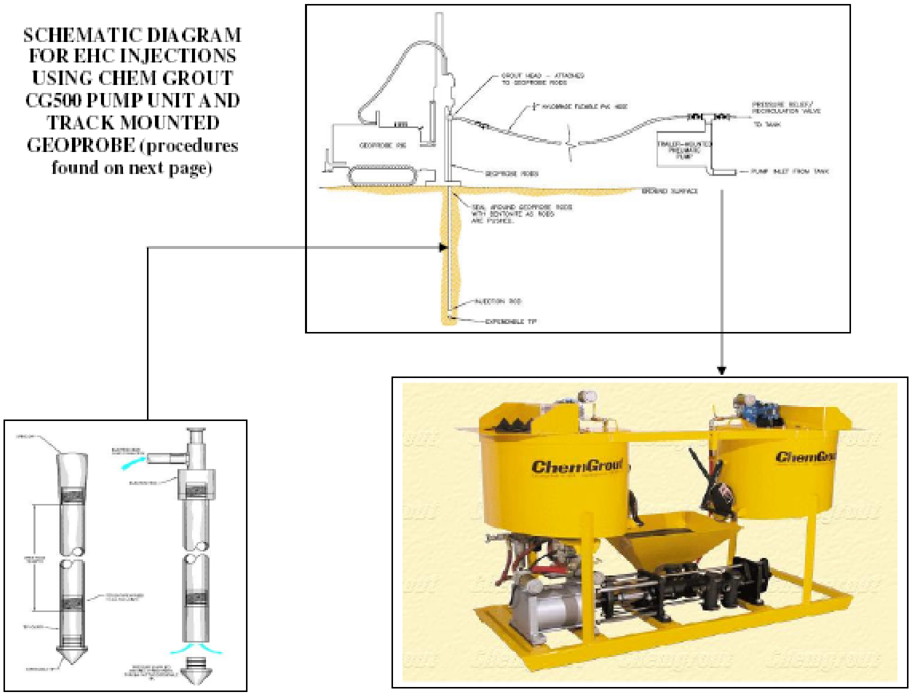
5. A description of the contamination and contamination source.

The CCC/USDA operated a grain storage facility from 1949 until 1971. The Site is currently vacant (no structures remain on site) but two existing subsurface foundations are present that relate to subsequent concrete mixing operations. Two additional grain storage facilities are located within the vicinity of the former CCC/USDA facility: 1) The Nehama County Co-op located about 4,000 ft south (downgradient) of the Site, and 2) a private grain storage facility located about 3,500 north (upgradient) of the site.

Prior to 1986, CT was utilized as a grain fumigant at the Site. In 1998, CT was detected in groundwater from the Private Grain storage facility. Subsequent Site investigations identified CT impacts at the former CCC/USDA Site but these were limited to the subsurface soil and the upper shallow aquifer and were generally confined to the Site.

Investigations conducted on behalf of the Commodity Credit Corporation of the U.S. Department of Agriculture (CCC/USDA) by Argonne National Laboratory have demonstrated that groundwater at the Centralia site is contaminated with carbon tetrachloride at levels that exceed the Kansas Tier 2 Risk-Based Screening Level (RBSL) and the U.S. Environmental Protection Agency's maximum contaminant level of 5.0 µg/L for this compound. Groundwater sampling and analyses conducted by Argonne under a monitoring program approved by the Kansas Department of Health and Environment (KDHE) indicated that the carbon tetrachloride levels at several locations in the groundwater plume have increased since twice yearly monitoring of the site began in September 2005. The identified groundwater contamination currently poses no unacceptable health risks, in view of the absence of potential human receptors in the vicinity of the former CCC/USDA facility.
Carbon tetrachloride contamination has also been identified at Centralia in subsurface soils at concentrations on the order of the Kansas Tier 2 RBSL of 200 µg/kg in soil for the soil-to-groundwater protection pathway.

6. Schematic of a typical injection point design



Bottom Out Injection Diagram

Chem Grout CG500 High Pressure Air Operated Pump Unit

7. Name and description of the geologic formation into which the remedial compound will be injected.

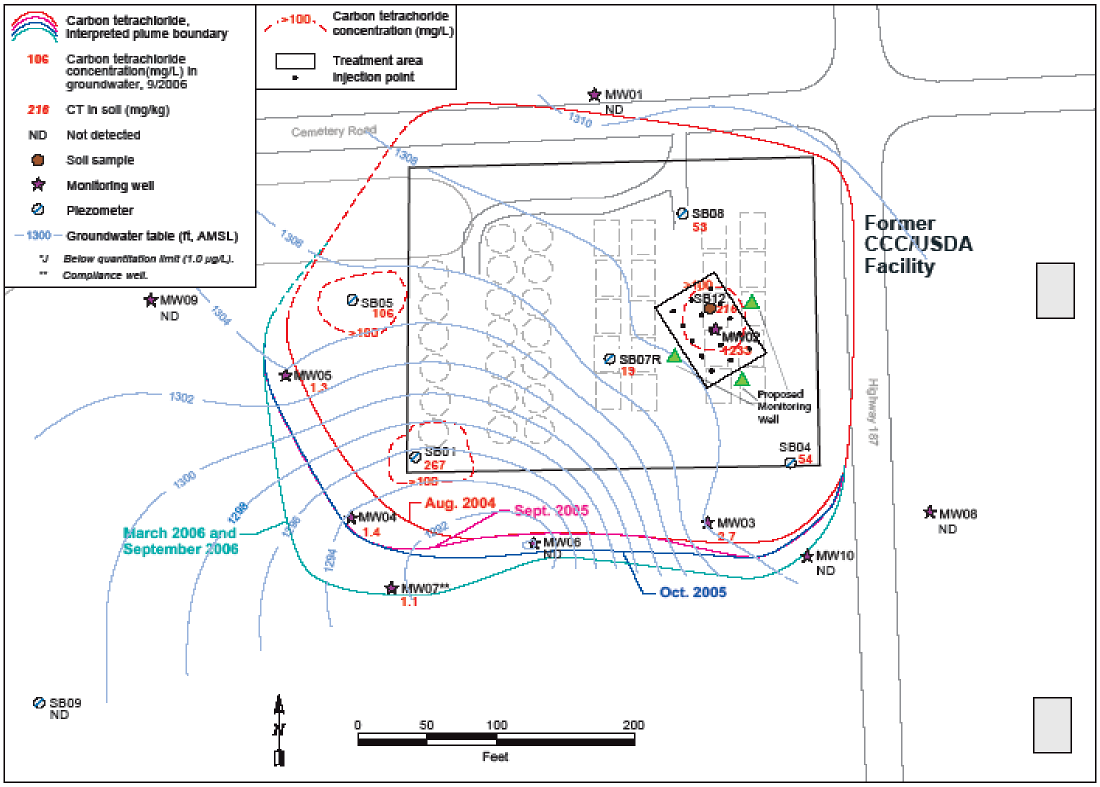
Groundwater CT impacts are generally confined to the area of the former CCC/USDA grain storage facility, and they are limited vertically to the shallow aquifer within the glacial outwash deposits of the Upper Pleistocene Independence Formation.

The aquifer is generally composed of glacial outwash consisting of coarser-grained sand deposits to finer-grained silt and clay. Groundwater is located at a depth of about 40 to 60 ft bgs and flows to the south/southwest. The aquifer conductivity is very low, ranging from 10^{-3} to 10^{-9} cm/sec. As such, the groundwater CT impacts are stable (not moving horizontally or vertically), limited to the upper portion of the shallow aquifer, and they remain very localized on Site.

8. Approximate depth below ground surface of injection interval.

Two pilot study areas have been selected, as shown on **Figure 2**.

Figure 2. Locations of proposed monitoring wells upgradient and downgradient of the treatment area. (Two monitoring wells inside of treatment area are not shown and will be placed at 3-4 ft from one injection point and midway between two injection points.)



1. Treatment of Groundwater near SB-12 / MW-02

To perform the pilot study, EHC will be injected in a gridded area of 45 x 75 feet around SB-12 (designated as SB-12/Grid) over the depth interval of 40 to 60 feet bgs, with the grid spacing being adjusted in the field a bit near MW-02 and another monitoring well. In addition, three new monitoring wells will be installed. One of these new wells will be installed up- and two down- gradient of SB-12/Grid. Figure 1 depicts the approximate layout of SB-12/Grid and the new monitoring wells. Positive effects on the quality of groundwater will be observed in the areas generally downgradient of SB-12/Grid, and at the wells located within SB-12/Grid itself.

2. Treatment of Soil in Vadose Zone

This will be achieved via enhanced natural attenuation using an aqueous formulation of EHC, EHC-A, to allow for movement in the subsurface. EHC-A is composed of a water soluble organic amendment and soluble iron (Fe(II)). Soil concentrations above the treatment criteria of 200 mg/kg were only detected in one sample. However, EHC-A will be injected in ten of the fifteen geoprobe boring locations. The targeted area will hence cover approximately 2/3 of SB-12/Grid, or 2,250 square feet over the depth range of 20 to 40 feet.

9. Detailed description of the injection procedure, including proposed injection pressure.

The injection procedure is described in detail below. The injection pressure may rise to 200 pounds per square inch or higher, as needed to deliver the injectate into the formation.

EHC Injection Procedure

1. Inspect all hoses, air and injection lines for any cracks or potential spots that could break and leak.

2. Read any MSDS sheets prior to chemical handling for any risks involved and advised PPE by chemical manufacturer.

3. Inspect tank for any residual chemicals. If needed flush out tank prior to injections to mitigate any adverse chemical reactions.

4. When attaching air hoses use whip-stops on both connections at the compressor and the pump.

5. While attaching injection lines check for locking cam locks. If the cam locks are not locking wrap connections in duct tape to keep attachments from coming loose.

6. Don level D PPE and a respirator prior to adding chemicals to the tank.

7. Add EHC to one of the two 50-gal tanks.

8. Add water to the EHC in first tank. Wear all proper PPE and safety glasses during this process. Splashing will occur if mixing paddles are rotated too quickly. Keep hands away from the mixing paddles

9. Mix the chemicals using the mixing paddles adjusting the rotation with the control level. Once complete, reduce rotation revolutions.

10. Prepare for injection by closing off the re-circulating valve and opening up the valve to the injection line.

11. Open the valve at the injection head and charge the line at approx 20 to 60 psi. The pump will not stop when the line is charged; therefore, control the pressure by stokes of the piston pump (2-3 strokes). Once the line is charged lift the GeoProbe rods and continue injections. If tight conditions are encountered, fracture the soil. Increase the pressure with the pump control until injections

12. In between injection intervals, shut off the pump using the control level to stop injections.

13. Relieve any backpressure by opening the injection valves and the re-circulation valves together to relieve any pressure back into the tank.

14. Once the backpressure has been relieved close the re-circulation lines and wait for the drillers signal to resume injections.

15. Continue mixing the EHC solution with the mixing paddles. Mix the EHC in the second tank while the injections are occurring in the first tank.

16. Upon completion of all injections of a single chemical, clean out the tank, lines, pump and plumbing before adding a new chemical to the tank. This is best done by rinsing the tank as the last injection is finishing, the water will clean the insides of the tank and will flush the lines. Once this is complete, drain the lines and the pumps of all residual liquids in an approved area.

17. When all injection activities are completed, completely decontaminate all equipment prior to leaving the site.

10. Description of the contents and characteristics of the compounds to be injected.

Two compounds are proposed to be injected at the site, Adventus EHC™ and EHC-A™. They are described in detail below, and Material Safety Data Sheets (MSDS) for the products are attached.

EHC technology describes a family of remediation products used for the *in situ* treatment of groundwater and saturated soil impacted by heavy metals and persistent organic compounds such as chlorinated solvents, pesticides and energetics. The technology is a modification of the Adventus DARAMEND® technology which has been used since 1992 to treat over 2,500,000 tons of similarly effected soil and sediment. Both EHC and DARAMEND are the subjects of numerous patents owned by Adventus Intellectual Properties, Inc. (Adventus).

EHC is a controlled-release, integrated carbon and zero valent iron (ZVI) source that yields redox potential (Eh) in the -500 to -650 mV range. This Eh is significantly lower than that achieved when using either organic materials (lactate, molasses, and sugars) or reduced metal alone. Eh potentials in this range facilitate the timely and effective removal of normally recalcitrant chlorinated organics (*e.g.*, CT, PCE) and other persistent compounds (e.g., perchlorate) without the formation of potentially problematic intermediates, such as DCE/VC from the anaerobic degradation of PCE/TCE or CF/DCM from the anaerobic degradation of CT (See below Figure 6).

The organic component of EHC (fibrous organic material) is nutrient-rich, hydrophilic, and has high surface area; thus, it is an ideal support for growth of bacteria in the groundwater environment. As they grow on EHC particle surfaces, indigenous heterotrophic bacteria consume dissolved oxygen, thereby reducing the redox potential in groundwater. In addition, as the bacteria grow on the organic particles, they ferment carbon and release a variety of volatile fatty acids (VFAs, for example acetic, propionic, butyric), which diffuse from the site of fermentation into the groundwater plume and serve as electron donors for other bacteria, including dehalogenators and halorespiring species. Finally, the soluble ferrous sulfate particles provide substantial reactive surface area that stimulates direct chemical dechlorination and an additional drop in the redox potential of the groundwater via chemical oxygen scavenging. These physical, chemical, and biological processes combine to create an extremely reduced environment that stimulates chemical and microbiological dechlorination of otherwise persistent compounds.

EHC-A is a cold-water soluble formulation for application by injection or to existing wells or other networks. EHC-A is composed of a water soluble organic amendment and soluble iron (Fe(II)). Similarly to EHC, physical, chemical, and biological processes combine to create an extremely reduced environment that stimulates dechlorination.

11. The amount of remedial compound to be injected.

Calculated application rates and total amounts of EHC and EHC-A to be injected are detailed in Tables 1 and 2, below.

Table 1. EHC Mass Requirements and Injection Details

	Value	Unit
Treatment Area Dimensions:		
Length of Treatment Area	75	ft
Width of Treatment Area	45	ft
Depth to Top of Treatment Area	40	ft
Depth to Bottom of Treatment Area	60	ft
Treatment Area Thickness	20	ft
Treatment Area Volume	67,500	ft3
Mass of Soil in Treatment Area	3,713	U.S. tons
Volume pore space	20,250	ft3
EHC mass calculations:		
Percentage EHC by soil mass	0.10%	
Mass of EHC Required	7,500	lbs
Preparation of EHC Slurry:		
Percent solids in slurry (can be altered)	30%	
Volume Water Required	2,100	U.S. gallons
Slurry Volume to Inject	2,604	U.S. gallons
Injection details:		

Injection spacing	15	ft
Number of injection points	15	points
Mass EHC per point	500	lbs
Slurry volume per point	174	U.S. gallons
Application rates for reference:		
Slurry volume to pore space volume	1.7%	
EHC concentration in groundwater	0.4	lbs/ft3

Table 2. EHC-A mass requirements and injection volumes.

	Value	**Unit**
Treatment Area Dimensions:		
Length of Treatment Area	50	ft
Width of Treatment Area	45	ft
Depth to Top of Treatment Area	20	ft
Depth to Bottom of Treatment Area	40	ft
Treatment Area Thickness	20	ft
Treatment Area Volume	45,000	ft3
Mass of Soil in Treatment Area	2,475	U.S. tons
Volume pore space	13,500	ft3
EHC mass calculations:		
Percentage EHC by soil mass	0.10%	
Mass of EHC Required	5,000	lbs
Preparation of EHC Slurry:		
Percent solids in slurry (can be altered)	10%	
Volume Water Required	5,399	U.S. gallons
Slurry Volume to Inject	5,555	U.S. gallons
Injection details:		
Injection spacing	15	ft
Number of injection points	9	points
Mass EHC per point	556	lbs
Slurry volume per point	617	U.S. gallons
Application rates for reference:		
Slurry volume to pore space volume	5.5%	
EHC concentration in groundwater	0.4	lbs/ft3

12. Frequency of Injection

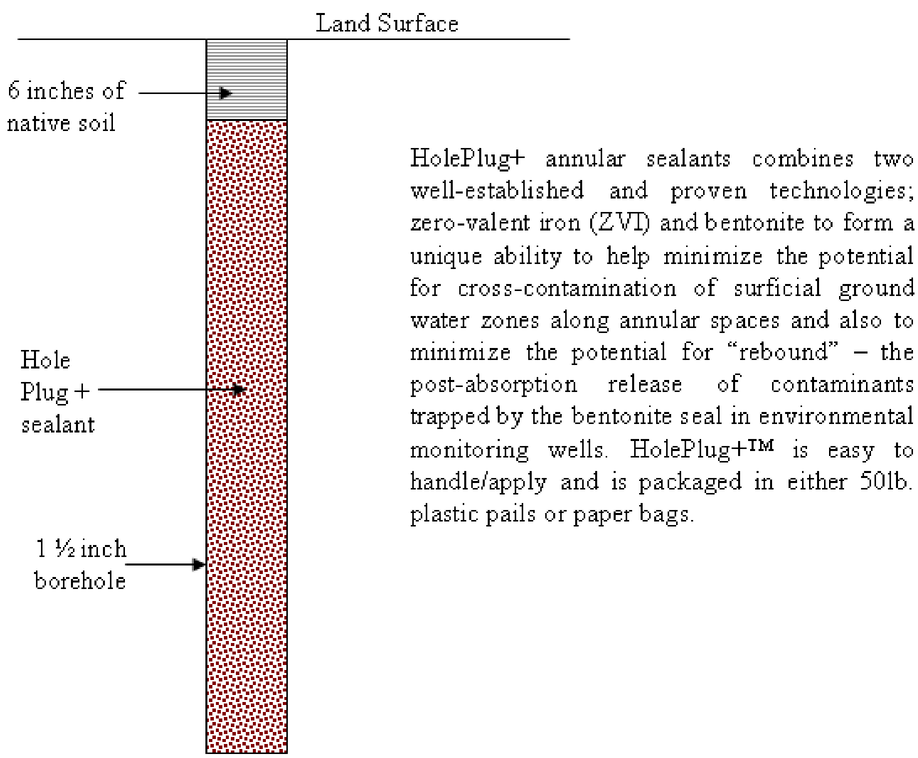
The intent of this pilot test is to inject these compounds only once.

13. Plugging procedure for the injection point including a schematic of the injection point after plugging.

Borehole Plugging Procedure

1. Upon completion of injection activities and removal of the GeoProbe injection rods, fill the borehole with bentonite Hole Plug+ (**Figure 3**). Note: Bentonite Hole Plug does not hydrate very quickly and is dense enough to fall below the water table surface and will provide a good seal. Cement grout should be avoided since it is possible to displace the grout in subsequent injections nearby.

Figure 3. Schematic of borehole plugging procedure.



2. Bentonite granular material may be placed in the borehole above the water table surface and is preferred when a fast-hydration is needed. Do not use below the water table because bridging will occur.

3. Fill the last few inches of the borehole with native soils or asphalt patch or cement patch in paved areas.

14. Description of the basic chemistry of the remediation process, including products and byproducts.

Following placement of EHC into the subsurface environment, a number of physical, chemical and microbiological processes combine to create very strong reducing conditions that stimulate rapid and complete dechlorination of organic solvents and other recalcitrant compounds. First, the organic component of EHC (fibrous organic material) is nutrient rich, **hydrophilic** and has high surface area; thus, it is an ideal support for growth of bacteria in the groundwater environment. As they grow on EHC particle surfaces, indigenous heterotrophic bacteria consume dissolved oxygen thereby reducing the redox potential in groundwater. In addition, as the bacteria grow on the organic particles, they ferment carbon and release a variety of volatile fatty acids (acetic, propionic, butyric) which diffuse from the site of fermentation into the groundwater plume and serve as electron donors for other bacteria, including dehalogenators and halorespiring species. Finally, the small ZVI particles (<5 to 45 μm) provide substantial reactive surface area that stimulates direct chemical dechlorination and an additional drop in the redox potential of the groundwater via chemical oxygen scavenging.

These physical, chemical and biological processes combine to create an extremely reduced environment that stimulates chemical and microbiological dechlorination of otherwise persistent compounds. Redox potentials as low as –550 mV are commonly observed in groundwater after EHC application. At these Eh levels, many organic constituents of interest (COI) are thermodynamically unstable and they will readily degrade via pathways more typical of physical destruction processes (minimum production and no accumulation of typically recognized biodegradation intermediates). Hence, the ISCR technology is microbiologically based in that we rely on indigenous microbes to biodegrade the EHC carbon (refined plant materials), but we do not require the presence or activity of special or otherwise unique bacteria for complete and effective remediation.

In either event, the fibrous organic carbon and ZVI or other reduced metal that comprises the slow release EHC will remain in the location where it is injected. It will not only treat COI that migrates into the treated area, but it will also have a ‘halo’ or ‘zone of influence’ of low redox conditions that will extend beyond its physical space, greatly increasing its effectiveness. **Figure 4** provides an example of how a small fracture of EHC creates a wide zone of influence outside of its immediate location. The native soil color is the yellow visible on the right hand side of the core. The orange discoloration is due to the low redox conditions created by the EHC, which became apparent after exposure to the air for 2 hours.

Figure 4. **Photograph of a soil core, from 30 ft to 33 ft bgs, showing a 1-inch fracture**

During aerobic respiration, dissolved oxygen concentrations decrease. After depletion of dissolved oxygen, anaerobic microorganisms utilize nitrate as an electron acceptor, followed by iron (III), sulfate, and finally carbon dioxide (methanogenesis). Each sequential reaction drives the oxidation reduction potential further down in to the range in which reductive dechlorination can occur. Reductive dechlorination is most effective in the ORP range corresponding to sulfate reduction and methanogenesis. When such conditions exist, the alternate pathway to carbon disulfide shown below can be realized. (Criddle, et. al., 1990; Freedman et. al., 1995; Devlin and Muller, 1999; Hashsham and Freedman, 1999).

It is critical to understand that the processes of COI destruction under ISCR conditions are different from the typical pathways. As an example, it is well documented for PCE and TCE that under ISCR conditions (Eh <-550 mV), these pathways are avoided and terminal destruction / mineralization proceeds along the lines of the recognized *beta*-elimination pathways (**Figure 5**). These differences have been described by various experts in the field of biotransformation processes (*e.g.*, Dr. John Wilson, US EPA as reported in the AFCEE Technology Transfer Seminar, 2003; Dr. Mark Ferry, MPCAA; J, Szecsody and J. Fruchter *et al*., Battelle Pacific Northwest National Laboratory). For Carbon Tetrachloride and related compounds, the ISCR pathway primarily entails the direct mineralization to innocuous terminal end products formate and carbon monoxide (**Figures 6a and 6b**).

Figure 5. **PCE /TCE Degradation Schematic – Representative Reactions for Mineralization under ISCR Conditions**

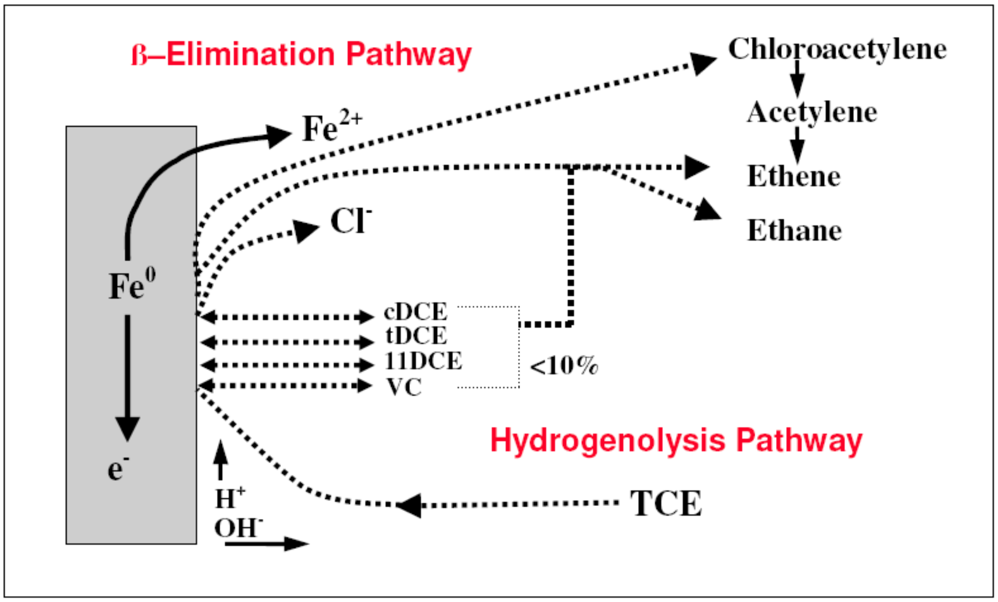
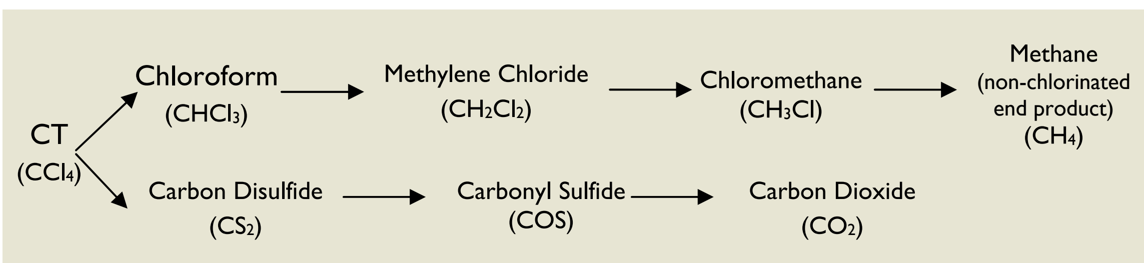
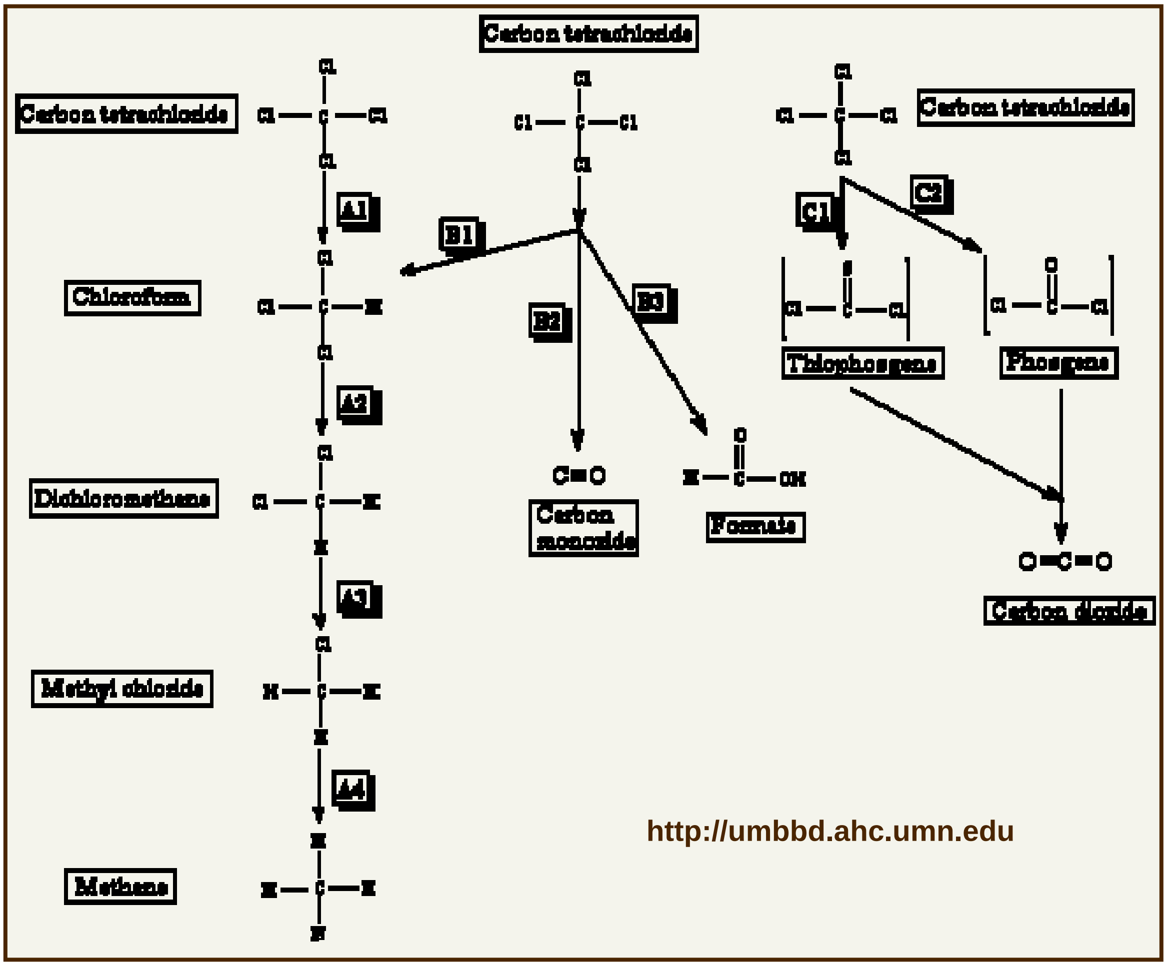


Figure 6a. **CT Degradation Schematic – Sequential Reductive Dehalogenation and Sulfate Reduction Reactions under Typical Anaerobic Conditions**



Note that many of these end products (methane, carbonyl sulfide and carbon dioxide) are gases under standard conditions.

Figure 6b. **CT Degradation Schematic Under ISCR Conditions (Middle Column) as compared to typical Sequential Reductive Dehalogenation (left column) and dichloroelimination reactions, which DO NOT occur under high iron, ISCR conditions (right column).**



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Argonne NATIONAL LABORATORY

Jorge S. Alvarado, Ph.D.
Applied Geosciences and Environmental Management Section

Environmental Science Division
Argonne National Laboratory
9700 South Cass Avenue, Bldg. 203
Argonne, IL 60439-4843

1-630-252-5267 phone
1-630-252-5747 fax
jsalvarado@anl.gov

November 12, 2007

Mr. Kirk Hoeffer
Kansas Depatmetnt of Health and Environment
khoeffer@kdhe.ks.us

Subject: *Amendment to Injection Permit – Centralia, KS*

Dear Mr. Hoeffer:

Following instructions from Mr. Christopher C. Carey of the Kansas Department of Health and Environment (KDHE) for the implementation of the pilot plan in the remediation of the former CCC/USDA site at Centralia, KS, he requested the introduction of a new compound to be use as tracer during the injection of EHC™ product.

We have selected to introduce bromide (Br^-) as tracer for this project as potassium bromide (KBr) at a concentration of Br- not to exceed 200 mg/L. Enclosed you will find the Material Safety Data Sheet of Potassium Bromide. The product is stable under normal temperature and pressures, solid, colorless to white, odorless, neutral in solution and not listed as carcinogenic. This product is not listed as Hazardous Substance under the Clean Water Act (CWA). None of the chemicals in this product are listed as Priority Pollutants or toxic pollutants under CWA. None of the chemicals in this product are considered highly hazardous by OSHA. This material not contains any hazardous air pollutants.

Due to the request of KDHE and the need to use a tracer in this project, I would like to request an amendment to the injection permit to include potassium bromide in the list of chemicals to be injected in the remediation project at Centralia, KS.

If you have any questions, please do not hesitate to call me at the number above,
Sincerely,

Jorge Alvarado

Jorge S. Alvarado, Ph.D.
Environmental Science Division

JSA:rs

Amendment to Injection Permit

Kirk:

This note has been prepared In accordance with Chris Carey's request that we add a tracer to the EHC slurry that we will be injecting at the CCC/ANL site in Centralia.

We are looking to inject the bromide along with a slightly more dilute mix of EHC to improve injectability and potentially decrease injection pressures. Accordingly, this table replaces the original Table 1 provided in the October 30, 2007 Proposal to Inject:

	Value	Unit
Treatment Area Dimensions:		
Length of Treatment Area	75	ft
Width of Treatment Area	45	ft
Depth to Top of Treatment Area	40	ft
Depth to Bottom of Treatment Area	60	ft
Treatment Area Thickness	20	ft
Treatment Area Volume	67,500	ft^3
Mass of Soil in Treatment Area	3,713	U.S. tons
Volume pore space	20,250	ft^3
EHC mass calculations:		
Percentage EHC by soil mass	0.10%	
Mass of EHC Required	7,500	lbs
Preparation of EHC Slurry:		
Percent solids in slurry (can be altered)	23.1%	
Volume Water Required	3,000	U.S. gallons
Slurry Volume to Inject	3,386	U.S. gallons
Injection details:		
Injection spacing	15	ft
Number of injection points	15	points
Mass EHC per point	500	lbs
Slurry volume per point	226	U.S. gallons
Application rates for reference:		
Slurry volume to pore space volume	2.2%	
EHC concentration in groundwater	0.4	lbs/ft^3

Starting with this information, here are some of the relevant factors we have used in selecting a bromide tracer dosage:

1). Assume that we like to reach the surrounding 5 newly installed piezometers, which will cover an additional area 22.5 ft from edge of the treatment area. So the maximum area to be covered is 90 x 120 ft^2

2). Assume that the maximum dilution vertically will extend 5 ft above and below. So thickness will be 30 ft.

3). The entire soil volume will be 324,000 ft^3 and pore volume will be 97,200 ft^3 based on a maximum effective porosity of 0.3. The total groundwater will be about 800,000 gallon.

4). The proposed total injection slurry (~3400 gallon) is made of 3000-gallon water mixed with EHC.

5). The following estimation is based on the initial bromide concentration in ~3000 gallon of water:

Initial Br^{-1} conc (mg/L)	Diluted Br^{-1} (mg/L)
400	1.70
200	0.85
150	0.63
100	0.42

The analytical method has a detection limit ranging from 0.0025 to 0.014 mg/L. Considering the highest detection limit and by trying to be at least one order of magnitude higher than the method detection limits, then we choose to use 150 mg/L concentration of Br^- (223 mg/L as KBr). For 3000 gallons of water to be mixed with the EHC, we would need 2530 g of KBr to make a 150 mg/L concentration.

Bromide concentrations in drinking water are around 0.1 mg/L. Because we are going to be above this level, regular drinking water will be fine for this application.

Thanks,

John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820
Phone: 517 669 5400 / Fax: 517 669 5455

MATERIAL SAFETY DATA SHEET

POTASSIUM BROMIDE, STANDARD INFRARED GRADE,
MATERIAL SAFETY DATA SHEET
NSN: 681000N037212
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: POTASSIUM BROMIDE, STANDARD INFRARED GRADE,

Ingredients/Identity Information

Proprietary: NO
Ingredient: POTASSIUM BROMIDE; (POTASSIUM BROMIDE, STANDARD INFRARED GRADE)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: TS7650000
CAS Number: 7758-02-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance and Odor: NONE SPECIFIED BY MANUFACTURER.

Fire and Explosion Hazard Data

Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). PREVENT CONTACT WITH SKIN AND EYES.
Unusual Fire And Expl Hazards: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

Reactivity Data

Stability: YES
Cond to Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials to Avoid: STRONG OXIDIZING AGENTS, STRONG ACIDS, HEAVY METAL SALTS.
Hazardous Decomp Products: HYDROGEN BROMIDE GAS.
Hazardous Poly Occur: NO
Conditions to Avoid (Poly): NOT RELEVANT

Health Hazard Data

==

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route of Entry - Inhalation: YES
Route of Entry - Skin: YES
Route of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE: HARMFUL IF SWALLOWED. MAY BE HARMFUL IF ABSORBED THRU SKIN. MAY BE HARMFUL IF INHALED. CAUSES EYE AND SKIN IRRITATION. MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT. CAN CAUSE CNS DEPRESSION. POTASSIUM BROMIDE ON PROLONGED
CONTACT W/MOIST SKIN CAN PRODUCE SEVERE (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms of Overexp: HLTH HAZ:IRRIT/BURNS. PRLNGD INHAL OF DUST CAN PRDCE BRONCHITIS. INGEST OF LG QTY CAN CAUSE IRRITABILITY, CONFUSION, TREMORS, ACNE-LIKE ERUPTIONS, MEMORY LOSS, HDCH, SLURRED SPEECH & ANOREXIA.
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, & TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: IMMED FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN: IMMED WASH WITH SOAP AND COPIOUS AMOUNTS OF
WATER. WASH CONTAMINATED CLOTHING BEFORE REUSE. INHAL: REMOVE TO FRESH AIR.
IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGEST: WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN.

==

Precautions for Safe Handling and Use

==

Steps If Matl Released/Spill: EVACUATE AREA. WEAR NIOSH/MSHA APPROVED RESPIRATOR, CHEMICAL SAFETY GOGGLES, RUBBER BOOTS & HEAVY RUBBER GLOVES.
SWEEP UP, PLACE IN A BAG & HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. VENTILATE AREA AND WASH SPILL SITE AFTER MATL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: FOR SMALL QTY:CAUTIOUSLY ADD TO A LARGE STIRRED EXCESS OF WATER. ADJUST PH TO NEUTRAL, SEPARATE ANY INSOL SOLIDS/LIQ & PKG
THEM FOR HAZ-WASTE DISP. FLUSH AQUEOUS SOLN DOWN DRAIN W/PLENTY OF WATER.
HYDROLYSIS & NEUT RXN MAY GENERATE HEAT & (SUPP DATA)
Precautions-Handling/Storing: DO NOT BREATHE DUST. AVOID CONT W/EYES/SKIN/ CLTHG. AVOID PRLNGD/RPTD EXPOSURE. IRRITANT. KEEP TIGHTLY CLOSED. HYGROSCOPIC. STORE IN A COOL DRY PLACE.
Other Precautions: NONE SPECIFIED BY MANUFACTURER.

==

Control Measures

===

Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: CHEMICAL-RESISTANT GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: SAFETY SHOWER AND EYE BATH. RUBBER BOOTS. WEAR
OTHER PROTECTIVE CLOTHING.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: WASTE DISP METH: FUMES WHICH CAN BE
CONTROLLED BY THE RATE OF ADDITION. OBSERVE ALL FEDERAL, STATE AND LOCAL
ENVIRONMENTAL REGULATIONS.

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Transportation Data

===

===

Disposal Data

===

===

Label Data

===

Label Required: YES
Technical Review Date: 02DEC92
Label Date: 02DEC92
Label Status: G
Common Name: POTASSIUM BROMIDE, STANDARD INFRARED GRADE, 34650-0
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: INGESTION, SKIN ABSORPTION OR
INHALATION MAY BE HARMFUL. EYE AND SKIN CONTACT MAY CAUSE IRRITATION.
MATERIAL MAY BE IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT
& MAY CAUSE CNS DEPRESSION. PROLONGED CONTACT W/MOIST SKIN MAY PRODUCE
SEVERE IRRITATION OR BURNS. INGESTION OF LARGE QUANTITIES MAY CAUSE
IRRITABILITY, CONFUSION, TREMORS, ACNE-LIKE SKIN ERUPTIONS, MEMORY LOSS,
HEADACHE, SLURRED SPEECH AND ANOREXIA. CHRONIC: PROLONGED INHALATION OF
DUST MAY PRODUCE BRONCHITIS.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Country: US
Label Emergency Number: 414-273-3850

KANSAS

DEPARTMENT OF HEALTH
AND ENVIRONMENT
Division of Environment

Kathleen Sebelius, Governor
Roderick L. Bremby, Secretary

www.kdheks.gov

November 20, 2007

Mr. Lorraine M. LaFreniere, Ph.D.
Argonne National Laboratory
9700 South Cass Avenue, Bldg. 203
Argonne, IL 60439-4843

RE: CCC/USDA Site at Centralia
Class V UIC Authorization
15 Injection Points

Dear: Mr. LaFreniere:

The Kansas Department of Health & Environment's Geology Section KDHE administers the Underground Injection Control (UIC) program. The UIC program has oversite of Class V injection points and has completed its review of this injection proposal submitted under your letter dated November 2, 2007, for compliance with the Underground Injection Control (UIC) Program Requirements. We have determined the proposal complies with the UIC Program requirements. This letter serves as the UIC Program authorization for the injection points.

This proposal was only reviewed for compliance with the UIC Program requirements. BER has oversight authority for this project. Your attached letter, from Chris Carey with BER, indicates approval to install and operate the injection points.

The following conditions required by the UIC Program apply:

- The injection points shall not endanger public health or the environment.
- This authorization is valid only for this proposal.
- This authorization is only for the injection of EHC, EHC-A, and bromide tracer solution.

- Injection pressure must be kept below 300 psi, unless prior approval is received from KDHE.

- Proposed significant changes of the injection proposal must be submitted to KDHE in writing, with supportive information, and have the approval of both KDHE=s Bureau of Environmental Remediation (BER) and the UIC program prior to implementation.

If you have any questions, please call me at (785) 296-1843 or email at khoeffne@kdhe.state.ks.us.

Sincerely,

Kirk Hoeffner, L.G.
Unit Chief, Underground Injection Control Program
Geology Section
Bureau of Water

C: Julie Coleman – KDHE/NEDO
Mike Cochran→File: USDA Centralia, Nemaha Co. Class V – General

Appendix B:

Correspondence

John Valkenburg

From: John Valkenburg [john.valkenburg@adventusgroup.com]

Sent: Tuesday, November 27, 2007 8:07 PM

To: KHoeffner@kdhe.state.ks.us

Cc: 'LaFreniere, Lorraine M.'; 'jim mueller@adventusgroup.com'; 'Ravi'; 'John Valkenburg'; 'Greg Powers'; 'haselow@redox-tech.com'; 'John Valkenburg'

Subject: Centralia Injection Status Update (11/27/07)

Kirk –

As discussed by phone today, we have observed these average injection pressures at our first boring (PT-5) today, as follows:

- PT-5-51' – 200 psi
- PT-5-53' – 250 psi
- PT-5-55 – 400 psi, with a peak of 500 psi.

As discussed, given the depth of these injections, the lack of any evidence of product surfacing, or any harm resulting from the injections, this is not of particular concern at this site. Accordingly, we will advise you if we should significantly exceed 500 psi at subsequent locations.

Thanks,

John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820
Phone: 517 669 5400 / Fax: 517 669 5455
www.adventusgroup.com / www.aquablokinfo.com / www.adventus.us / www.eti.ca

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"North American Environmental Remediation Product Innovation of the Year" from Frost & Sullivan, May 2007
"Innovation Award for Technology 2007" from ICU, May 2007

John Valkenburg

From: KHoeffner@kdhe.state.ks.us
Sent: Wednesday, November 28, 2007 9:10 AM
To: John Valkenburg
Cc: CKhan@kdhe.state.ks.us; MCochran@kdhe.state.ks.us
Subject: Re: Centralia Injection Status Update (11/27/07)

Attachments: pic22929.gif

pic22929.gif (11 KB)

John,

Thanks for the email documentation and for letting us know if there are additional pressure increases above 500 psi during the injection.

Kirk Hoeffner
Unit Chief, Underground Injection Control, Geology Section Kansas Department of Health & Environment 1000 SW Jackson St., Suite 420 Topeka, KS 66612-1367
Telephone: (785) 296-1843
Fax: (785) 296-5509
www.kdheks.gov/geo

Website: www.kdheks.gov/geo

File: USDA Centralia, Nemaha Co. Class V - General

"John Valkenburg" <john.valkenburg@adventusgroup.com>

11/27/2007 07:06 PM

To
<KHoeffner@kdhe.state.ks.us>

cc
"'LaFreniere, Lorraine M.'" <lafreniere@anl.gov>, "'jim mueller@adventusgroup.com'" <jim.mueller@adventusgroup.com>, "'Ravi'" <Ravi.Srirangam@AdventusGroup.com>, "'John Valkenburg'" <john.valkenburg@adventusgroup.com>, "'Greg Powers'" <powers@redox-tech.com>, <haselow@redox-tech.com>, "'John Valkenburg'" <john.valkenburg@adventusgroup.com>

Subject
Centralia Injection Status Update (11/27/07)

Kirk -

As discussed by phone today, we have observed these average injection pressures at our first boring (PT-5) today, as follows:

PT-5-51' - 200 psi
PT-5-53' - 250 psi
PT-5-55 - 400 psi, with a peak of 500 psi.

As discussed, given the depth of these injections, the lack of any evidence of product surfacing, or any harm resulting from the injections, this is not of particular concern at this site. Accordingly, we will advise you if we should significantly exceed 500 psi at subsequent locations.

Thanks,

John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820

Phone: 517 669 5400 / Fax: 517 669 5455

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"North American Environmental Remediation Product Innovation of the Year"
from Frost & Sullivan, May 2007

"Innovation Award for Technology 2007" from ICU, May 2007

John Valkenburg

From: John Valkenburg [john.valkenburg@adventusgroup.com]
Sent: Wednesday, November 28, 2007 11:58 AM
To: KHoeffner@kdhe.state.ks.us
Cc: Chris Carey; 'jim mueller@adventusgroup.com'; 'LaFreniere, Lorraine M.'; 'DAVID SURGNIER'; 'Ravi'; 'John Valkenburg'; Sedivy, Robert A.
Subject: Centralia Injection Pressure Update (11/28/07)

Kirk –

We observed slightly higher pressure at PT-3-55', with an average injection pressure of 450 psi, and a peak of 600 psi. We will continue to advise you if we see higher pressures than this. Again, we have seen no evidence of any problems arising from operating at these pressures.

Was unable to reach you by phone, as your number (785) 296-1673 seemingly currently rings at the number of one Carrie Bacon (sp?) of the Kansas Department of Disability Concerns. Please call my cell phone to discuss this matter as/if desired at (517) 927-3752.

Thanks,

John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820
Phone: 517 669 5400 / Fax: 517 669 5455
www.adventusgroup.com / www.aquablokinfo.com / www.adventus.us / www.eti.ca

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"North American Environmental Remediation Product Innovation of the Year" from Frost & Sullivan, May 2007
"Innovation Award for Technology 2007" from ICU, May 2007

John Valkenburg

From: John Valkenburg [john.valkenburg@adventusgroup.com]

Sent: Thursday, November 29, 2007 12:37 PM

To: KHoeffner@kdhe.state.ks.us

Cc: 'LaFreniere, Lorraine M.'; Sedivy, Robert A.; 'DAVID SURGNIER'; 'John Valkenburg'; 'Ravi'; 'jim mueller@adventusgroup.com'

Subject: Centralia Injection Pressure Update (11/29/07)

Kirk –

Just a note to advise you of some transient high pressures we have observed. At PT-15-53', we observed a pressure of 900 to 1000 psi. However, there was little or no injected material flow at this pressure. This suggests a plugged injection tip or tight formation. After some assessment of the condition in the field, we advanced the boring an additional 8" and had no problem injecting at normal pressures (in this case approximately 150 psi). We also observed a transient high pressure of 600 to 700 psi at PT-15-55' (for one or two seconds). After this the pressure stabilized to 450 psi and ultimately stabilized to 300 psi by the end of the injection.

Thanks,

John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820
Phone: 517 669 5400 / Fax: 517 669 5455
www.adventusgroup.com / www.aquablokinfo.com / www.adventus.us / www.eti.ca

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"North American Environmental Remediation Product Innovation of the Year" from Frost & Sullivan, May 2007
"Innovation Award for Technology 2007" from ICU, May 2007

John Valkenburg

From: KHoeffner@kdhe.state.ks.us
Sent: Thursday, November 29, 2007 5:14 PM
To: John Valkenburg
Cc: RHarper@kdhe.state.ks.us; DFTaylor@kdhe.state.ks.us; MCochran@kdhe.state.ks.us
Subject: Re: Centralia Injection Pressure Update (11/29/07)

Attachments: pic21548.gif

pic21548.gif (11 KB)

John,

As per our discussions regarding the plugging of the injection probe boreholes, we do not require grouting with cement. The bentonite pellets you are currently using are an approved grout. As we also discussed, if you cannot use a pvc pipe to tremie the pellets down the well, then slowly pouring them down and then making sure their is no bridging with a probe rod will be sufficient. You indicated that all the boreholes so far have taken enough material to properly plug the interval above the water table without any indicates of bridging.

Kirk Hoeffner
Unit Chief, Underground Injection Control, Geology Section Kansas Department of Health & Environment 1000 SW Jackson St., Suite 420 Topeka, KS 66612-1367
Telephone: (785) 296-1843
Fax: (785) 296-5509
www.kdheks.gov/geo

Website: www.kdheks.gov/geo

File: USDA Centralia, Nemaha Co. Class V - General

"John Valkenburg" <john.valkenburg@adventusgroup.com>

11/29/2007 11:36 AM

To
<KHoeffner@kdhe.state.ks.us>

cc
"'LaFreniere, Lorraine M.'" <lafreniere@anl.gov>, "Sedivy, Robert A." <RAsedivy@anl.gov>, "'DAVID SURGNIER'" <surgnier@prodigy.net>, "'John Valkenburg'" <john.valkenburg@adventusgroup.com>, "'Ravi'" <Ravi.Srirangam@AdventusGroup.com>, "'jim mueller@adventusgroup.com'" <jim.mueller@adventusgroup.com>

Subject
Centralia Injection Pressure Update (11/29/07)

Kirk –

Just a note to advise you of some transient high pressures we have observed. At PT-15-53', we observed a pressure of 900 to 1000 psi. However, there was little or no injected material flow at this pressure. This suggests a plugged injection tip or tight formation. After some assessment of the condition in the field, we advanced the boring an additional 8" and had no problem injecting at normal pressures (in this case approximately 150 psi). We also observed a transient high pressure of 600 to 700 psi at PT-15-55' (for one or two seconds). After this the pressure stabilized to 450 psi and ultimately stabilized to 300 psi by the end of the injection.

Thanks,

John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820

Phone: 517 669 5400 / Fax: 517 669 5455

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(Embedded image moved to file: pic21548.gif)

"North American Environmental Remediation Product Innovation of the Year"
from Frost & Sullivan, May 2007

"Innovation Award for Technology 2007" from ICU, May 2007

John Valkenburg

From: John Valkenburg [john.valkenburg@adventusgroup.com]
Sent: Tuesday, December 04, 2007 9:17 AM
To: KHoeffner@kdhe.state.ks.us
Cc: 'LaFreniere, Lorraine M.'; 'John Valkenburg'; Chris Carey; 'jim mueller@adventusgroup.com'; 'Ravi'
Subject: FW: Centralia, KS -12/4/07

Kirk –

Please see the note below with regard to some of our observations on injection pressures in the field. The saturated zone is quite tight in some locations.

Thanks,

John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820
Phone: 517 669 5400 / Fax: 517 669 5455
www.adventusgroup.com / www.aquablokinfo.com / www.adventus.us / www.eti.ca

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"North American Environmental Remediation Product Innovation of the Year" from Frost & Sullivan, May 2007
"Innovation Award for Technology 2007" from ICU, May 2007

From: Ravi [mailto:Ravi.Srirangam@AdventusGroup.com]
Sent: Tuesday, December 04, 2007 9:04 AM
To: John Valkenburg
Cc: "'jim mueller@adventusgroup.com'"
Subject: Centralia, KS -12/4/07

John,

I think Lotrraine is quite sick and is not going to be on site . I hope she checks her email from her room.

I wanted to just mention that we went up to 900 psi a couple of times when we were injecting in the saturated zone

The average for the borings in the saturated zone could be between 450-550 psi

Again , I do not believe that high pressures are necessarily indicative of the pressure that we inject , It could be a combination of pressure building up in the hoses and clogging of the injection tip (I just wanted to brief you so that you know and can inform Kirk).

The weather today is going to be the last of the good days. Wednesday and Thursday are going to be pretty cold and there is a good possibility for rain or snow.

Greg said he is going to leave tomorrow but Dave and Elias are going to take care of the operation after he leaves.

Thanks

Ravi

----- Original Message -----
From: John Valkenburg
To: 'LaFreniere, Lorraine M.'
Cc: 'Ravi' ; Sedivy, Robert A.
Sent: Tuesday, December 04, 2007 8:47 AM
Subject: Kirk Hoeffner

Lorraine –

I left Kirk a message that the injections are ongoing, and invited him to give me a call. I'll let you know if I hear anything from him.

Thanks,

John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820
Phone: 517 669 5400 / Fax: 517 669 5455
www.adventusgroup.com / www.aquablokinfo.com / www.adventus.us / www.eti.ca

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"North American Environmental Remediation Product Innovation of the Year" from Frost & Sullivan, May 2007
"Innovation Award for Technology 2007" from ICU, May 2007

John Valkenburg

From: John Valkenburg [john.valkenburg@adventusgroup.com]
Sent: Tuesday, December 04, 2007 11:29 AM
To: KHoeffner@kdhe.state.ks.us
Cc: 'LaFreniere, Lorraine M.'; 'Ravi'; Sedivy, Robert A.; 'John Valkenburg'; 'jim mueller@adventusgroup.com'; Chris Carey
Subject: Centralia Phone Conversation w/KDHE (12/04/07)

Kirk –

We welcome your possible trip out to the ANL site on Wednesday this week.

Also as discussed, we have observed some 'daylighting' or 'short-circuiting' of product to the surface at some locations. When we observe this, we have attempted to abate the problem (such as plugging the point from which surfacing is occurring) immediately. In cases where we are unable to easily abate the problem, we have stopped injecting at that interval and worked from another interval or location.

Please let us know if you have any questions or comments.

Thanks,

John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820
Phone: 517 669 5400 / Fax: 517 669 5455
www.adventusgroup.com / www.aquablokinfo.com / www.adventus.us / www.eti.ca

ADVENTUS

"North American Environmental Remediation Product Innovation of the Year" from Frost & Sullivan, May 2007
"Innovation Award for Technology 2007" from ICU, May 2007

John Valkenburg

From: KHoeffner@kdhe.state.ks.us
Sent: Tuesday, December 04, 2007 11:39 AM
To: John Valkenburg
Subject: Re: Centralia Phone Conversation w/KDHE (12/04/07)

Attachments: pic07958.gif

pic07958.gif (11 KB)

John,

Thanks for the email with the information. I will plan to come out to the site tomorrow morning probably around 8:30 or 9:00 a.m.

Kirk Hoeffner
Unit Chief, Underground Injection Control, Geology Section Kansas Department of Health & Environment 1000 SW Jackson St., Suite 420 Topeka, KS 66612-1367
Telephone: (785) 296-1843
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"John Valkenburg" <john.valkenburg@adventusgroup.com>

12/04/2007 10:29 AM

To
<KHoeffner@kdhe.state.ks.us>

cc
"'LaFreniere, Lorraine M.'" <lafreniere@anl.gov>, "'Ravi'" <Ravi.Srirangam@AdventusGroup.com>, "Sedivy, Robert A." <RAsedivy@anl.gov>, "'John Valkenburg'" <john.valkenburg@adventusgroup.com>, "'jim mueller@adventusgroup.com'" <jim.mueller@adventusgroup.com>, "Chris Carey" <ccarey@kdhe.state.ks.us>

Subject
Centralia Phone Conversation w/KDHE (12/04/07)

Kirk –

We welcome your possible trip out to the ANL site on Wednesday this week.

Also as discussed, we have observed some 'daylighting' or 'short-circuiting' of product to the surface at some locations. When we observe this, we have attempted to abate the problem (such as plugging the point from which surfacing is occurring) immediately. In cases where we are unable to easily abate the problem, we have stopped injecting at that interval and worked from another interval or location.

Please let us know if you have any questions or comments.

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John Valkenburg, P.E. / Senior Engineer / Adventus Americas Inc. / 1493 West Pratt Road / DeWitt, MI 48820

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"North American Environmental Remediation Product Innovation of the Year"
from Frost & Sullivan, May 2007

"Innovation Award for Technology 2007" from ICU, May 2007

Appendix C:

Field Injection Log

Appendix C. Field Injection Log
USDA/CCC Argonne Labs Site
Centralia, Kansas

Boring ID	Injection Depth (ft)	Date	Time (CST)	EHC or EHC-A	Water (gallons)	EHC or EHC-A (lbs)	Pressure (psi)	Comments
PT-5	51	11/27/2007	12:20	EHC-A	40	100	200-250	EHC-A Injected instead of EHC
PT-5	53	11/27/2007	12:50	EHC	40	100	250-300	Pressure remained on rods after injection completed
PT-5A	55	11/27/2007	13:15	EHC	40	100	400-450	High back pressure due to tight formation
PT-5B	57	11/28/2007	8:30	EHC	40	100	300-350	Shifted to new hole
PT-5B	59	11/28/2007	9:10	EHC	40	100	350-400	Back Pressure in the Injection rods
PT-3	51	11/28/2007	9:40	EHC	40	100	350-400	
PT-3	53	11/28/2007	10:10	EHC	40	100	450-500	Maximum pressure of 600 psi for a short time
PT-3	55	11/28/2007	10:40	EHC	40	100	350-400	Reduction of pressure at greater depths
PT-3	57	11/28/2007	11:15	EHC	40	100	300-350	
PT-3	59	11/28/2007	13:15	EHC	40	100	300-350	
PT-13	21	11/28/2007	14:20	EHC-A	54	50	50-75	
PT-13	23	11/28/2007	14:30	EHC-A	54	50	50-75	
PT-13	25	11/28/2007	14:40	EHC-A	54	50	50-75	
PT-13	27	11/28/2007	14:50	EHC-A	54	50	50-75	
PT-13	29	11/28/2007	14:55	EHC-A	54	50	50-75	
PT-13	31	11/28/2007	15:02	EHC-A	54	50	50-75	
PT-13	33	11/28/2007	15:07	EHC-A	54	50	100-150	
PT-13	35	11/28/2007	15:15	EHC-A	54	50	100-150	
PT-13	37	11/28/2007	15:27	EHC-A	54	50	100-150	
PT-13	39	11/28/2007	15:40	EHC-A	54	50	100-150	
PT-13	42	11/28/2007	16:10	EHC	54	50	150-200	
PT-13	45	11/28/2007	16:20	EHC	54	50	200-250	Daylighting at MW-02
PT-13	48	11/28/2007	16:30	EHC	54	50	400-450	Daylighting at MW-02 continues
PT-13	51	11/28/2007	16:40	EHC	54	50	400-450	Further Daylighting at MW-02 resulted in skipping the deeper saturated zone

Appendix C. Field Injection Log
USDA/CCC Argonne Labs Site
Centralia, Kansas

Boring ID	Injection Depth (ft)	Date	Time (CST)	EHC or EHC-A	Water (gallons)	EHC or EHC-A (lbs)	Pressure (psi)	Comments
PT-15	51.5	11/29/2007	9:00	EHC	40	100	150-200	Delay due to clogging of tips during injection
PT-15	53.8	11/29/2007	9:45	EHC	40	100	100-150	Less injection Pressure at 8 inches down –attributed to formation at 53’
PT-15	55	11/29/2007	10:10	EHC	40	100	200-250	Drilling tough due to tight zone of clay
PT-15	57	11/29/2007	10:25	EHC	40	100	300-400	600-700 psi for short period, slight daylighting at surface
PT-15	59	11/29/2007	10:45	EHC	40	100	200-250	Minimal Daylighting recorded
PT-1	21	11/29/2007	12:45	EHC-A	54	50	75-100	
PT-1	23	11/29/2007	12:55	EHC-A	54	50	75-100	Occurrence of surficial daylighting
PT-1	25	11/29/2007	13:00	EHC-A	54	50	75-100	Surficial daylighting continues
PT-1	27	11/29/2007	13:20	EHC-A	54	50	75-100	
PT-1	29	11/29/2007	13:30	EHC-A	54	50	75-100	
PT-1	31	11/29/2007	13:40	EHC-A	54	50	75-100	
PT-1	33	11/29/2007	13:46	EHC-A	54	50	75-100	
PT-1	35	11/29/2007	13:53	EHC-A	54	50	75-100	
PT-1	37	11/29/2007	14:00	EHC-A	54	50	100-200	
PT-1	39	11/29/2007	14:08	EHC-A	54	50	100-200	
PT-1	42	11/29/2007	14:13	EHC	54	50	450-600	Pressure stabilized after clogging removal
PT-1	44.3	11/29/2007	14:25	EHC	54	50	400-600	Back pressure reduction by going up 0.7ft
PT-1	48.5	11/29/2007						Had flow around rods (annulus), so moved to new location for 49'

Appendix C. Field Injection Log
USDA/CCC Argonne Labs Site
Centralia, Kansas

Boring ID	Injection Depth (ft)	Date	Time (CST)	EHC or EHC-A	Water (gallons)	EHC or EHC-A (lbs)	Pressure (psi)	Comments
PT-1A	49	11/29/2007	14:35	EHC	54	50	150-250	Back pressure reduction by going up 1 ft – still treated as a GW zone injection
PT-1A	51	11/29/2007	16:40	EHC	54	50	150-250	
PT-12	21	11/30/2007	8:42	EHC-A	54	50	50-100	Preheating required due to weather condition
PT-12	23	11/30/2007	8:49	EHC-A	54	50	50	
PT-12	25	11/30/2007	8:55	EHC-A	54	50	50-100	
PT-12	27	11/30/2007	9:02	EHC-A	54	50	50-100	
PT-12	29	11/30/2007	9:10	EHC-A	54	50	50-100	
PT-12	31	11/30/2007	9:17	EHC-A	54	50	250-300	
PT-12	33	11/30/2007	9:24	EHC-A	54	50	250-300	Geoprobe tip plugging/jams
PT-12	35	11/30/2007	9:32	EHC-A	54	50	~450	Backpressure prevented proceeding further
PT-2	21	11/30/2007	11:00	EHC-A	54	50	50	
PT-2	23	11/30/2007	11:07	EHC-A	54	50	50-100	
PT-2	25	11/30/2007	11:14	EHC-A	54	50	50	
PT-2	27	11/30/2007	11:18	EHC-A	54	50	50-100	
PT-2	29	11/30/2007	11:23	EHC-A	54	50	100-200	
PT-2	31	11/30/2007	11:26	EHC-A	54	50	50-100	
PT-2	33	11/30/2007	11:30	EHC-A	54	50	50-100	
PT-2	35	11/30/2007	11:38	EHC-A	54	50	100-200	
PT-2	37	11/30/2007	11:47	EHC-A	54	50	100-150	
PT-2	39	11/30/2007	13:10	EHC-A	54	50	50-100	
PT-6	21	11/30/2007	13:26	EHC-A	54	50	50	Small daylights
PT-6	23	11/30/2007	13:32	EHC-A	54	50	100-300	
PT-6	25	11/30/2007	13:40	EHC-A	54	50	150-250	Daylighting of EHC A observed from this depth to 35 feet.
PT-6	27	11/30/2007	13:46	EHC-A	54	50	100-200	
PT-6	29	11/30/2007	13:52	EHC-A	54	50	100-200	
PT-6	31	11/30/2007	13:58	EHC-A	54	50	250-300	Daylights at probe annulus.
PT-6	33	11/30/2007	14:07	EHC-A	54	50	150-250	

Appendix C. Field Injection Log
USDA/CCC Argonne Labs Site
Centralia, Kansas

Boring ID	Injection Depth (ft)	Date	Time (CST)	EHC or EHC-A	Water (gallons)	EHC or EHC-A (lbs)	Pressure (psi)	Comments
PT-6	35	11/30/2007	14:13	EHC-A	54	50	100-200	Daylighting beyond SB-07R
PT-6	37	11/30/2007	14:19	EHC-A	54	50	150-200	
PT-6	39	11/30/2007	14:24	EHC-A	54	50	150-250	
PT-6	42	11/30/2007	14:30	EHC	54	50	150-250	
PT-6	45	11/30/2007	14:40	EHC	54	50	150-250	
PT-6	48	11/30/2007	14:50	EHC	54	50	150-200	EHC daylighting from the annulus of SB07R
PT-7	21	12/2/2007	8:32	EHC-A	54	50	150-200	
PT-7	23	12/2/2007	8:40	EHC-A	54	50	200-250	
PT-7	25	12/2/2007	8:47	EHC-A	54	50	200-300	
PT-7	27	12/2/2007	8:55	EHC-A	54	50	200-250	
PT-7	29	12/2/2007	9:00	EHC-A	54	50	200-250	Daylighting of EHC A at MW-02
PT-7	31	12/2/2007	9:20	EHC-A	54	50	200-250	
PT-7	33	12/2/2007	9:32	EHC-A	54	50	200-250	
PT-7	35	12/2/2007	9:43	EHC-A	54	50	200-250	Some Daylighting at MW-02
PT-7	37	12/2/2007	9:55	EHC-A	54	50	250-300	
PT-7	39	12/2/2007	10:07	EHC-A	54	50	250-300	
PT-7	42	12/2/2007	10:45	EHC	54	50	250-300	
PT-7	45	12/2/2007	11:15	EHC				Some daylighting, ceased injection
PT-7	49	12/2/2007	11:45	EHC	40	100	250-300	Back pressure was offset by going 1 foot deeper
PT-7	52	12/2/2007	1:15	EHC	40	100	350-400	
PT-7	55	12/2/2007	1:24	EHC	60	150	350-400	Skipped interval in between due to high pressure (Dosage increased)
PT-7	58	12/2/2007	1:31	EHC	40	100	300-350	Injected at 58 to account for tight formation
PT-10	52	12/2/2007	13:45	EHC	40	100	250-300	Elevated back pressure at 51 ‘ was offset by going deeper

Appendix C. Field Injection Log
USDA/CCC Argonne Labs Site
Centralia, Kansas

Boring ID	Injection Depth (ft)	Date	Time (CST)	EHC or EHC-A	Water (gallons)	EHC or EHC-A (lbs)	Pressure (psi)	Comments
PT-10	53	12/2/2007	14:10	EHC	40	100	300-350	Some daylighting, ceased injection
PT-10	57	12/2/2007	14:45	EHC	40	100	400-500	Skipped 55 owing to tight formation, multiple daylights
PT-10	59	12/2/2007	15:06	EHC			400-550	Very minimal Injection but largely lost to surface.
PT-4	51	12/3/2007	8:55	EHC	40	100	250-350	
PT-4	53	12/3/2007	9:15	EHC	40	100	300-350	
PT-4	55	12/3/2007	9:30	EHC	40	100	250-350	
PT-4	57	12/3/2007	9:40	EHC	40	100	250-350	
PT-4	59	12/3/2007	9:55	EHC	40	100	300-500	
PT-14	40	12/3/2007	12:40	EHC	40	100	150-250	EHC Injected at 40 ft by mistake
PT-14	51	12/3/2007	12:55	EHC	40	100	200-300	
PT-14	53	12/3/2007	13:03	EHC	40	100	200-300	
PT-14	55	12/3/2007	13:18	EHC	40	100	300-600	High fluctuations in pressure
PT-14	57	12/3/2007	13:33	EHC	40	100	300-400	Slight surfical daylighting - multiple points + at MW-02
PT-14	59	12/3/2007	13:51	EHC	40	<100	250-300	Slight Daylighting Continues
PT-2	42	12/3/2007	14:30	EHC	54	50	200-300	
PT-2	45	12/3/2007		EHC				Skipped due to tight formations - attempted injection, but daylighting occurred around rods.
PT-2	48	12/3/2007	14:50	EHC	40	50	300-400	
PT-2	52	12/3/2007	15:05	EHC	40	100	150-450	Variations in pressure
PT-2	55	12/3/2007	5:16	EHC	40	100	300-600	~50# daylighted
PT-2	59	12/3/2007	15:40	EHC	67	100		Skipped 57 due to daylighting issues. Injected 250 lbs out of 350 lbs

Appendix C. Field Injection Log
USDA/CCC Argonne Labs Site
Centralia, Kansas

Boring ID	Injection Depth (ft)	Date	Time (CST)	EHC or EHC-A	Water (gallons)	EHC or EHC-A (lbs)	Pressure (psi)	Comments
PT-11	50.5	12/4/2007	8:40	EHC	54	50	400-600	
PT-11	53	12/4/2007	8:59	EHC	40	100	400-600	Slow pumping
PT-11	55	12/4/2007	9:15	EHC	54	50	300-500	
PT-11	57	12/4/2007	9:28	EHC	40	100	300-500	Slow pumping
PT-11	59	12/4/2007	9:35	EHC	54	50	200-300	
PT-1-B	53	12/4/2007	10:20	EHC	0	0	N/A	Skipped 51 due to no flow
PT-1-B	55	12/4/2007	10:40	EHC	60	150	300-450	Injected 150 lbs of EHC
PT-1-B	57	12/4/2007	10:20	EHC	54	50	300-450	250-350
PT-1-B	59	12/4/2007	11:01	EHC	108	100	450-600	Max 900 psi Recorded for a very short period probably due to some clogging
PT-12-A	37	12/4/2007	13:24	EHC-A	54	50	300-450	
PT-12-A	39	12/4/2007	13:55	EHC-A	54	50	300-400	
PT-12-A	42	12/4/2007	14:01	EHC	54	50	150-300	Daylighting near PT-13
PT-12-A	45	12/4/2007	14:08	EHC	54	50	150-300	
PT-12-A	48	12/4/2007	14:15	EHC	54	50	150-300	
PT-12-A	51	12/4/2007	14:22	EHC	54	50	150-300	
PT-12-A	53	12/4/2007	14:29	EHC	40	100	150-300	
PT-12-A	55	12/4/2007	14:36	EHC	54	50	300-450	
PT-12-A	57	12/4/2007	14:49	EHC	40	100	250-300	
PT-12-A	59	12/4/2007	14:58	EHC	54	50	~450	
PT-9	53	12/4/2007	15:35				300-500	Skipped 51 due to very tight formation - attempted 53, but had daylighting around probe hole.
PT-9	55	12/4/2007	16:20	EHC	100	250	300-500	250 lbs EHC
PT-9	57	12/4/2007	16:31	EHC	60	150	300-500	150 lbs EHC
PT-9	59	12/4/2007	16:48	EHC	40	100	300-500	
PT-11-A	21	12/5/2007	8:20	EHC-A	54	50	150-200	
PT-11-A	23	12/5/2007	8:26	EHC-A	0	0	100-200	Multiple surficial daylights
PT-11-A	25	12/5/2007	8:32	EHC-A	80	100	100-200	

Appendix C. Field Injection Log
USDA/CCC Argonne Labs Site
Centralia, Kansas

Boring ID	Injection Depth (ft)	Date	Time (CST)	EHC or EHC-A	Water (gallons)	EHC or EHC-A (lbs)	Pressure (psi)	Comments
PT-11-A	27	12/5/2007	8:40	EHC-A	40	50	100-200	EHC-A application rate was doubled starting from the depth of 27 feet
PT-11-A	29	12/5/2007	8:46	EHC-A	40	100	100-200	
PT-11-A	31	12/5/2007	8:50	EHC-A	40	0	100-200	Daylighting around probe.
PT-11-A	33	12/5/2007	9:00	EHC-A	32	~80	100-300	Injected but daylights
PT-11-A	35	12/5/2007	9:08	EHC-A	20	~50	100-200	Daylights
PT-11-A	37	12/5/2007	9:17	EHC-A	40	~50	150-200	Daylights
PT-11-A	39	12/5/2007	9:25	EHC-A	40	170	100-200	
PT-11-A	42	12/5/2007	9:30	EHC	40	100	100-200	
PT-11-A	45	12/5/2007	9:40	EHC	40	100	100-200	
PT-11-A	48	12/5/2007	9.48	EHC	40	100	100-200	
PT-6-A	55	12/5/2007	11:05	EHC	40	100	500-900	High pressures, skipped 51 and 53
PT-6-A	56.5	12/5/2007	11:22	EHC	40	100	400-600	
PT-6-A	58.5	12/5/2007	11:44	EHC	40	100	600-750	

Total water usage for injection of 8650 gallons

Supplement 4:

Analytical Results for Groundwater and Soil Samples Collected during the Extended Post-Injection Monitoring Program

TABLE S4.1 Post-injection monitoring: Field measurements made prior to collection of groundwater samples within and adjacent to the treatment area.

Location	Sample	Sample Date	Depth (ft BGL)	Temperature (°C)	pH	Conductivity (μS/cm)	Concentration (mg/L) Dissolved Oxygen	Iron(II)	Carbon Dioxide	ORP (mV)
MW01	CNMW01-W-26023	3/19/08	54.5-64.5	9.5	7.31	613	3.34	–	–	122
MW01	CNMW01-W-26673	9/9/08	54.5-64.5	13.9	7.28	595	5.18	0.03	20	28
MW02	CNMW02-W-26074	1/9/08	49.5-59.5	17.0	5.81	2280	0.17	3.3+	–	-218
MW02	CNMW02-W-26097	1/24/08	49.5-59.5	8.6	5.81	3910	0.96	3.3+	–	89
MW02	CNMW02-W-26099	2/23/08	49.5-59.5	9.0	5.64	8501	2.40	3.3+	–	45
MW02	CNMW02-W-26000	3/12/08	49.5-59.5	11.1	5.58	10174	0.28	3.3+	–	-42
MW02	CNMW02-W-26045	4/24/08	49.5-59.5	16.9	5.68	8264	0.11	3.3+	–	-54
MW02	CNMW02-W-26620	6/4/08	49.5-59.5	17.4	6.04	10065	0.09	3.3+	–	-119
MW02	CNMW02-W-26639	7/8/08	49.5-59.5	15.3	6.12	8934	1.63	3.3+	–	-49
MW02	CNMW02-W-26658	8/6/08	49.5-59.5	16.6	5.91	8654	0.33	3.3+	–	-75
MW02	CNMW02-W-26674	9/8/08	49.5-59.5	13.1	6.12	6821	0.40	3.3+	50	-74
MW03	CNMW03-W-26078	1/10/08	50.5-60.5	13.0	6.94	719	10.31	0.38	–	113
MW03	CNMW03-W-26115	2/23/08	50.5-60.5	9.5	7.10	741	7.19	0.10	–	246
MW03	CNMW03-W-26001	3/12/08	50.5-60.5	14.6	7.12	777	7.90	3.13	–	89
MW03	CNMW03-W-26046	4/23/08	50.5-60.5	13.8	7.11	733	5.46	0.07	–	177
MW03	CNMW03-W-26621	6/4/08	50.5-60.5	15.9	7.16	807	5.61	0.07	–	123
MW03	CNMW03-W-26640	7/7/08	50.5-60.5	16.1	7.07	839	6.23	0.08	–	149
MW03	CNMW03-W-26659	8/6/08	50.5-60.5	15.0	6.34	843	1.98	0.15	–	208
MW03	CNMW03-W-26675	9/9/08	50.5-60.5	14.9	7.13	763	9.60	0.12	110	66
MW04	CNMW04-W-26024	3/19/08	37.5-47.5	11.2	7.32	636	7.55	–	–	164
MW04	CNMW04-W-26676	9/9/08	37.5-47.5	14.2	7.14	648	8.68	0	100	72
MW05	CNMW05-W-26025	3/19/08	34.5-44.5	12.9	7.42	642	5.42	–	–	177
MW05	CNMW05-W-26677	9/10/08	34.5-44.5	13.9	7.11	663	7.14	0	95	130
MW06	CNMW06-W-26026	3/19/08	46.5-56.5	14.1	7.01	552	7.00	–	–	172
MW06	CNMW06-W-26678	9/9/08	46.5-56.5	14.4	7.20	437	0.36	0.07	105	-96

TABLE S4.1 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Temperature (°C)	pH	Conductivity (μS/cm)	Concentration (mg/L) Dissolved Oxygen	Concentration (mg/L) Iron(II)	Concentration (mg/L) Carbon Dioxide	ORP (mV)
MW07	CNMW07-W-26027	3/19/08	45-55	12.5	7.29	647	2.70	–	–	215
MW07	CNMW07-W-26679	9/9/08	45-55	15.6	7.10	629	1.41	0	68	16
MW08	CNMW08-W-26028	3/20/08	38-53	13.5	7.19	869	2.11	–	–	185
MW08	CNMW08-W-26680	9/10/08	38-53	16.3	7.03	864	1.17	0.03	100	117
MW09	CNMW09-W-26029	3/20/08	25-35	13.5	7.17	720	4.70	–	–	173
MW09	CNMW09-W-26681	9/10/08	25-35	14.7	7.02	706	3.68	0.07	110	120
MW10	CNMW10-W-26030	3/20/08	30-45	10.9	7.18	898	6.12	–	–	187
MW10	CNMW10-W-26682	9/9/08	30-45	14.8	7.05	879	7.18	0.06	100	94
PMP1	CNPMP1-W-26079	1/10/08	50-60	17.7	6.26	1140	3.11	0.33	–	-222
PMP1	CNPMP1-W-26083	1/24/08	50-60	7.8	6.25	1446	1.01	3.3+	–	-357
PMP1	CNPMP1-W-25985	2/24/08	50-60	12.3	6.68	924	3.24	0.66	–	26
PMP1	CNPMP1-W-26005	3/13/08	50-60	–	–	–	–	1.32	–	–
PMP1	CNPMP1-W-26050	4/24/08	50-60	14.9	7.09	782	0.21	0	–	-95
PMP1	CNPMP1-W-26625	6/5/08	50-60	15.7	7.30	735	0.46	0.08	–	-113
PMP1	CNPMP1-W-26644	7/8/08	50-60	15.5	7.06	756	0.47	0.15	–	-53
PMP1	CNPMP1-W-26663	8/6/08	50-60	15.0	7.23	714	3.52	0	–	-48
PMP1	CNPMP1-W-26689	9/9/08	50-60	14.4	5.54	700	1.37	0.23	115	40
PMP2	CNPMP2-W-26081	1/10/08	50-60	19.9	6.55	703	0.18	0.50	–	-556
PMP2	CNPMP2-W-26084	1/24/08	50-60	7.2	6.74	1058	1.40	3.3+	–	-266
PMP2	CNPMP2-W-25986	2/24/08	50-60	9.7	6.35	991	2.05	2.13	–	-87
PMP2	CNPMP2-W-26006	3/13/08	50-60	–	–	–	–	1.95	–	–
PMP2	CNPMP2-W-26051	4/24/08	50-60	14.5	6.21	1093	0.28	1.37	–	-98
PMP2	CNPMP2-W-26626	6/5/08	50-60	15.6	6.88	1080	0.34	1.00	–	-101
PMP2	CNPMP2-W-26645	7/8/08	50-60	15.5	6.70	1100	0.16	1.26	–	-66
PMP2	CNPMP2-W-26664	8/6/08	50-60	15.3	6.86	1051	2.87	0.5	–	-66
PMP2	CNPMP2-W-26690	9/9/08	50-60	14.4	7.09	997	0.05	1.68	180	-41
PMP3	CNPMP3-W-26071	1/9/08	50-60	18.3	6.56	1368	0.15	0.62	–	-550
PMP3	CNPMP3-W-26086	1/24/08	50-60	9.5	6.34	2420	0.26	3.3+	–	-344
PMP3	CNPMP3-W-25990	2/25/08	50-60	10.6	6.44	1901	0.62	3.16	–	-17
PMP3	CNPMP3-W-26007	3/13/08	50-60	12.5	6.73	1908	0.33	0.20	–	-88

TABLE S4.1 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Temperature (°C)	pH	Conductivity (μS/cm)	Concentration (mg/L)			ORP (mV)
							Dissolved Oxygen	Iron(II)	Carbon Dioxide	
PMP3	CNPMP3-W-26052	4/24/08	50-60	15.1	6.99	1813	0.18	2.58	–	-176
PMP3	CNPMP3-W-26627	6/5/08	50-60	15.7	7.18	1678	0.03	2.15	–	-193
PMP3	CNPMP3-W-26646	7/8/08	50-60	15.1	6.32	1646	0.21	1.46	–	-119
PMP3	CNPMP3-W-26665	8/6/08	50-60	14.9	7.38	1505	1.43	0.23	–	-138
PMP3	CNPMP3-W-26691	9/9/08	50-60	14.5	6.98	1301	0.03	3.3+	150	-150
PMP4	CNPMP4-W-26068	1/9/08	48.75-58.75	15.8	7.13	736	2.01	0.50	–	-213
PMP4	CNPMP4-W-26087	1/24/08	48.75-58.75	7.7	7.76	669	2.35	3.3+	–	-306
PMP4	CNPMP4-W-25992	2/25/08	48.75-58.75	8.5	7.16	697	2.36	0.36	–	-209
PMP4	CNPMP4-W-26008	3/13/08	48.75-58.75	–	–	–	–	–	–	–
PMP4	CNPMP4-W-26053	4/24/08	48.75-58.75	15.2	7.15	677	2.91	0	–	66
PMP4	CNPMP4-W-26628	6/5/08	48.75-58.75	14.6	7.46	733	3.82	0.09	–	12
PMP4	CNPMP4-W-26647	7/7/08	48.75-58.75	15.5	7.04	753	12.13	0.04	–	97
PMP4	CNPMP4-W-26666	8/6/08	48.75-58.75	14.9	7.04	761	11.61	0	–	66
PMP4	CNPMP4-W-26692	9/9/08	48.75-58.75	14.3	4.97	738	4.87	0.49	100	134
PMP5	CNPMP5-W-26069	1/9/08	50-60	13.2	7.25	743	2.45	0.31	–	-189
PMP5	CNPMP5-W-26088	1/24/08	50-60	8.2	7.43	805	2.23	3.3+	–	33
PMP5	CNPMP5-W-25997	2/25/08	50-60	9.0	7.25	831	2.02	0.15	–	150
PMP5	CNPMP5-W-26009	3/13/08	50-60	10.7	7.28	828	1.83	0.14	–	221
PMP5	CNPMP5-W-26054	4/24/08	50-60	16.4	7.35	858	1.04	0.11	–	154
PMP5	CNPMP5-W-26629	6/4/08	50-60	22.0	7.37	927	1.25	0.12	–	-107
PMP5	CNPMP5-W-26648	7/8/08	50-60	19.0	7.21	915	3.93	0.31	–	111
PMP5	CNPMP5-W-26667	8/6/08	50-60	18.4	6.25	970	0.43	0.09	–	163
PMP5	CNPMP5-W-26693	9/10/08	50-60	16.9	7.20	875	2.51	0.18	105	117
PMP6	CNPMP6-W-26065	1/8/08	50-60	15.5	7.63	826	0.96	0.45	–	-276
PMP6	CNPMP6-W-26090	1/24/08	50-60	8.6	7.65	547	3.36	3.3+	–	-155
PMP6	CNPMP6-W-25993	2/25/08	50-60	9.1	7.22	755	3.18	0.26	–	133
PMP6	CNPMP6-W-26010	3/13/08	50-60	10.3	7.32	750	3.31	0.27	–	231
PMP6	CNPMP6-W-26055	4/24/08	50-60	14.9	7.07	761	2.67	3.3+	–	197
PMP6	CNPMP6-W-26630	6/5/08	50-60	15.7	7.32	783	2.94	0.08	–	100
PMP6	CNPMP6-W-26649	7/7/08	50-60	15.5	7.17	806	9.96	0.11	–	108
PMP6	CNPMP6-W-26668	8/6/08	50-60	15.1	7.02	816	9.13	0.08	–	89
PMP6	CNPMP6-W-26694	9/8/08	50-60	13.2	6.87	787	3.32	0.09	75	173

TABLE S4.1 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Temperature (°C)	pH	Conductivity (µS/cm)	Concentration (mg/L) Dissolved Oxygen	Concentration (mg/L) Iron(II)	Concentration (mg/L) Carbon Dioxide	ORP (mV)
PMP7	CNPMP7-W-26066	1/8/08	50-60	18.0	7.14	803	1.01	0.3	–	-381
PMP7	CNPMP7-W-26091	1/24/08	50-60	9.5	7.55	629	2.90	3.3+	–	-201
PMP7	CNPMP7-W-25996	2/25/08	50-60	6.4	7.27	782	2.73	0.32	–	129
PMP7	CNPMP7-W-26011	3/13/08	50-60	11.3	7.29	789	3.20	0.16	–	218
PMP7	CNPMP7-W-26056	4/24/08	50-60	15.6	6.77	814	3.32	0.36	–	198
PMP7	CNPMP7-W-26631	6/5/08	50-60	14.2	7.39	836	3.77	0.08	–	95
PMP7	CNPMP7-W-26650	7/7/08	50-60	15.0	7.18	842	12.48	0.02	–	106
PMP7	CNPMP7-W-26669	8/6/08	50-60	14.7	6.95	844	9.67	0	–	85
PMP7	CNPMP7-W-26695	9/9/08	50-60	14.2	6.30	807	2.18	0.18	70	15
PMP8	CNPMP8-W-26075	1/9/08	50-60	18.4	6.84	1310	0.08	0.51	–	-548
PMP8	CNPMP8-W-26092	1/24/08	50-60	7.7	7.15	1322	1.01	3.3+	–	-201
PMP8	CNPMP8-W-25994	2/25/08	50-60	8.8	7.07	1055	0.31	1.28	–	-122
PMP8	CNPMP8-W-26012	3/13/08	50-60	–	–	–	–	3.3+	–	–
PMP8	CNPMP8-W-26057	4/24/08	50-60	14.8	6.94	1385	0.18	3.3+	–	-186
PMP8	CNPMP8-W-26632	6/5/08	50-60	15.6	7.44	1304	0.06	1.78	–	-190
PMP8	CNPMP8-W-26651	7/8/08	50-60	15.1	6.96	1435	0.08	1.15	–	-135
PMP8	CNPMP8-W-26670	8/6/08	50-60	14.9	7.56	1433	1.30	0.52	–	-158
PMP8	CNPMP8-W-26696	9/9/08	50-60	14.4	7.05	1388	0.03	2.72	60	-129
PMP9	CNPMP9-W-26077	1/10/08	50-60	14.9	7.19	656	0.59	0.42	–	-323
PMP9	CNPMP9-W-26109	1/24/08	50-60	8.7	7.47	598	2.64	0.47	–	-244
PMP9	CNPMP9-W-25989	2/24/08	50-60	9.2	7.24	603	3.53	0.2	–	-23
PMP9	CNPMP9-W-26013	3/13/08	50-60	13.3	7.47	595	4.18	0.04	–	75
PMP9	CNPMP9-W-26058	4/24/08	50-60	14.4	7.23	618	5.32	0.17	–	41
PMP9	CNPMP9-W-26633	6/5/08	50-60	14.6	7.41	634	5.60	0.03	–	1
PMP9	CNPMP9-W-26652	7/8/08	50-60	14.5	7.27	656	5.67	0.16	–	34
PMP9	CNPMP9-W-26671	8/6/08	50-60	14.9	7.24	640	18.65	0	–	-10
PMP9	CNPMP9-W-26697	9/9/08	50-60	14.0	6.36	606	7.78	0.10	120	45
SB01	CNSB01-W-26031	3/20/08	40-50	15.6	7.29	783	8.02	–	–	182
SB01	CNSB01-W-26683	9/10/08	40-50	16.5	7.10	676	2.89	0.17	100	100
SB04	CNSB04-W-26076	1/10/08	51-50	9.0	6.82	866	8.73	0.10	–	89
SB04	CNSB04-W-26094	1/24/08	51-50	8.7	7.19	778	6.32	0.40	–	184
SB04	CNSB04-W-26117	2/23/08	51-50	9.6	7.08	804	5.53	0	–	266

TABLE S4.1 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Temperature (°C)	pH	Conductivity (μS/cm)	Concentration (mg/L)			ORP (mV)
							Dissolved Oxygen	Iron(II)	Carbon Dioxide	
SB04	CNSB04-W-26002	3/12/08	51-50	15.5	7.04	819	6.16	0.09	–	154
SB04	CNSB04-W-26047	4/24/08	51-50	15.4	7.18	817	3.72	0.07	–	147
SB04	CNSB04-W-26622	6/4/08	51-50	21.7	7.24	857	4.73	0.08	–	128
SB04	CNSB04-W-26641	7/7/08	51-50	24.2	7.04	896	3.88	0.08	–	164
SB04	CNSB04-W-26660	8/6/08	51-50	20.6	7.00	892	0.90	0.06	–	127
SB04	CNSB04-W-26684	9/9/08	51-50	16.5	7.11	802	6.48	0.02	100	70
SB05	CNSB05-W-26032	3/20/08	32-42	14.5	7.11	870	5.56	–	–	206
SB05	CNSB05-W-26685	9/9/08	32-42	13.7	6.79	890	7.60	0.09	90	56
SB07R	CNSB07R-W-26073	1/9/08	45-60	17.4	7.05	565	6.64	0.07	–	130
SB07R	CNSB07R-W-26111	1/24/08	45-60	8.4	7.29	624	5.97	2.90	–	167
SB07R	CNSB07R-W-25984	2/24/08	45-60	14.2	7.18	629	4.64	0	–	277
SB07R	CNSB07R-W-26003	3/12/08	45-60	17.3	7.18	639	5.33	0	–	108
SB07R	CNSB07R-W-26048	4/24/08	45-60	16.7	7.19	631	1.93	0	–	158
SB07R	CNSB07R-W-26623	6/4/08	45-60	16.6	7.37	651	4.06	0.05	–	111
SB07R	CNSB07R-W-26642	7/7/08	45-60	18.3	7.11	676	4.03	0.02	–	128
SB07R	CNSB07R-W-26661	8/6/08	45-60	15.9	6.01	682	0.78	0	–	154
SB07R	CNSB07R-W-26686	9/9/08	45-60	14.1	7.06	631	5.08	0.07	100	55
SB08	CNSB08-W-26070	1/9/08	52-62	14.7	7.01	587	4.58	0	–	118
SB08	CNSB08-W-26112	1/24/08	52-62	8.2	7.27	622	2.84	0.39	–	175
SB08	CNSB08-W-25978	2/24/08	52-62	9.4	7.23	628	3.30	0.03	–	255
SB08	CNSB08-W-26004	3/12/08	52-62	17.1	7.17	642	3.63	0.14	–	102
SB08	CNSB08-W-26049	4/23/08	52-62	15.7	7.07	642	2.55	0	–	168
SB08	CNSB08-W-26624	6/4/08	52-62	21.7	7.18	673	2.57	0.07	–	131
SB08	CNSB08-W-26643	7/7/08	52-62	21.2	6.83	700	2.04	0.07	–	176
SB08	CNSB08-W-26662	8/6/08	52-62	19.9	6.80	701	0.64	0	–	102
SB08	CNSB08-W-26687	9/8/08	52-62	13.6	7.14	626	2.70	0	90	230
SB09	CNSB09-W-26033	3/20/08	32-42	10.1	6.94	1000	1.57	–	–	221
SB09	CNSB09-W-26688	9/10/08	32-42	18.4	6.87	977	0.56	0.11	160	109

TABLE S4.2 Post-injection monitoring: Results for organic analyses of groundwater samples collected within and adjacent to the pilot test area

				Concentration (μg/L)			
Location	Sample	Sample Date	Depth (ft BGL)	Carbon Tetrachloride	Chloroform	Methylene Chloride	Comment
MW01	CNMW01-W-26023	3/19/08	54.5-64.5	ND[a]	ND	ND	
MW01	CNMW01-W-26673	9/9/08	54.5-64.5	ND	ND	ND	
MW02	CNMW02-W-26074	1/9/08	49.5-59.5	0.3 J[b]	23	ND	No purge
MW02	CNMW02-W-26097	1/24/08	49.5-59.5	ND	11	1.8	No purge
MW02	CNMW02-W-26099	2/23/08	49.5-59.5	ND	1.6	1.3	
MW02	CNMW02-W-26000	3/12/08	49.5-59.5	ND	1.2	1.9	
MW02	CNMW02-W-26045	4/24/08	49.5-59.5	ND	6.6	2.4	
MW02	CNMW02-W-26620	6/4/08	49.5-59.5	9.8	22	5.6	
MW02	CNMW02-W-26639	7/8/08	49.5-59.5	6.8	69	13	
MW02	CNMW02-W-26658	8/6/08	49.5-59.5	21	72	12	
MW02	CNMW02-W-26674	9/8/08	49.5-59.5	18	57	11	
MW03	CNMW03-W-26078	1/10/08	50.5-60.5	2.9	ND	ND	No purge
MW03	CNMW03-W-26115	2/23/08	50.5-60.5	2.1	ND	ND	
MW03	CNMW03-W-26001	3/12/08	50.5-60.5	2.3	ND	ND	
MW03	CNMW03-W-26046	4/23/08	50.5-60.5	2.4	ND	ND	
MW03	CNMW03-W-26621	6/4/08	50.5-60.5	2.7	0.2 J	ND	
MW03	CNMW03-W-26640	7/7/08	50.5-60.5	3.3	ND	ND	
MW03	CNMW03-W-26659	8/6/08	50.5-60.5	3.2	0.5 J	ND	
MW03	CNMW03-W-26675	9/9/08	50.5-60.5	3.2	0.3 J	ND	
MW04	CNMW04-W-26024	3/19/08	37.5-47.5	1.3	ND	ND	
MW04	CNMW04-W-26676	9/9/08	37.5-47.5	2.0	ND	ND	
MW05	CNMW05-W-26025	3/19/08	34.5-44.5	1.9	ND	ND	
MW05	CNMW05-W-26677	9/10/08	34.5-44.5	13	0.7 J	ND	Primary sample
MW05	CNMW05DUP-W-26698	9/10/08	34.5-44.5	12	0.6 J	ND	Replicate
MW06	CNMW06-W-26026	3/19/08	46.5-56.5	ND	ND	ND	
MW06	CNMW06-W-26678	9/9/08	46.5-56.5	ND	ND	ND	
MW07	CNMW07-W-26027	3/19/08	45-55	3.0	ND	ND	
MW07	CNMW07-W-26679	9/9/08	45-55	4.0	0.2 J	ND	
MW08	CNMW08-W-26028	3/20/08	38-53	ND	ND	ND	
MW08	CNMW08-W-26680	9/10/08	38-53	ND	ND	ND	Primary sample
MW08	CNMW08DUP-W-26699	9/10/08	38-53	ND	ND	ND	Replicate
MW09	CNMW09-W-26029	3/20/08	25-35	ND	ND	ND	
MW09	CNMW09-W-26681	9/10/08	25-35	ND	ND	ND	
MW10	CNMW10-W-26030	3/20/08	30-45	ND	ND	ND	
MW10	CNMW10-W-26682	9/9/08	30-45	ND	ND	ND	
PMP1	CNPMP1-W-26079	1/10/08	50-60	158	22	ND	No purge
PMP1	CNPMP1-W-26083	1/24/08	50-60	0.5 J	92	6.8	No purge
PMP1	CNPMP1-W-25985	2/24/08	50-60	71	87	6.0	
PMP1	CNPMP1-W-26005	3/13/08	50-60	131	49	ND	
PMP1	CNPMP1-W-26050	4/24/08	50-60	113	41	1.2	
PMP1	CNPMP1-W-26625	6/5/08	50-60	150	39	0.7 J	
PMP1	CNPMP1-W-26644	7/8/08	50-60	145	33	ND	
PMP1	CNPMP1-W-26663	8/6/08	50-60	142	29	ND	
PMP1	CNPMP1-W-26689	9/9/08	50-60	136	30	ND	
PMP2	CNPMP2-W-26081	1/10/08	50-60	980	951	4.2	No purge
PMP2	CNPMP2-W-26084	1/24/08	50-60	265	875	17	No purge
PMP2	CNPMP2-W-25986	2/24/08	50-60	1249	715	24	
PMP2	CNPMP2-W-26006	3/13/08	50-60	1550	456	Diluted	

TABLE S4.2 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Concentration (μg/L) Carbon Tetrachloride	Chloroform	Methylene Chloride	Comment
PMP2	CNPMP2-W-26051	4/24/08	50-60	2254	476	8.7	
PMP2	CNPMP2-W-26626	6/5/08	50-60	2873	340	6.6	
PMP2	CNPMP2-W-26645	7/8/08	50-60	1831	282	6.1	
PMP2	CNPMP2-W-26664	8/6/08	50-60	1315	246	5.2	
PMP2	CNPMP2-W-26690	9/9/08	50-60	1854	318	5.6	
PMP3	CNPMP3-W-26071	1/9/08	50-60	112	116	1.0	No purge
PMP3	CNPMP3-W-26086	1/24/08	50-60	4.2	79	3.4	No purge
PMP3	CNPMP3-W-25990	2/25/08	50-60	3.1	147	6.5	
PMP3	CNPMP3-W-26007	3/13/08	50-60	3.9	110	10	
PMP3	CNPMP3-W-26052	4/24/08	50-60	16	89	28	
PMP3	CNPMP3-W-26627	6/5/08	50-60	46	129	32	
PMP3	CNPMP3-W-26646	7/8/08	50-60	42	90	20	
PMP3	CNPMP3-W-26665	8/6/08	50-60	40	67	8.9	
PMP3	CNPMP3-W-26691	9/9/08	50-60	21	57	6.2	
PMP4	CNPMP4-W-26068	1/9/08	48.75-58.75	36	12	ND	No purge
PMP4	CNPMP4-W-26087	1/24/08	48.75-58.75	10	6.9	1.1	No purge
PMP4	CNPMP4-W-25992	2/25/08	48.75-58.75	42	5.8	0.6 J	
PMP4	CNPMP4-W-26008	3/13/08	48.75-58.75	31	4.4	ND	
PMP4	CNPMP4-W-26053	4/24/08	48.75-58.75	33	6.8	0.8 J	
PMP4	CNPMP4-W-26628	6/5/08	48.75-58.75	60	6.3	ND	
PMP4	CNPMP4-W-26647	7/7/08	48.75-58.75	52	4.9	ND	
PMP4	CNPMP4-W-26666	8/6/08	48.75-58.75	50	4.8	ND	
PMP4	CNPMP4-W-26692	9/9/08	48.75-58.75	49	4.2	ND	
PMP5	CNPMP5-W-26069	1/9/08	50-60	321	97	2.6	No purge
PMP5	CNPMP5-W-26088	1/24/08	50-60	265	121	4.6	No purge
PMP5	CNPMP5-W-25997	2/25/08	50-60	421	62	0.7 J	
PMP5	CNPMP5-W-26009	3/13/08	50-60	70	13	0.7 J	
PMP5	CNPMP5-W-26054	4/24/08	50-60	357	101	2.9	
PMP5	CNPMP5-W-26629	6/4/08	50-60	365	91	2.7	
PMP5	CNPMP5-W-26648	7/8/08	50-60	397	71	2.5	
PMP5	CNPMP5-W-26667	8/6/08	50-60	476	55	1.7	
PMP5	CNPMP5-W-26693	9/10/08	50-60	418	46	1.6 J	
PMP6	CNPMP6-W-26065	1/8/08	50-60	37	18	ND	No purge
PMP6	CNPMP6-W-26090	1/24/08	50-60	26	31	2.9	No purge
PMP6	CNPMP6-W-25993	2/25/08	50-60	111	8.8	ND	
PMP6	CNPMP6-W-26010	3/13/08	50-60	94	10	ND	
PMP6	CNPMP6-W-26055	4/24/08	50-60	103	13	ND	
PMP6	CNPMP6-W-26630	6/5/08	50-60	101	9.8	ND	
PMP6	CNPMP6-W-26649	7/7/08	50-60	96	8.5	ND	
PMP6	CNPMP6-W-26668	8/6/08	50-60	108	8.2	ND	
PMP6	CNPMP6-W-26694	9/8/08	50-60	110	7.8	ND	
PMP7	CNPMP7-W-26066	1/8/08	50-60	119	26	ND	No purge
PMP7	CNPMP7-W-26091	1/24/08	50-60	62	40	1.6	No purge
PMP7	CNPMP7-W-25996	2/25/08	50-60	123	17	0.7 J	
PMP7	CNPMP7-W-26011	3/13/08	50-60	121	14	0.6 J	
PMP7	CNPMP7-W-26056	4/24/08	50-60	134	13	ND	
PMP7	CNPMP7-W-26631	6/5/08	50-60	120	8.8	ND	
PMP7	CNPMP7-W-26650	7/7/08	50-60	120	7.6	ND	
PMP7	CNPMP7-W-26669	8/6/08	50-60	154	9.2	ND	
PMP7	CNPMP7-W-26695	9/9/08	50-60	119	13	ND	
PMP8	CNPMP8-W-26075	1/9/08	50-60	30	606	3.4	No purge
PMP8	CNPMP8-W-26092	1/24/08	50-60	31	430	28	No purge
PMP8	CNPMP8-W-25994	2/25/08	50-60	287	374	25	
PMP8	CNPMP8-W-26012	3/13/08	50-60	122	292	20	
PMP8	CNPMP8-W-26057	4/24/08	50-60	72	553	41	

TABLE S4.2 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Concentration (μg/L) Carbon Tetrachloride	Chloroform	Methylene Chloride	Comment
PMP8	CNPMP8-W-26632	6/5/08	50-60	73	364	24	
PMP8	CNPMP8-W-26651	7/8/08	50-60	67	339	23	
PMP8	CNPMP8-W-26670	8/6/08	50-60	105	317	18	
PMP8	CNPMP8-W-26696	9/9/08	50-60	72	125	3.4	
PMP9	CNPMP9-W-26077	1/10/08	50-60	1.9	0.9 J	ND	No purge
PMP9	CNPMP9-W-26109	1/24/08	50-60	3.1	1.1	ND	No purge
PMP9	CNPMP9-W-25989	2/24/08	50-60	4.7	0.8 J	ND	
PMP9	CNPMP9-W-26013	3/13/08	50-60	4.0	0.5 J	ND	
PMP9	CNPMP9-W-26058	4/24/08	50-60	5.7	1.8	ND	
PMP9	CNPMP9-W-26633	6/5/08	50-60	6.3	0.6 J	ND	
PMP9	CNPMP9-W-26652	7/8/08	50-60	7.2	1.4	ND	
PMP9	CNPMP9-W-26671	8/6/08	50-60	12	1.1	ND	
PMP9	CNPMP9-W-26697	9/9/08	50-60	7.6	0.4 J	ND	
SB01	CNSB01-W-26031	3/20/08	40-50	325	4.8	ND	
SB01	CNSB01-W-26683	9/10/08	40-50	378	4.1	ND	
SB04	CNSB04-W-26076	1/10/08	51-61	10	2.1	ND	No purge
SB04	CNSB04-W-26094	1/24/08	51-61	15	0.2 J	ND	No purge
SB04	CNSB04-W-26117	2/23/08	51-61	42	0.4 J	ND	
SB04	CNSB04-W-26002	3/12/08	51-61	30	0.3 J	ND	
SB04	CNSB04-W-26047	4/24/08	51-61	16	0.3 J	ND	
SB04	CNSB04-W-26622	6/4/08	51-61	25	0.4 J	ND	
SB04	CNSB04-W-26641	7/7/08	51-61	14	0.2 J	ND	
SB04	CNSB04-W-26660	8/6/08	51-61	11	0.2 J	ND	
SB04	CNSB04-W-26684	9/9/08	51-61	15	0.3 J	ND	
SB05	CNSB05-W-26032	3/20/08	32-42	224	17	ND	
SB05	CNSB05-W-26685	9/9/08	32-42	256	20	ND	
SB07R	CNSB07R-W-26073	1/9/08	45-60	30	1.8	ND	No purge
SB07R	CNSB07R-W-26111	1/24/08	45-60	19	0.9 J	ND	No purge
SB07R	CNSB07R-W-25984	2/24/08	45-60	24	1.4	ND	
SB07R	CNSB07R-W-26003	3/12/08	45-60	13	0.9 J	ND	
SB07R	CNSB07R-W-26048	4/24/08	45-60	10	0.8 J	ND	
SB07R	CNSB07R-W-26623	6/4/08	45-60	17	1.0	ND	
SB07R	CNSB07R-W-26642	7/7/08	45-60	15	0.9 J	ND	
SB07R	CNSB07R-W-26661	8/6/08	45-60	15	0.9 J	ND	
SB07R	CNSB07R-W-26686	9/9/08	45-60	21	1.4 J	ND	
SB08	CNSB08-W-26070	1/9/08	52-62	32	1.5	ND	No purge
SB08	CNSB08-W-26112	1/24/08	52-62	36	1.5	ND	No purge
SB08	CNSB08-W-25978	2/24/08	52-62	44	1.5	ND	
SB08	CNSB08-W-26004	3/12/08	52-62	28	1.1	ND	
SB08	CNSB08-W-26049	4/23/08	52-62	23	1.2	ND	
SB08	CNSB08-W-26624	6/4/08	52-62	24	1.4	ND	
SB08	CNSB08-W-26643	7/7/08	52-62	17	1.0	ND	
SB08	CNSB08-W-26662	8/6/08	52-62	20	1.1	ND	
SB08	CNSB08-W-26687	9/8/08	52-62	22	1.2 J	ND	
SB09	CNSB09-W-26033	3/20/08	32-42	ND	ND	ND	
SB09	CNSB09-W-26688	9/10/08	32-42	ND	ND	ND	

[a] ND, not detected at instrument detection limit of 0.1 μg/L.

[b] Qualifier J indicates an estimated concentration below the purge-and-trap method quantitation limit of 1.0 μg/L.

TABLE S4.3 Post-injection monitoring: Results for geochemical and attenuation parameter analyses of groundwater samples collected within and adjacent to the pilot test area.

				Concentration (mg/L)									
Location	Sample	Sample Date	Depth (ft BGL)	Alkalinity	Aluminum	Bromide	Calcium	Chloride	Iron	Magnesium	Manganese	Nitrate as N	Nitrite
MW02	CNMW02-W-26074	1/9/08	49.5-59.5	–	–	4.9	–	–	–	–	–	–	–
MW02	CNMW02-W-26099	2/23/08	49.5-59.5	–	–	Int.[b]	–	32	–	–	–	5 U	–
MW02	CNMW02-W-26045	4/24/08	49.5-59.5	–	–	350	–	–	–	–	–	–	–
MW02	CNMW02-W-26620	6/4/08	49.5-59.5	–	–	490	–	26	–	–	–	5 U	–
MW02	CNMW02-W-26639	7/8/08	49.5-59.5	–	0.14 J B	Int.[b]	170	17	190	46	14	1 U	1 U
MW02	CNMW02-W-26658	8/6/08	49.5-59.5	–	0.54	250	870	14	1000	240	69	5 U	5 U
MW03	CNMW03-W-26078	1/10/08	50.5-60.5	–	–	0.27	–	–	–	–	–	–	–
MW03	CNMW03-W-26115	2/23/08	50.5-60.5	–	–	0.11	–	20	–	–	–	6.8	–
MW03	CNMW03-W-26046	4/23/08	50.5-60.5	–	–	0.27	–	–	–	–	–	–	–
MW03	CNMW03-W-26659	8/6/08	50.5-60.5	–	0.2 U	0.27	80	22	0.1 U	29	0.010 U	7.9	1 U
PMP1	CNPMP1-W-26079	1/10/08	50-60	–	–	0.43	–	–	–	–	–	–	–
PMP1	CNPMP1-W-25985	2/24/08	50-60	–	–	0.32	–	16	–	–	–	0.51	–
PMP1	CNPMP1-W-26050	4/24/08	50-60	–	–	0.36	–	–	–	–	–	–	–
PMP1	CNPMP1-W-26663	8/6/08	50-60	–	0.35	0.52	66	14	0.54	25	0.75	1.4	0.1 U
PMP2	CNPMP2-W-26081	1/10/08	50-60	–	–	1.4	–	–	–	–	–	–	–
PMP2	CNPMP2-W-25986	2/24/08	50-60	–	–	1.1	–	20	–	–	–	0.12	–
PMP2	CNPMP2-W-26051	4/24/08	50-60	–	–	1.2	–	–	–	–	–	–	–
PMP2	CNPMP2-W-26664	8/6/08	50-60	–	0.2 U	0.84	94	15	0.27	29	2.0	0.12	1 U
PMP3	CNPMP3-W-26071	1/9/08	50-60	–	–	32	–	–	–	–	–	–	–
PMP3	CNPMP3-W-25990	2/25/08	50-60	–	–	27	–	7.3	–	–	–	0.83	–
PMP3	CNPMP3-W-26052	4/24/08	50-60	–	–	2.1	–	–	–	–	–	–	–
PMP3	CNPMP3-W-26665	8/6/08	50-60	–	0.2 U	1.1	120	6.5	7.6	39	4.5	0.78	0.95
PMP4	CNPMP4-W-26068	1/9/08	48.75-58.75	–	–	0.27	–	–	–	–	–	–	–
PMP4	CNPMP4-W-25992	2/25/08	48.75-58.75	–	–	0.3	–	36	–	–	–	0.25	–
PMP4	CNPMP4-W-26053	4/24/08	48.75-58.75	–	–	0.37	–	–	–	–	–	–	–
PMP4	CNPMP4-W-26666	8/6/08	48.75-58.75	–	0.2 U	0.36	66	34	0.1 U	23	0.21	0.73	1 U
PMP5	CNPMP5-W-26069	1/9/08	50-60	–	–	0.3	–	–	–	–	–	–	–
PMP5	CNPMP5-W-25997	2/25/08	50-60	–	–	0.4	–	81	–	–	–	1.5	–
PMP5	CNPMP5-W-26054	4/24/08	50-60	–	–	0.54	–	–	–	–	–	–	–
PMP5	CNPMP5-W-26667	8/6/08	50-60	–	0.2 U	0.61	73	82	0.21	26	0.19	1.6	1 U
PMP6	CNPMP6-W-26065	1/8/08	50-60	–	–	0.28	–	–	–	–	–	–	–
PMP6	CNPMP6-W-25993	2/25/08	50-60	–	–	0.17	–	36	–	–	–	6.7	–
PMP6	CNPMP6-W-26055	4/24/08	50-60	–	–	0.32	–	–	–	–	–	–	–
PMP6	CNPMP6-W-26668	8/6/08	50-60	–	0.2 U	0.28	75	28	0.11	28	0.17	8.2	1 U
PMP7	CNPMP7-W-26066	1/8/08	50-60	–	–	0.59	–	–	–	–	–	–	–
PMP7	CNPMP7-W-25996	2/25/08	50-60	–	–	0.49	–	20	–	–	–	6.1	–
PMP7	CNPMP7-W-26056	4/24/08	50-60	–	–	0.52	–	–	–	–	–	–	–
PMP7	CNPMP7-W-26669	8/6/08	50-60	–	0.2 U	0.55	70	16	0.1 U	25	0.12	6.9	0.1 U

TABLE S4.3 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Concentration (mg/L)									
				Alkalinity	Aluminum	Bromide	Calcium	Chloride	Iron	Magnesium	Manganese	Nitrate as N	Nitrite
PMP8	CNPMP8-W-26075	1/9/08	50-60	–	–	4.7	–	–	–	–	–	–	–
PMP8	CNPMP8-W-25994	2/25/08	50-60	–	–	1.3	–	28	–	–	–	1.9	–
PMP8	CNPMP8-W-26057	4/24/08	50-60	–	–	11	–	–	–	–	–	–	–
PMP8	CNPMP8-W-26670	8/6/08	50-60	–	0.2 U	9.7	120	25	0.42	65	2.2	0.1 U	1 U
PMP9	CNPMP9-W-26077	1/10/08	50-60	–	–	0.14	–	–	–	–	–	–	–
PMP9	CNPMP9-W-25989	2/24/08	50-60	–	–	0.1 U	–	11	–	–	–	<0.1	–
PMP9	CNPMP9-W-26058	4/24/08	50-60	–	–	0.1 U	–	–	–	–	–	–	–
PMP9	CNPMP9-W-26671	8/6/08	50-60	–	0.2 U	0.13	60	8.7	0.1 U	24	0.010 U	0.26	0.1 U
SB04	CNSB04-W-26076	1/10/08	51-61	–	–	0.26	–	–	–	–	–	–	–
SB04	CNSB04-W-26117	2/23/08	51-61	–	–	0.1 U	–	41	–	–	–	2	–
SB04	CNSB04-W-26047	4/24/08	51-61	–	–	0.1 U	–	–	–	–	–	–	–
SB04	CNSB04-W-26660	8/6/08	51-61	–	0.2 U	0.2 U	73	37	0.1 U	27	0.010 U	1.5	1 U
SB07R	CNSB07R-W-26073	1/9/08	45-60	–	–	0.1 U	–	–	–	–	–	–	–
SB07R	CNSB07R-W-25984	2/24/08	45-60	–	–	0.1 U	–	20	–	–	–	0.66	–
SB07R	CNSB07R-W-26048	4/24/08	45-60	–	–	0.1 U	–	–	–	–	–	–	–
SB07R	CNSB07R-W-26661	8/6/08	45-60	–	0.2 U	0.2 U	61	16	0.1 U	23	0.010 U	0.53	0.1 U
SB08	CNSB08-W-26070	1/9/08	52-62	–	–	0.1 U	–	–	–	–	–	–	–
SB08	CNSB08-W-25978	2/24/08	52-62	–	–	0.1 U	–	15	–	–	–	0.85	–
SB08	CNSB08-W-26049	4/23/08	52-62	–	–	0.1 U	–	–	–	–	–	–	–
SB08	CNSB08-W-26662	8/6/08	52-62	–	0.2 U	0.2 U	61	13	0.1 U	24	0.010 U	0.76	0.1 U

Location	Sample	Sample Date	Depth (ft BGL)	Concentration[a] (mg/L)								Methane (μg/l)
				Phosphate	Potassium	Silicon	Sodium	Sulfate	Sulfide	Zinc	TOC[c]	
MW02	CNMW02-W-26074	1/9/08	49.5-59.5	–	–	–	–	–	–	–	–	–
MW02	CNMW02-W-26099	2/23/08	49.5-59.5	10 U	–	–	–	Int.	–	–	–	–
MW02	CNMW02-W-26045	4/24/08	49.5-59.5	–	–	–	–	–	–	–	–	–
MW02	CNMW02-W-26620	6/4/08	49.5-59.5	10 U	–	–	–	23	–	–	–	–
MW02	CNMW02-W-26639	7/8/08	49.5-59.5	1.4 J	11	3.3	41	Int.	–	0.031	–	–
MW02	CNMW02-W-26658	8/6/08	49.5-59.5	10 U	68	22	220	25	–	0.26	–	–
MW03	CNMW03-W-26078	1/10/08	50.5-60.5	–	–	–	–	–	–	–	–	–
MW03	CNMW03-W-26115	2/23/08	50.5-60.5	0.2 U	–	–	–	7.3	–	–	–	–
MW03	CNMW03-W-26046	4/23/08	50.5-60.5	–	–	–	–	–	–	–	–	–
MW03	CNMW03-W-26659	8/6/08	50.5-60.5	0.2 U	1.7	16	41	7.7	–	0.02 U	–	–
PMP1	CNPMP1-W-26079	1/10/08	50-60	–	–	–	–	–	–	–	–	–
PMP1	CNPMP1-W-25985	2/24/08	50-60	0.2 U	–	–	–	8.9	–	–	–	–
PMP1	CNPMP1-W-26050	4/24/08	50-60	–	–	–	–	–	–	–	–	–
PMP1	CNPMP1-W-26663	8/6/08	50-60	0.2 U	2.6	13	32	7.3	–	0.02 U	–	–

TABLE S4.3 (Cont.)

Location	Sample	Sample Date	Depth (ft BGL)	Concentration[a] (mg/L) Phosphate	Potassium	Silicon	Sodium	Sulfate	Sulfide	Zinc	TOC[c]	Methane (μg/l)
PMP2	CNPMP2-W-26081	1/10/08	50-60	–	–	–	–	–	–	–	–	–
PMP2	CNPMP2-W-25986	2/24/08	50-60	0.2 U	–	–	–	4.0	–	–	–	–
PMP2	CNPMP2-W-26051	4/24/08	50-60	–	–	–	–	–	–	–	–	–
PMP2	CNPMP2-W-26664	8/6/08	50-60	0.2 U	3.7	14	44	6.9	–	0.02 U	–	–
PMP3	CNPMP3-W-26071	1/9/08	50-60	–	–	–	–	–	–	–	–	–
PMP3	CNPMP3-W-25990	2/25/08	50-60	0.2 U	–	–	–	11	–	–	–	–
PMP3	CNPMP3-W-26052	4/24/08	50-60	–	–	–	–	–	–	–	–	–
PMP3	CNPMP3-W-26665	8/6/08	50-60	2 U	14	12	45	8.8	–	0.02 U	–	–
PMP4	CNPMP4-W-26068	1/9/08	48.75-58.75	–	–	–	–	–	–	–	–	–
PMP4	CNPMP4-W-25992	2/25/08	48.75-58.75	0.2 U	–	–	–	7.7	–	–	–	–
PMP4	CNPMP4-W-26053	4/24/08	48.75-58.75	–	–	–	–	–	–	–	–	–
PMP4	CNPMP4-W-26666	8/6/08	48.75-58.75	0.2 U	2.0	13	35	7.2	–	0.02 U	–	–
PMP5	CNPMP5-W-26069	1/9/08	50-60	–	–	–	–	–	–	–	–	–
PMP5	CNPMP5-W-25997	2/25/08	50-60	0.2 U	–	–	–	8.7	–	–	–	–
PMP5	CNPMP5-W-26054	4/24/08	50-60	–	–	–	–	–	–	–	–	–
PMP5	CNPMP5-W-26667	8/6/08	50-60	0.2 U	3.1	14	68	9.2	–	0.02 U	–	–
PMP6	CNPMP6-W-26065	1/8/08	50-60	–	–	–	–	–	–	–	–	–
PMP6	CNPMP6-W-25993	2/25/08	50-60	0.2 U	–	–	–	12	–	–	–	–
PMP6	CNPMP6-W-26055	4/24/08	50-60	–	–	–	–	–	–	–	–	–
PMP6	CNPMP6-W-26668	8/6/08	50-60	0.2 U	2.4	14	35	14	–	0.02 U	–	–
PMP7	CNPMP7-W-26066	1/8/08	50-60	–	–	–	–	–	–	–	–	–
PMP7	CNPMP7-W-25996	2/25/08	50-60	0.2 U	–	–	–	14	–	–	–	–
PMP7	CNPMP7-W-26056	4/24/08	50-60	–	–	–	–	–	–	–	–	–
PMP7	CNPMP7-W-26669	8/6/08	50-60	0.2 U	2.5	14	66	15	–	0.02 U	–	–
PMP8	CNPMP8-W-26075	1/9/08	50-60	–	–	–	–	–	–	–	–	–
PMP8	CNPMP8-W-25994	2/25/08	50-60	< 0.2	–	–	–	28	–	–	–	–
PMP8	CNPMP8-W-26057	4/24/08	50-60	–	–	–	–	–	–	–	–	–
PMP8	CNPMP8-W-26670	8/6/08	50-60	0.2 U	2.9	12	62	2.7	–	0.02 U	–	–
PMP9	CNPMP9-W-26077	1/10/08	50-60	–	–	–	–	–	–	–	–	–
PMP9	CNPMP9-W-25989	2/24/08	50-60	0.2 U	–	–	–	2.0	–	–	–	–
PMP9	CNPMP9-W-26058	4/24/08	50-60	–	–	–	–	–	–	–	–	–
PMP9	CNPMP9-W-26671	8/6/08	50-60	0.2 U	1.8	14	25	1.7	–	0.02 U	–	–
SB04	CNSB04-W-26076	1/10/08	51-61	–	–	–	–	–	–	–	–	–
SB04	CNSB04-W-26117	2/23/08	51-61	0.2 U	–	–	–	7.1	–	–	–	–
SB04	CNSB04-W-26047	4/24/08	51-61	–	–	–	–	–	–	–	–	–
SB04	CNSB04-W-26660	8/6/08	51-61	0.2 U	2.0	14	46	6.0	–	0.02 U	–	–
SB07R	CNSB07R-W-26073	1/9/08	45-60	–	–	–	–	–	–	–	–	–
SB07R	CNSB07R-W-25984	2/24/08	45-60	0.2 U	–	–	–	6.3	–	–	–	–
SB07R	CNSB07R-W-26048	4/24/08	45-60	–	–	–	–	–	–	–	–	–
SB07R	CNSB07R-W-26661	8/6/08	45-60	0.2 U	1.7	13	27	3.5	–	0.02 U	–	–

TABLE S4.3 (Cont.)

				Concentration[a] (mg/L)								
Location	Sample	Sample Date	Depth (ft BGL)	Phosphate	Potassium	Silicon	Sodium	Sulfate	Sulfide	Zinc	TOC[c]	Methane (μg/l)
SB08	CNSB08-W-26070	1/9/08	52-62	–	–	–	–	–	–	–	–	–
SB08	CNSB08-W-25978	2/24/08	52-62	0.2 U	–	–	–	6.8	–	–	–	–
SB08	CNSB08-W-26049	4/23/08	52-62	–	–	–	–	–	–	–	–	–
SB08	CNSB08-W-26662	8/6/08	52-62	0.2 U	1.8	14	21	6.1	–	0.02 U	–	–

[a] Qualifiers:
B, constituent detected in the associated blank.
J, estimated concentration below the quantitation limit.
U, constituent not detected at the indicated reporting limit.

[b] Interfering peaks in the analysis prevented quantitation of the concentration.

[c] TOC, total organic carbon.

TABLE S4.4 Results of purge-and-trap organic analyses at the AGEM Laboratory for soil samples collected at PSB13 during the August 2008 post-injection sampling event.

Location	Sample	Sample Date	Depth (ft BGL)	Concentration (μg/kg) Carbon Tetrachloride	Chloroform	Methylene Chloride
PSB13	CNPSB13-S-27120	8/21/08	2	ND[a]	ND	ND
	CNPSB13-S-27121	8/21/08	4	ND	ND	ND
	CNPSB13-S-27122	8/21/08	6	ND	ND	ND
	CNPSB13-S-27123	8/21/08	8	ND	ND	ND
	CNPSB13-S-27124	8/21/08	10	ND	5.1 J[b]	ND
	CNPSB13-S-27125	8/21/08	12	ND	3 J	ND
	CNPSB13-S-27126	8/21/08	14	ND	13	ND
	CNPSB13-S-27127	8/21/08	16	6.5 J	8.3 J	ND
	CNPSB13-S-27128	8/21/08	18	ND	3.4 J	11
	CNPSB13-S-27129	8/21/08	20	ND	13	ND
	CNPSB13-S-27130	8/21/08	22	6.2 J	6.9 J	ND
	CNPSB13-S-27131	8/21/08	24	ND	6.7 J	ND
	CNPSB13-S-27132	8/21/08	26	3 J	16	ND
	CNPSB13-S-27133	8/21/08	28	4 J	15	ND
	CNPSB13-S-27134	8/21/08	30	ND	13	ND
	CNPSB13-S-27135	8/21/08	32	ND	17	ND
	CNPSB13-S-27136	8/21/08	34	46	4.8 J	ND
	CNPSB13-S-27137	8/21/08	36	61	9.6 J	ND
	CNPSB13-S-27138	8/21/08	38	32	7 J	ND
	CNPSB13-S-27139	8/21/08	40	10	3.6 J	ND

[a] ND, not detected at an instrument detection limit of 1 μg/kg.

[b] Qualifier J indicates an estimated concentration below the purge-and-trap method quantitation limit of 10 μg/kg.

Supplement 5:

Outside Laboratory Data for Verification Organic Analyses

Contents

ENVIROSYSTEMS, INC.

9200 Rumsey Road • Suite B102 • Columbia, Maryland 21045-1934
Phone (410) 964-0330 • Fax (410) 740-9306
Email: info@envsystems.com • Webpage: www.envsystems.com/envsys

January 16, 2007

Jorge S. Alvarado, PH. D
Argonne National Laboratory
Environmental Research Division
Applied Geosciences and Environmental
Management Section
9700 South Cass Avenue, ER-203
Argonne, Illinois 60439

RE: Report #070315

Dear Jorge,

Enclosed is the Analytical Data Package for Organics Analysis for the samples received on November 15, 2007. These samples were analyzed by using method SW-846 8260B and USEPA CLP SOWOLM04.3 and the chain of custody instructions.

Please do not hesitate to call if you have any questions, comments, or require additional information.

Sincerely,

Mohan Khare

Mohan Khare Ph.D.
President/CEO

Enclosure (1)
MK/ncc

1. Narrative

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

Envirosystems, Inc.

Contract: N/A
Client: Argonne National Laboratory
Case: N/A
SDG: ARG71104, ARG71105

1. SAMPLE RECIEPT

Date received: 11-15-2007
Cooler Temperature: 2

Sample Summary

Client ID	Laboratory ID	Matrix	pH
CNPSB1-W-16246	0071104-01	WATER	7
CNPSB1-W-16246DL	0071104-01DL	WATER	7
CNQCTB-W-19961	0071104-02	WATER	7
CNPSB3-W-16250	0071104-03	WATER	7
CNPSB3-W-16250DL	0071104-03DL	WATER	7
CNPSB6-W-16254	0071104-04	WATER	7
CNPUBL-W-26062	0071105-01	WATER	7

2. HOLDING TIMES

A. Sample Preparation: All holding times were met.
B. Sample Analysis: All holding times were met

3. METHODS

The samples were analyzed and reported by using method SW-846 8260B and USEPA CLP SOW OLM04.3 for target compound list.

4. INSTRUMENT AND CHROMATOGRAPHIC CONDITIONS

A Hewlett Packard 6890 gas chromatograph equipped with a Hewlett Packard 5975 MSD was used for sample analysis. The capillary column used was a Restek 20m by 0.18 mm ID by 1.0 µm film thickness (Restek Cat. # RTX-624). The trap used with the sample concentrator is an OI Analytical Trap #10, 30cm packed with Tenax/silica gel/cms (PN#228122).

5. PREPARATION

The submitted samples were analyzed as received.

6. ANALYSIS

A. Calibration:

I. Initial calibration

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

All acceptance criteria as stipulated by SW-846 8260b were met for all SPCC's and CCC's. All target compounds met the required percent RSD.

II. Blanks:

All acceptance criteria were met.

II. Surrogates:

All acceptance criteria were met.

B. Spikes:

I. Laboratory Control Spikes (LCS)

LCS and LCSD samples were analyzed.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The client did not request a MS/MSD.

C. Internal Standards:

All acceptance criteria were met.

D. Samples

Sample analysis proceeded normally.

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in the hard copy Sample Data Package and in the Electronic Data Deliverables has been authorized by the laboratory manager or the manager's designee, as verified by the following signatures.

Laboratory Manager

Roy H Collett

Date

1-14-08

2. SGD Cover Sheet/Traffic Reports

Argonne NATIONAL LABORATORY

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← NOTE DATES

ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*

MATRIX: WATER

RECEIVING LAB: ENVIROSYSTEMS

PROJECT/SITE: CENTRALIA PILOT

SAMPLER(S) (Signature) Seeling /YAN

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): 402-429-5144

	DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOCs									REMARKS
TUES	11/13/07	CNPSB1-W-16246	2	X									
WED	11/14/07	CNQCTB-W-19961	2	X									
		CNPSB3-W-16250	2	X									
	↓	CNPSB6-W-16254	2	X									

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
B Seeling	11/14/07	20:30			11/15/07	11:00	Barbara Crook
Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks	
						Temp 2°C	

Y	N	FOR LAB USE ONLY
✓		Custody seal was intact when shipment received.
✓		Sample containers were intact when received.
✓		Shipment was at required temperature when received.
✓		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne NATIONAL LABORATORY

6362

ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*

MATRIX: WATER

RECEIVING LAB: ENVIROSYSTEMS

PROJECT/SITE: CENTRALIA PILOT

SAMPLER(S) (Signature) D. BIERE

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): 402-429-5144

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOCs *	REMARKS
11/15/07	CNPUBL-W-26062	4	X	RUSH ANALYSIS REQUIRED
				INCLUDE CARBON DISULFIDE

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
B. Sedivy	11/15/07	20:30			11/16/07	11 00	Barbara Crook
Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks	
						Temp 2°C	

Y	N	FOR LAB USE ONLY
		Custody seal was intact when shipment received.
		Sample containers were intact when received.
		Shipment was at required temperature when received.
		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne National Laboratory, Applied Geosciences & Environmental Mgt. Group, Environmental Science Division, 9700 S. Cass Avenue, Argonne, IL 60439

EVS-160 (6-07)

VOLATILE SAMPLE DATA

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPSB1-W-16246

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-01

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA237.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	29	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	460	E
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.: CNPSB1-W-16246

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-01

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA237.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPSB1-W-16246DL

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-01RE1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA242.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 10.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	50	U
74-87-3	Chloromethane	50	U
75-01-4	Vinyl chloride	50	U
74-83-9	Bromomethane	50	U
75-00-3	Chloroethane	50	U
75-69-4	Trichlorofluoromethane	50	U
75-35-4	1,1-Dichloroethene	50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	50	U
67-64-1	Acetone	50	U
75-15-0	Carbon disulfide	50	U
79-20-9	Methyl acetate	50	U
75-09-2	Methylene chloride	50	U
156-60-5	trans-1,2-Dichloroethene	50	U
1634-04-4	Methyl tert-butyl ether	50	U
75-34-3	1,1-Dichloroethane	50	U
156-59-2	cis-1,2-Dichloroethene	50	U
78-93-3	2-Butanone	50	U
67-66-3	Chloroform	28	JD
71-55-6	1,1,1-Trichloroethane	50	U
110-82-7	Cyclohexane	50	U
56-23-5	Carbon Tetrachloride	570	D
71-43-2	Benzene	50	U
107-06-2	1,2-Dichloroethane	50	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPSB1-W-16246DL

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-01RE1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA242.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 10.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	50	U
108-87-2	Methylcyclohexane	50	U
78-87-5	1,2-Dichloropropane	50	U
75-27-4	Bromodichloromethane	50	U
10061-01-5	cis-1,3-Dichloropropene	50	U
108-10-1	4-Methyl-2-pentanone	50	U
108-88-3	Toluene	50	U
10061-02-6	trans-1,3-Dichloropropene	50	U
79-00-5	1,1,2-Trichloroethane	50	U
127-18-4	Tetrachloroethene	50	U
591-78-6	2-Hexanone	50	U
124-48-1	Dibromochloromethane	50	U
106-93-4	1,2-Dibromoethane	50	U
108-90-7	Chlorobenzene	50	U
100-41-4	Ethylbenzene	50	U
95-47-6	o-Xylene	50	U
179601-23-1	m,p-Xylene	50	U
100-42-5	Styrene	50	U
75-25-2	Bromoform	50	U
98-82-8	Isopropylbenzene	50	U
79-34-5	1,1,2,2-Tetrachloroethane	50	U
541-73-1	1,3-Dichlorobenzene	50	U
106-46-7	1,4-Dichlorobenzene	50	U
95-50-1	1,2-Dichlorobenzene	50	U
96-12-8	1,2-Dibromo-3-chloropropane	50	U
120-82-1	1,2,4-Trichlorobenzene	50	U
91-20-3	Naphthalene	50	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNQCTB-W-19961

Lab Name: Envirosystems, Inc.   Contract:

Lab Code: ENVSYS Case No.:   Mod. Ref No.:   SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: 0071104-02

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: H73FA238.D

Level: (TRACE/LOW/MED) LOW   Date Received: 11/15/2007

% Moisture: not dec.   Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNQCTB-W-19961

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-02

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA238.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNPSB3-W-16250

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-03

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA239.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	3.2	J
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	15	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	840	E
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNPSB3-W-16250

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-03

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA239.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPSB3-W-16250DL

Lab Name: Envirosystems, Inc.   Contract:

Lab Code: ENVSYS Case No.:   Mod. Ref No.:   SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER   Lab Sample ID: 0071104-03RE1

Sample wt/vol: 5.00 (g/mL) ML   Lab File ID: H73FA243.D

Level: (TRACE/LOW/MED) LOW   Date Received: 11/15/2007

% Moisture: not dec.   Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm)   Dilution Factor: 20.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	100	U
74-87-3	Chloromethane	100	U
75-01-4	Vinyl chloride	100	U
74-83-9	Bromomethane	100	U
75-00-3	Chloroethane	100	U
75-69-4	Trichlorofluoromethane	100	U
75-35-4	1,1-Dichloroethene	100	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	100	U
67-64-1	Acetone	100	U
75-15-0	Carbon disulfide	100	U
79-20-9	Methyl acetate	100	U
75-09-2	Methylene chloride	100	U
156-60-5	trans-1,2-Dichloroethene	100	U
1634-04-4	Methyl tert-butyl ether	100	U
75-34-3	1,1-Dichloroethane	100	U
156-59-2	cis-1,2-Dichloroethene	100	U
78-93-3	2-Butanone	100	U
67-66-3	Chloroform	25	JD
71-55-6	1,1,1-Trichloroethane	100	U
110-82-7	Cyclohexane	100	U
56-23-5	Carbon Tetrachloride	1200	D
71-43-2	Benzene	100	U
107-06-2	1,2-Dichloroethane	100	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPSB3-W-16250DL

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-03RE1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA243.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 20.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	100	U
108-87-2	Methylcyclohexane	100	U
78-87-5	1,2-Dichloropropane	100	U
75-27-4	Bromodichloromethane	100	U
10061-01-5	cis-1,3-Dichloropropene	100	U
108-10-1	4-Methyl-2-pentanone	100	U
108-88-3	Toluene	100	U
10061-02-6	trans-1,3-Dichloropropene	100	U
79-00-5	1,1,2-Trichloroethane	100	U
127-18-4	Tetrachloroethene	100	U
591-78-6	2-Hexanone	100	U
124-48-1	Dibromochloromethane	100	U
106-93-4	1,2-Dibromoethane	100	U
108-90-7	Chlorobenzene	100	U
100-41-4	Ethylbenzene	100	U
95-47-6	o-Xylene	100	U
179601-23-1	m,p-Xylene	100	U
100-42-5	Styrene	100	U
75-25-2	Bromoform	100	U
98-82-8	Isopropylbenzene	100	U
79-34-5	1,1,2,2-Tetrachloroethane	100	U
541-73-1	1,3-Dichlorobenzene	100	U
106-46-7	1,4-Dichlorobenzene	100	U
95-50-1	1,2-Dichlorobenzene	100	U
96-12-8	1,2-Dibromo-3-chloropropane	100	U
120-82-1	1,2,4-Trichlorobenzene	100	U
91-20-3	Naphthalene	100	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPSB6-W-16254

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-04

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA240.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.6	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	57	
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPSB6-W-16254

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71104

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071104-04

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA240.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/15/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNPUBL-W-26062

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71105

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071105-01

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA241.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/16/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	2.6	J
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPUBL-W-26062

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG71105

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0071105-01

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: H73FA241.D

Level: (TRACE/LOW/MED) LOW Date Received: 11/16/2007

% Moisture: not dec. Date Analyzed: 11/16/2007

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

December 11, 2007

Mr. Clyde Dennis
Argonne National Laboratory
9700 S. Cass Avenue,
Building 203, Office B149
Argonne, IL 60439

Re: Laboratory Project No. 21005
Case: CENTRALI; SDG: 123144

Dear Mr. Dennis:

Enclosed are analytical results for samples that were received by TestAmerica Burlington on November 28th, 2007. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
	Received: 11/28/07 ETR No: 123144		
733216	CN-S-19972 (10A)	11/26/07	LIQUID
733217	CN-S-25966D (20A)	11/26/07	LIQUID
733218	CN-S-19950 (20A)	11/26/07	LIQUID
733219	CN-S-16342 (10A)	11/26/07	LIQUID
733220	CN-S-MEOH BLANK	11/27/07	LIQUID

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal. In order to accommodate field length limitations in processing the data summary forms, the laboratory did, in certain instances, abbreviate the sample identifier. The electronically formatted data provides for the full sample identifier.

The samples were analyzed by Method 8260B, using a low-level calibration. In performing the analytical work, 500 microliters of the methanol extract were added to the 5 milliliter purge volume. Each of the analyses associated with the sample set did exhibit an acceptable internal standard performance, and there was an acceptable recovery of the surrogate controls in each analysis. Two types of laboratory control sample analyses were performed in the course of performing the analytical work. One was performed to evaluate method performance, and one was performed with 500 microliters of methanol added to the purge volume in order to characterize the affect on the analytical process. With the exception of that for 1,4-dioxane, there was an acceptable recovery of each target analyte in the laboratory control sample analysis that

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defined method performance. The recovery of 1,4-dioxane was low in that analysis (58 percent). In the laboratory control sample analysis with methanol, several of the earlier eluting compounds did exhibit a lower recovery performance, as did, generally, the ketones and alcohols. Most significantly affected was the recovery performance of acrolein (39 percent) and acetone (46 percent). The recovery of each of the other compounds was greater than 50 percent. Chloroform and carbon tetrachloride were recovered well in each of the laboratory control sample analyses. Matrix spike and matrix spike duplicate analyses were not performed on samples in this sample set. Trace concentrations of chloromethane, bromomethane, methyl iodide, and 2-butanone were identified in the analysis sample CN-S-MEOH BLANK. The laboratory did associate the analysis of CN-S-MEOH BLANK with the analysis of each of the field samples in order to reference the blank association, and accordingly qualify the reported results. A trace concentration of methyl iodide was identified in the analysis of the instrument blank associated with the analytical work. The laboratory did provide for a methanol blank in the analytical sequence in order to properly characterize the results of the laboratory control sample analysis that was performed with 500 microliters of methanol added to the purge volume.

The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.

If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Kirk F. Young
Project Manager

KFY/hsf
Enclosure

TestAmerica Burlington Data Qualifier Definitions

Organic

U: Compound analyzed but not detected at a concentration above the reporting limit.

J: Estimated value.

N: Indicates presumptive evidence of a compound. This flag is used only for tentatively identified compounds (TICs) where the identification of a compound is based on a mass spectral library search.

P: SW-846: Greater than 40% difference for detected concentrations between two GC columns. Unless otherwise specified the higher of the two values is reported on the Form I.

CLP SOW: Greater than 25% difference for detected concentrations between two GC columns. Unless otherwise specified the lower of the two values is reported on the Form I.

C: Pesticide result whose identification has been confirmed by GC/MS.

B: Analyte is found in the sample and the associated method blank. The flag is used for tentatively identified compounds as well as positively identified compounds.

E: Compounds whose concentrations exceed the upper limit of the calibration range of the instrument for that specific analysis.

D: Concentrations identified from analysis of the sample at a secondary dilution.

A: Tentatively identified compound is a suspected aldol condensation product.

X,Y,Z: Laboratory defined flags that may be used alone or combined, as needed. If used, the description of the flag is defined in the project narrative.

Inorganic/Metals

E: Reported value is estimated due to the presence of interference.

N: Matrix spike sample recovery is not within control limits.

* Duplicate sample analysis is not within control limits.

B: The result reported is less than the reporting limit but greater than the instrument detection limit.

U: Analyte was analyzed for but not detected above the reporting limit.

Method Codes:

P ICP-AES
MS ICP-MS
CV Cold Vapor AA
AS Semi-Automated Spectrophotometric

ARGONNE NATIONAL LABORATORY
CHAIN OF CUSTODY RECORD*

MATRIX: Soil - methanol
RECEIVING LAB: Test America
PROJECT/SITE: Centralia, KS
SAMPLER(S) (Signature) [signature]

Shipping Container No.
Shipping Info:
ANL Field Contact (Name & Temporary Phone):

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC's	REMARKS: Mass (g)	REMARKS: Vol MeOH (mL)
11/26/07	CN-S-19972 (10A)	1-20ml	✓	12.020	10.00
	CN-S-25966D (20A)		✓	11.844	10.–
	CN-S-19950 (20A)		✓	12.852	10.–
	CN-S-16342 (10A)		✓	11.398	10.–
11/27/07	CN-S-MeOH blank		✓	–	–

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	11/27/07	9:40 am	[signature] 11.28-07 0935				

Relinquished by (Signature)	Date	Time	Received for Laboratory by	Date	Time	Remarks
[signature] 11-27-07	11-27-07	1015 AM				

Y	N	FOR LAB USE ONLY
		Custody seal was intact when shipment received.
		Sample containers were intact when received.
		Shipment was at required temperature when received.
		Sample labels, Tags and COC agree.

*A sample is under custody if:
1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne National Laboratory, Applied Geosciences & Environmental Mgt. Group, Environmental Research Division, 9700 S. Cass Avenue, Argonne, IL 60439

ER-160 (4-01)

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-16342 10A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733219

Sample wt/vol: 11.4 (g/mL) G Lab File ID: 733219

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	8.8	U
74-87-3	Chloromethane	2.6	JB
75-01-4	Vinyl Chloride	8.8	U
74-83-9	Bromomethane	6.2	JB
75-00-3	Chloroethane	8.8	U
75-69-4	Trichlorofluoromethane	8.8	U
107-02-8	Acrolein	44	U
75-35-4	1,1-Dichloroethene	8.8	U
76-13-1	Freon TF	8.8	U
67-64-1	Acetone	44	U
74-88-4	Methyl Iodide	6.5	JB
75-15-0	Carbon Disulfide	8.8	U
107-05-1	Allyl Chloride	8.8	U
75-09-2	Methylene Chloride	8.8	U
107-13-1	Acrylonitrile	8.8	U
156-60-5	trans-1,2-Dichloroethene	8.8	U
1634-04-4	Methyl-t-Butyl Ether	8.8	U
540-59-0	1,2-Dichloroethene (total)	8.8	U
75-34-3	1,1-Dichloroethane	8.8	U
108-05-4	Vinyl Acetate	8.8	U
126-99-8	Chloroprene	8.8	U
594-20-7	2,2-Dichloropropane	8.8	U
156-59-2	cis-1,2-Dichloroethene	8.8	U
78-93-3	2-Butanone	17	JB
107-12-0	Propionitrile	35	U
74-97-5	Bromochloromethane	8.8	U
126-98-7	Methacrylonitrile	8.8	U
109-99-9	Tetrahydrofuran	120	U
67-66-3	Chloroform	7.0	J
71-55-6	1,1,1-Trichloroethane	8.8	U
56-23-5	Carbon Tetrachloride	180	
563-58-6	1,1-Dichloropropene	8.8	U
71-43-2	Benzene	8.8	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-16342 10A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733219

Sample wt/vol: 11.4 (g/mL) G Lab File ID: 733219

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
78-83-1	Isobutyl Alcohol	440	U
107-06-2	1,2-Dichloroethane	8.8	U
79-01-6	Trichloroethene	8.8	U
78-87-5	1,2-Dichloropropane	8.8	U
74-95-3	Dibromomethane	8.8	U
80-62-6	Methyl Methacrylate	8.8	U
123-91-1	1,4-Dioxane	440	U
75-27-4	Bromodichloromethane	8.8	U
110-75-8	2-Chloroethyl Vinyl Ether	8.8	U
10061-01-5	cis-1,3-Dichloropropene	8.8	U
108-10-1	4-Methyl-2-pentanone	44	U
108-88-3	Toluene	8.8	U
10061-02-6	trans-1,3-Dichloropropene	8.8	U
97-63-2	Ethyl Methacrylate	8.8	U
79-00-5	1,1,2-Trichloroethane	8.8	U
127-18-4	Tetrachloroethene	8.8	U
142-28-9	1,3-Dichloropropane	8.8	U
591-78-6	2-Hexanone	44	U
124-48-1	Dibromochloromethane	8.8	U
106-93-4	1,2-Dibromoethane	8.8	U
108-90-7	Chlorobenzene	8.8	U
630-20-6	1,1,1,2-Tetrachloroethane	8.8	U
100-41-4	Ethylbenzene	8.8	U
1330-20-7	Xylene (m,p)	8.8	U
95-47-6	Xylene (o)	8.8	U
1330-20-7	Xylene (total)	8.8	U
100-42-5	Styrene	8.8	U
75-25-2	Bromoform	8.8	U
98-82-8	Isopropylbenzene	8.8	U
1476-11-5	cis-1,4-Dichloro-2-butene	8.8	U
108-86-1	Bromobenzene	8.8	U
79-34-5	1,1,2,2-Tetrachloroethane	8.8	U
96-18-4	1,2,3-Trichloropropane	8.8	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-16342 10A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733219

Sample wt/vol: 11.4 (g/mL) G Lab File ID: 733219

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
110-57-6	trans-1,4-Dichloro-2-butene	8.8	U
103-65-1	n-Propylbenzene	8.8	U
95-49-8	2-Chlorotoluene	8.8	U
106-43-4	4-Chlorotoluene	8.8	U
108-67-8	1,3,5-Trimethylbenzene	8.8	U
98-06-6	tert-Butylbenzene	8.8	U
95-63-6	1,2,4-Trimethylbenzene	8.8	U
135-98-8	sec-Butylbenzene	8.8	U
541-73-1	1,3-Dichlorobenzene	8.8	U
99-87-6	4-Isopropyltoluene	8.8	U
106-46-7	1,4-Dichlorobenzene	8.8	U
95-50-1	1,2-Dichlorobenzene	8.8	U
104-51-8	n-Butylbenzene	8.8	U
96-12-8	1,2-Dibromo-3-Chloropropane	8.8	U
120-82-1	1,2,4-Trichlorobenzene	8.8	U
87-68-3	Hexachlorobutadiene	8.8	U
91-20-3	Naphthalene	8.8	U
87-61-6	1,2,3-Trichlorobenzene	8.8	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-19950 20A

Lab Name: TESTAMERICA BURLINGTON   Contract: 21005

Lab Code: STLV   Case No.: CENTRALI SAS No.:   SDG No.: 123144

Matrix: (soil/water) SOIL   Lab Sample ID: 733218

Sample wt/vol: 12.9 (g/mL) G   Lab File ID: 733218

Level: (low/med) MED   Date Received: 11/28/07

% Moisture: not dec. ________   Date Analyzed: 12/03/07

GC Column: CAP   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: 10000(uL)   Soil Aliquot Volume: 500(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	7.8	U
74-87-3	Chloromethane	2.5	JB
75-01-4	Vinyl Chloride	7.8	U
74-83-9	Bromomethane	8.9	B
75-00-3	Chloroethane	7.8	U
75-69-4	Trichlorofluoromethane	7.8	U
107-02-8	Acrolein	39	U
75-35-4	1,1-Dichloroethene	7.8	U
76-13-1	Freon TF	7.8	U
67-64-1	Acetone	39	U
74-88-4	Methyl Iodide	7.8	B
75-15-0	Carbon Disulfide	7.8	U
107-05-1	Allyl Chloride	7.8	U
75-09-2	Methylene Chloride	23	
107-13-1	Acrylonitrile	7.8	U
156-60-5	trans-1,2-Dichloroethene	7.8	U
1634-04-4	Methyl-t-Butyl Ether	7.8	U
540-59-0	1,2-Dichloroethene (total)	7.8	U
75-34-3	1,1-Dichloroethane	7.8	U
108-05-4	Vinyl Acetate	7.8	U
126-99-8	Chloroprene	7.8	U
594-20-7	2,2-Dichloropropane	7.8	U
156-59-2	cis-1,2-Dichloroethene	7.8	U
78-93-3	2-Butanone	16	JB
107-12-0	Propionitrile	31	U
74-97-5	Bromochloromethane	7.8	U
126-98-7	Methacrylonitrile	7.8	U
109-99-9	Tetrahydrofuran	110	U
67-66-3	Chloroform	2.8	J
71-55-6	1,1,1-Trichloroethane	7.8	U
56-23-5	Carbon Tetrachloride	2.2	J
563-58-6	1,1-Dichloropropene	7.8	U
71-43-2	Benzene	7.8	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-19950 20A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733218

Sample wt/vol: 12.9 (g/mL) G Lab File ID: 733218

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
78-83-1	Isobutyl Alcohol	390	U
107-06-2	1,2-Dichloroethane	7.8	U
79-01-6	Trichloroethene	7.8	U
78-87-5	1,2-Dichloropropane	7.8	U
74-95-3	Dibromomethane	7.8	U
80-62-6	Methyl Methacrylate	7.8	U
123-91-1	1,4-Dioxane	390	U
75-27-4	Bromodichloromethane	7.8	U
110-75-8	2-Chloroethyl Vinyl Ether	7.8	U
10061-01-5	cis-1,3-Dichloropropene	7.8	U
108-10-1	4-Methyl-2-pentanone	39	U
108-88-3	Toluene	6.8	J
10061-02-6	trans-1,3-Dichloropropene	7.8	U
97-63-2	Ethyl Methacrylate	7.8	U
79-00-5	1,1,2-Trichloroethane	7.8	U
127-18-4	Tetrachloroethene	7.8	U
142-28-9	1,3-Dichloropropane	7.8	U
591-78-6	2-Hexanone	39	U
124-48-1	Dibromochloromethane	7.8	U
106-93-4	1,2-Dibromoethane	7.8	U
108-90-7	Chlorobenzene	7.8	U
630-20-6	1,1,1,2-Tetrachloroethane	7.8	U
100-41-4	Ethylbenzene	7.8	U
1330-20-7	Xylene (m,p)	7.8	U
95-47-6	Xylene (o)	7.8	U
1330-20-7	Xylene (total)	7.8	U
100-42-5	Styrene	7.8	U
75-25-2	Bromoform	7.8	U
98-82-8	Isopropylbenzene	7.8	U
1476-11-5	cis-1,4-Dichloro-2-butene	7.8	U
108-86-1	Bromobenzene	7.8	U
79-34-5	1,1,2,2-Tetrachloroethane	7.8	U
96-18-4	1,2,3-Trichloropropane	7.8	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-19950 20A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733218

Sample wt/vol: 12.9 (g/mL) G Lab File ID: 733218

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
110-57-6	trans-1,4-Dichloro-2-butene	7.8	U
103-65-1	n-Propylbenzene	7.8	U
95-49-8	2-Chlorotoluene	7.8	U
106-43-4	4-Chlorotoluene	7.8	U
108-67-8	1,3,5-Trimethylbenzene	7.8	U
98-06-6	tert-Butylbenzene	7.8	U
95-63-6	1,2,4-Trimethylbenzene	7.8	U
135-98-8	sec-Butylbenzene	7.8	U
541-73-1	1,3-Dichlorobenzene	7.8	U
99-87-6	4-Isopropyltoluene	7.8	U
106-46-7	1,4-Dichlorobenzene	7.8	U
95-50-1	1,2-Dichlorobenzene	7.8	U
104-51-8	n-Butylbenzene	7.8	U
96-12-8	1,2-Dibromo-3-Chloropropane	7.8	U
120-82-1	1,2,4-Trichlorobenzene	7.8	U
87-68-3	Hexachlorobutadiene	7.8	U
91-20-3	Naphthalene	7.8	U
87-61-6	1,2,3-Trichlorobenzene	7.8	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-19972 10A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733216

Sample wt/vol: 12.0 (g/mL) G Lab File ID: 733216

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	8.3	U
74-87-3	Chloromethane	3.1	JB
75-01-4	Vinyl Chloride	8.3	U
74-83-9	Bromomethane	5.9	JB
75-00-3	Chloroethane	8.3	U
75-69-4	Trichlorofluoromethane	8.3	U
107-02-8	Acrolein	42	U
75-35-4	1,1-Dichloroethene	8.3	U
76-13-1	Freon TF	8.3	U
67-64-1	Acetone	42	U
74-88-4	Methyl Iodide	6.0	JB
75-15-0	Carbon Disulfide	8.3	U
107-05-1	Allyl Chloride	8.3	U
75-09-2	Methylene Chloride	8.3	U
107-13-1	Acrylonitrile	8.3	U
156-60-5	trans-1,2-Dichloroethene	8.3	U
1634-04-4	Methyl-t-Butyl Ether	8.3	U
540-59-0	1,2-Dichloroethene (total)	8.3	U
75-34-3	1,1-Dichloroethane	8.3	U
108-05-4	Vinyl Acetate	8.3	U
126-99-8	Chloroprene	8.3	U
594-20-7	2,2-Dichloropropane	8.3	U
156-59-2	cis-1,2-Dichloroethene	8.3	U
78-93-3	2-Butanone	13	JB
107-12-0	Propionitrile	33	U
74-97-5	Bromochloromethane	8.3	U
126-98-7	Methacrylonitrile	8.3	U
109-99-9	Tetrahydrofuran	120	U
67-66-3	Chloroform	8.3	U
71-55-6	1,1,1-Trichloroethane	8.3	U
56-23-5	Carbon Tetrachloride	4.2	J
563-58-6	1,1-Dichloropropene	8.3	U
71-43-2	Benzene	8.3	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-19972 10A

Lab Name: TESTAMERICA BURLINGTON   Contract: 21005

Lab Code: STLV   Case No.: CENTRALI SAS No.:   SDG No.: 123144

Matrix: (soil/water) SOIL   Lab Sample ID: 733216

Sample wt/vol: 12.0 (g/mL) G   Lab File ID: 733216

Level: (low/med) MED   Date Received: 11/28/07

% Moisture: not dec. ______   Date Analyzed: 12/03/07

GC Column: CAP   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: 10000(uL)   Soil Aliquot Volume: 500(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	CONCENTRATION	Q
78-83-1	Isobutyl Alcohol	420	U
107-06-2	1,2-Dichloroethane	8.3	U
79-01-6	Trichloroethene	8.3	U
78-87-5	1,2-Dichloropropane	8.3	U
74-95-3	Dibromomethane	8.3	U
80-62-6	Methyl Methacrylate	8.3	U
123-91-1	1,4-Dioxane	420	U
75-27-4	Bromodichloromethane	8.3	U
110-75-8	2-Chloroethyl Vinyl Ether	8.3	U
10061-01-5	cis-1,3-Dichloropropene	8.3	U
108-10-1	4-Methyl-2-pentanone	42	U
108-88-3	Toluene	8.3	U
10061-02-6	trans-1,3-Dichloropropene	8.3	U
97-63-2	Ethyl Methacrylate	8.3	U
79-00-5	1,1,2-Trichloroethane	8.3	U
127-18-4	Tetrachloroethene	8.3	U
142-28-9	1,3-Dichloropropane	8.3	U
591-78-6	2-Hexanone	42	U
124-48-1	Dibromochloromethane	8.3	U
106-93-4	1,2-Dibromoethane	8.3	U
108-90-7	Chlorobenzene	8.3	U
630-20-6	1,1,1,2-Tetrachloroethane	8.3	U
100-41-4	Ethylbenzene	8.3	U
1330-20-7	Xylene (m,p)	8.3	U
95-47-6	Xylene (o)	8.3	U
1330-20-7	Xylene (total)	8.3	U
100-42-5	Styrene	8.3	U
75-25-2	Bromoform	8.3	U
98-82-8	Isopropylbenzene	8.3	U
1476-11-5	cis-1,4-Dichloro-2-butene	8.3	U
108-86-1	Bromobenzene	8.3	U
79-34-5	1,1,2,2-Tetrachloroethane	8.3	U
96-18-4	1,2,3-Trichloropropane	8.3	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-19972 10A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733216

Sample wt/vol: 12.0 (g/mL) G Lab File ID: 733216

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
110-57-6	trans-1,4-Dichloro-2-butene	8.3	U
103-65-1	n-Propylbenzene	8.3	U
95-49-8	2-Chlorotoluene	8.3	U
106-43-4	4-Chlorotoluene	8.3	U
108-67-8	1,3,5-Trimethylbenzene	8.3	U
98-06-6	tert-Butylbenzene	8.3	U
95-63-6	1,2,4-Trimethylbenzene	8.3	U
135-98-8	sec-Butylbenzene	8.3	U
541-73-1	1,3-Dichlorobenzene	8.3	U
99-87-6	4-Isopropyltoluene	8.3	U
106-46-7	1,4-Dichlorobenzene	8.3	U
95-50-1	1,2-Dichlorobenzene	8.3	U
104-51-8	n-Butylbenzene	8.3	U
96-12-8	1,2-Dibromo-3-Chloropropane	8.3	U
120-82-1	1,2,4-Trichlorobenzene	8.3	U
87-68-3	Hexachlorobutadiene	8.3	U
91-20-3	Naphthalene	8.3	U
87-61-6	1,2,3-Trichlorobenzene	8.3	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-25966D 20A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733217

Sample wt/vol: 11.8 (g/mL) G Lab File ID: 733217

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	8.4	U
74-87-3	Chloromethane	3.8	JB
75-01-4	Vinyl Chloride	8.4	U
74-83-9	Bromomethane	8.3	JB
75-00-3	Chloroethane	8.4	U
75-69-4	Trichlorofluoromethane	8.4	U
107-02-8	Acrolein	42	U
75-35-4	1,1-Dichloroethene	8.4	U
76-13-1	Freon TF	8.4	U
67-64-1	Acetone	42	U
74-88-4	Methyl Iodide	7.1	JB
75-15-0	Carbon Disulfide	8.4	U
107-05-1	Allyl Chloride	8.4	U
75-09-2	Methylene Chloride	8.4	U
107-13-1	Acrylonitrile	8.4	U
156-60-5	trans-1,2-Dichloroethene	8.4	U
1634-04-4	Methyl-t-Butyl Ether	8.4	U
540-59-0	1,2-Dichloroethene (total)	8.4	U
75-34-3	1,1-Dichloroethane	8.4	U
108-05-4	Vinyl Acetate	8.4	U
126-99-8	Chloroprene	8.4	U
594-20-7	2,2-Dichloropropane	8.4	U
156-59-2	cis-1,2-Dichloroethene	8.4	U
78-93-3	2-Butanone	13	JB
107-12-0	Propionitrile	34	U
74-97-5	Bromochloromethane	8.4	U
126-98-7	Methacrylonitrile	8.4	U
109-99-9	Tetrahydrofuran	120	U
67-66-3	Chloroform	8.4	U
71-55-6	1,1,1-Trichloroethane	8.4	U
56-23-5	Carbon Tetrachloride	8.2	J
563-58-6	1,1-Dichloropropene	8.4	U
71-43-2	Benzene	8.4	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-25966D 20A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733217

Sample wt/vol: 11.8 (g/mL) G Lab File ID: 733217

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
78-83-1	Isobutyl Alcohol	420	U
107-06-2	1,2-Dichloroethane	8.4	U
79-01-6	Trichloroethene	8.4	U
78-87-5	1,2-Dichloropropane	8.4	U
74-95-3	Dibromomethane	8.4	U
80-62-6	Methyl Methacrylate	8.4	U
123-91-1	1,4-Dioxane	420	U
75-27-4	Bromodichloromethane	8.4	U
110-75-8	2-Chloroethyl Vinyl Ether	8.4	U
10061-01-5	cis-1,3-Dichloropropene	8.4	U
108-10-1	4-Methyl-2-pentanone	42	U
108-88-3	Toluene	8.4	U
10061-02-6	trans-1,3-Dichloropropene	8.4	U
97-63-2	Ethyl Methacrylate	8.4	U
79-00-5	1,1,2-Trichloroethane	8.4	U
127-18-4	Tetrachloroethene	8.4	U
142-28-9	1,3-Dichloropropane	8.4	U
591-78-6	2-Hexanone	42	U
124-48-1	Dibromochloromethane	8.4	U
106-93-4	1,2-Dibromoethane	8.4	U
108-90-7	Chlorobenzene	8.4	U
630-20-6	1,1,1,2-Tetrachloroethane	8.4	U
100-41-4	Ethylbenzene	8.4	U
1330-20-7	Xylene (m,p)	8.4	U
95-47-6	Xylene (o)	8.4	U
1330-20-7	Xylene (total)	8.4	U
100-42-5	Styrene	8.4	U
75-25-2	Bromoform	8.4	U
98-82-8	Isopropylbenzene	8.4	U
1476-11-5	cis-1,4-Dichloro-2-butene	8.4	U
108-86-1	Bromobenzene	8.4	U
79-34-5	1,1,2,2-Tetrachloroethane	8.4	U
96-18-4	1,2,3-Trichloropropane	8.4	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-25966D 20A

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733217

Sample wt/vol: 11.8 (g/mL) G Lab File ID: 733217

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
110-57-6	trans-1,4-Dichloro-2-butene	8.4	U
103-65-1	n-Propylbenzene	8.4	U
95-49-8	2-Chlorotoluene	8.4	U
106-43-4	4-Chlorotoluene	8.4	U
108-67-8	1,3,5-Trimethylbenzene	8.4	U
98-06-6	tert-Butylbenzene	8.4	U
95-63-6	1,2,4-Trimethylbenzene	8.4	U
135-98-8	sec-Butylbenzene	8.4	U
541-73-1	1,3-Dichlorobenzene	8.4	U
99-87-6	4-Isopropyltoluene	8.4	U
106-46-7	1,4-Dichlorobenzene	8.4	U
95-50-1	1,2-Dichlorobenzene	8.4	U
104-51-8	n-Butylbenzene	8.4	U
96-12-8	1,2-Dibromo-3-Chloropropane	8.4	U
120-82-1	1,2,4-Trichlorobenzene	8.4	U
87-68-3	Hexachlorobutadiene	8.4	U
91-20-3	Naphthalene	8.4	U
87-61-6	1,2,3-Trichlorobenzene	8.4	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-MEOH BLANK

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733220

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 733220

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	CONCENTRATION	Q
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	4.4	J
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	8.7	J
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	10	U
107-02-8	Acrolein	50	U
75-35-4	1,1-Dichloroethene	10	U
76-13-1	Freon TF	10	U
67-64-1	Acetone	50	U
74-88-4	Methyl Iodide	9.8	J
75-15-0	Carbon Disulfide	10	U
107-05-1	Allyl Chloride	10	U
75-09-2	Methylene Chloride	10	U
107-13-1	Acrylonitrile	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
1634-04-4	Methyl-t-Butyl Ether	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
75-34-3	1,1-Dichloroethane	10	U
108-05-4	Vinyl Acetate	10	U
126-99-8	Chloroprene	10	U
594-20-7	2,2-Dichloropropane	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	17	J
107-12-0	Propionitrile	40	U
74-97-5	Bromochloromethane	10	U
126-98-7	Methacrylonitrile	10	U
109-99-9	Tetrahydrofuran	140	U
67-66-3	Chloroform	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
563-58-6	1,1-Dichloropropene	10	U
71-43-2	Benzene	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-MEOH BLANK

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733220

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 733220

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
78-83-1	Isobutyl Alcohol	500	U
107-06-2	1,2-Dichloroethane	10	U
79-01-6	Trichloroethene	10	U
78-87-5	1,2-Dichloropropane	10	U
74-95-3	Dibromomethane	10	U
80-62-6	Methyl Methacrylate	10	U
123-91-1	1,4-Dioxane	500	U
75-27-4	Bromodichloromethane	10	U
110-75-8	2-Chloroethyl Vinyl Ether	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
108-10-1	4-Methyl-2-pentanone	50	U
108-88-3	Toluene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
97-63-2	Ethyl Methacrylate	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U
142-28-9	1,3-Dichloropropane	10	U
591-78-6	2-Hexanone	50	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	10	U
108-90-7	Chlorobenzene	10	U
630-20-6	1,1,1,2-Tetrachloroethane	10	U
100-41-4	Ethylbenzene	10	U
1330-20-7	Xylene (m,p)	10	U
95-47-6	Xylene (o)	10	U
1330-20-7	Xylene (total)	10	U
100-42-5	Styrene	10	U
75-25-2	Bromoform	10	U
98-82-8	Isopropylbenzene	10	U
1476-11-5	cis-1,4-Dichloro-2-butene	10	U
108-86-1	Bromobenzene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
96-18-4	1,2,3-Trichloropropane	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGLAB SAMPLE NO.

CN-S-MEOH BLANK

Lab Name: TESTAMERICA BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALI SAS No.: SDG No.: 123144

Matrix: (soil/water) SOIL Lab Sample ID: 733220

Sample wt/vol: 10.0 (g/mL) G Lab File ID: 733220

Level: (low/med) MED Date Received: 11/28/07

% Moisture: not dec. ________ Date Analyzed: 12/03/07

GC Column: CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10000(uL) Soil Aliquot Volume: 500(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
110-57-6	trans-1,4-Dichloro-2-butene	10	U
103-65-1	n-Propylbenzene	10	U
95-49-8	2-Chlorotoluene	10	U
106-43-4	4-Chlorotoluene	10	U
108-67-8	1,3,5-Trimethylbenzene	10	U
98-06-6	tert-Butylbenzene	10	U
95-63-6	1,2,4-Trimethylbenzene	10	U
135-98-8	sec-Butylbenzene	10	U
541-73-1	1,3-Dichlorobenzene	10	U
99-87-6	4-Isopropyltoluene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
104-51-8	n-Butylbenzene	10	U
96-12-8	1,2-Dibromo-3-Chloropropane	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
87-68-3	Hexachlorobutadiene	10	U
91-20-3	Naphthalene	10	U
87-61-6	1,2,3-Trichlorobenzene	10	U

ENVIROSYSTEMS, INC.

9200 Rumsey Road • Suite B102 • Columbia, Maryland 21045-1934
Phone (410) 964-0330 • Fax (410) 740-9306
Email: info@envsystems.com • Webpage: www.envsystems.com/envsys

January 21, 2007

Jorge S. Alvarado, PH. D
Argonne National Laboratory
Environmental Research Division
Applied Geosciences and Environmental
Management Section
9700 South Cass Avenue, ER-203
Argonne, Illinois 60439

RE: Report #070318

Dear Jorge,

Enclosed is the Analytical Data Package for Organics Analysis for the samples received on January 18, 2008. These samples were analyzed by using method SW-846 8260B and USEPA CLP SOWOLM04.3 and the chain of custody instructions.

Please do not hesitate to call if you have any questions, comments, or require additional information.

Sincerely,

Mohan Khare

Mohan Khare Ph.D.
President/CEO

Enclosure (1)
MK/ncc

Table of Contents

1. SDG Case Narrative

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

Envirosystems, Inc.

Contract: N/A
Client: Argonne National Laboratory
Case: N/A
SDG: ARG80111

1. SAMPLE RECIEPT

Date received: 01-18-2008
Cooler Temperature: 2

Sample Summary

Client ID	Laboratory ID	Matrix	pH
CNQCTB-W-25976	0080111-01	WATER	7
CNPMP4-W-26068	0080111-02	WATER	7
CNPMP3-W-26071	0080111-03	WATER	7
CNPMP8-W-26075	0080111-04	WATER	7

2. HOLDING TIMES

A. Sample Preparation: All holding times were met.
B. Sample Analysis: All holding times were met

3. METHODS

The samples were analyzed and reported by using method SW-846 8260B and USEPA CLP SOW OLM04.3 for target compound list.

4. INSTRUMENT AND CHROMATOGRAPHIC CONDITIONS

A Hewlett Packard 6890 gas chromatograph equipped with a Hewlett Packard 5973 MSD was used for sample analysis. The capillary column used was a Restek 30m by 0.25 mm ID by 1.0 µm film thickness (Restek Cat. # RTX-Volatiles). The trap used with the sample concentrator is an OI Analytical Trap #10, 30cm packed with Tenax/silica gel/cms (PN#228122).

5. PREPARATION

The submitted samples were analyzed as received.

6. ANALYSIS

A. Calibration:

I. Initial calibration

All acceptance criteria as stipulated by SW-846 8260b were met for all SPCC's and CCC's. All target compounds met the required percent RSD.

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

II. Blanks:

All acceptance criteria were met.

II. Surrogates:

All acceptance criteria were met.

B. Spikes:

I. Laboratory Control Spikes (LCS)

LCS samples were analyzed.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The client did not request a MS/MSD.

C. Internal Standards:

All acceptance criteria were met.

D. Samples

Sample analysis proceeded normally. Samples CNPMP3-W-26071 required a dilution of 2X and sample CNPMP8-W-26075 required a dilution of 10X.

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in the hard copy Sample Data Package and in the Electronic Data Deliverables has been authorized by the laboratory manager or the manager's designee, as verified by the following signatures.

MOlu Oma for

Laboratory Manager

1/21/08

Date

2. Chain of Custody Records

Argonne NATIONAL LABORATORY

6380

ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*

MATRIX: WATER

RECEIVING LAB: ENVIROSYSTEMS

PROJECT/SITE: CENTRALIA PILOT

SAMPLER(S) (Signature) Seeliry / BIERE

Shipping Container:

Shipping Info: FEDEX 8627 4922 2710

Field Contact (Name & Temporary Phone): 402-429-5144

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOCS										REMARKS
1/9/08	CNQCTB-W-25976	1											
↓	CNPMP4-W-26068	2											
	CNPMP3-W-26071	2											
	CNPMP8-W-26075	2											

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
B. Seeliry	1/10/08	21:00			1/11/08	11:30	Barbara Crook

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks
						Temp 2°C

Y	N	FOR LAB USE ONLY
✓		Custody seal was intact when shipment received.
✓		Sample containers were intact when received.
✓		Shipment was at required temperature when received.
✓		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne National Laboratory, Applied Geosciences & Environmental Mgt. Group, Environmental Science Division, 9700 S. Cass Avenue, Argonne, IL 60439

EVS-160 (6-07)

Volatile Sample Results

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNQCTB-W-25976

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-01

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000219.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/16/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	3.1	J
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNQCTB-W-25976

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-01

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000219.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/16/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPMP4-W-26068

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-02

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000220.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/16/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	22	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	7.9	
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPMP4-W-26068

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-02

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000220.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/16/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPMP3-W-26071

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-03

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000221.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/17/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	48	
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	290	E
67-66-3	Chloroform	150	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPMP3-W-26071

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-03

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000221.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/17/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNPMP3-W-26071DL

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-03RE1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000230.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/17/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 2.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	10	U
75-35-4	1,1-Dichloroethene	10	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
67-64-1	Acetone	62	D
75-15-0	Carbon disulfide	10	U
79-20-9	Methyl acetate	10	U
75-09-2	Methylene chloride	10	U
156-60-5	trans-1,2-Dichloroethene	10	U
1634-04-4	Methyl tert-butyl ether	10	U
75-34-3	1,1-Dichloroethane	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	270	D
67-66-3	Chloroform	140	D
71-55-6	1,1,1-Trichloroethane	10	U
110-82-7	Cyclohexane	10	U
56-23-5	Carbon Tetrachloride	10	U
71-43-2	Benzene	10	U
107-06-2	1,2-Dichloroethane	10	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPMP3-W-26071DL

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-03RE1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000230.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/17/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 2.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	10	U
108-87-2	Methylcyclohexane	10	U
78-87-5	1,2-Dichloropropane	10	U
75-27-4	Bromodichloromethane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
108-10-1	4-Methyl-2-pentanone	10	U
108-88-3	Toluene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
95-47-6	o-Xylene	10	U
179601-23-1	m,p-Xylene	10	U
100-42-5	Styrene	10	U
75-25-2	Bromoform	10	U
98-82-8	Isopropylbenzene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNPMP8-W-26075

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-04

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000222.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/17/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	5.0	U
79-20-9	Methyl acetate	5.0	U
75-09-2	Methylene chloride	4.1	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-butyl ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	16	
67-66-3	Chloroform	740	E
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.1	
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPMP8-W-26075

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-04

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000222.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/17/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
95-47-6	o-Xylene	5.0	U
179601-23-1	m,p-Xylene	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	5.0	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPMP8-W-26075DL

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-04RE1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000231.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/17/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 10.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	50	U
74-87-3	Chloromethane	50	U
75-01-4	Vinyl chloride	50	U
74-83-9	Bromomethane	50	U
75-00-3	Chloroethane	50	U
75-69-4	Trichlorofluoromethane	50	U
75-35-4	1,1-Dichloroethene	50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	50	U
67-64-1	Acetone	50	U
75-15-0	Carbon disulfide	50	U
79-20-9	Methyl acetate	50	U
75-09-2	Methylene chloride	50	U
156-60-5	trans-1,2-Dichloroethene	50	U
1634-04-4	Methyl tert-butyl ether	50	U
75-34-3	1,1-Dichloroethane	50	U
156-59-2	cis-1,2-Dichloroethene	50	U
78-93-3	2-Butanone	50	U
67-66-3	Chloroform	720	D
71-55-6	1,1,1-Trichloroethane	50	U
110-82-7	Cyclohexane	50	U
56-23-5	Carbon Tetrachloride	50	U
71-43-2	Benzene	50	U
107-06-2	1,2-Dichloroethane	50	U

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNPMP8-W-26075DL

Lab Name: Envirosystems, Inc. Contract:

Lab Code: ENVSYS Case No.: Mod. Ref No.: SDG No.: ARG80111

Matrix: (SOIL/SED/WATER) WATER Lab Sample ID: 0080111-04RE1

Sample wt/vol: 5.00 (g/mL) ML Lab File ID: F000231.D

Level: (TRACE/LOW/MED) LOW Date Received: 01/11/2008

% Moisture: not dec. Date Analyzed: 01/17/2008

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 10.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 5.00 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) UG/L	Q
79-01-6	Trichloroethene	50	U
108-87-2	Methylcyclohexane	50	U
78-87-5	1,2-Dichloropropane	50	U
75-27-4	Bromodichloromethane	50	U
10061-01-5	cis-1,3-Dichloropropene	50	U
108-10-1	4-Methyl-2-pentanone	50	U
108-88-3	Toluene	50	U
10061-02-6	trans-1,3-Dichloropropene	50	U
79-00-5	1,1,2-Trichloroethane	50	U
127-18-4	Tetrachloroethene	50	U
591-78-6	2-Hexanone	50	U
124-48-1	Dibromochloromethane	50	U
106-93-4	1,2-Dibromoethane	50	U
108-90-7	Chlorobenzene	50	U
100-41-4	Ethylbenzene	50	U
95-47-6	o-Xylene	50	U
179601-23-1	m,p-Xylene	50	U
100-42-5	Styrene	50	U
75-25-2	Bromoform	50	U
98-82-8	Isopropylbenzene	50	U
79-34-5	1,1,2,2-Tetrachloroethane	50	U
541-73-1	1,3-Dichlorobenzene	50	U
106-46-7	1,4-Dichlorobenzene	50	U
95-50-1	1,2-Dichlorobenzene	50	U
96-12-8	1,2-Dibromo-3-chloropropane	50	U
120-82-1	1,2,4-Trichlorobenzene	50	U
91-20-3	Naphthalene	50	U

ENVIROSYSTEMS, INC.

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Date: 02-11-2008

Name: Jorge S. Alvarado Ph.D
Company: Argonne National Laboratory
Address: Enviromental Research Division
Applied Geosciences and Enviromental
Management Section
9700 South Cass Avenue
Bldg: 203, Room # A137
Lemont, IL 60439

RE: Report# 0070328

Dear Jorge,

Enclosed are the results of analyses for samples received by the laboratory on Febuary 25, 2008 . If you have any questions concerning this report, please feel free to contact me.

Please do not hesitate to call if you have any questions, comments or require additional information

Sincerely,

Mohan Khare

Mohan Khare, Ph.D
President/ CEO

Table of Contents

1. Case Narrative

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

Envirosystems, Inc.

Contract: N/A
Client: Argonne National Laboratory
Case: N/A
SDG: ARG80114

1. SAMPLE RECIEPT

Date received: 01-25-2008
Cooler Temperature: 2

Sample Summary

Client ID	Laboratory ID	Matrix	pH
CNQCTB-W-25981	0080114-01	WATER	7
CNPMP2-W-26084	0080114-02	WATER	7
CNPMP2-W-26084DL	0080114-02RE1	WATER	7
CNPMP5-W-26088	0080114-03	WATER	7

2. HOLDING TIMES

A. Sample Preparation: All holding times were met.
B. Sample Analysis: All holding times were met

3. METHODS

The samples were analyzed and reported by using method SW-846 8260B and USEPA CLP SOW OLM04.3 for target compound list.

4. INSTRUMENT AND CHROMATOGRAPHIC CONDITIONS

A Hewlett Packard 6890 gas chromatograph equipped with a Hewlett Packard 5973 MSD was used for sample analysis. The capillary column used was a Restek 30m by 0.25 mm ID by 1.0 µm film thickness (Restek Cat. # RTX-Volatiles). The trap used with the sample concentrator is an OI Analytical Trap #10, 30cm packed with Tenax/silica gel/cms (PN#228122).

5. PREPARATION

The submitted samples were analyzed as received.

6. ANALYSIS

A. Calibration:

I. Initial calibration

All acceptance criteria as stipulated by SW-846 8260b were met for all SPCC's and CCC's. All target compounds met the required percent RSD.

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

II. Blanks:

All acceptance criteria were met.

II. Surrogates:

All acceptance criteria were met.

B. Spikes:

I. Laboratory Control Spikes (LCS)

LCS samples were analyzed.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The client did not request a MS/MSD.

C. Internal Standards:

All acceptance criteria were met.

D. Samples

Sample analysis proceeded normally. Samples CNPMP2-W-26084 required a dilution of 10X.

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in the hard copy Sample Data Package and in the Electronic Data Deliverables has been authorized by the laboratory manager or the manager's designee, as verified by the following signatures.

Laboratory Manager

7/11/08

Date

2. Traffic Report and Chain of Custody Records

Argonne NATIONAL LABORATORY

6028

MATRIX: Water
RECEIVING LAB: ENVIROSYSTEMS INC.
PROJECT/SITE: Centralia KS.
SAMPLER(S) (Signature): David Bir

ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*

Shipping Container:
Shipping Info:
Field Contact (Name & Temporary Phone): David Surgnier 630-408-7724

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC										REMARKS
Jan. 24-2008	CNQCTB-W-25981	1	✓										Trip Blank
Jan. 24-2008	CN PMP2-W-26084	2	✓										NF
Jan 24-2008	CN PMP5-W-26088	2	✓										NF

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
David Bir	01-24-2008	1630			1/25/08	10:30	Barbara Crook

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks
						Temp 1 °C

Y	N	FOR LAB USE ONLY
✓		Custody seal was intact when shipment received.
✓		Sample containers were intact when received.
✓		Shipment was at required temperature when received.
✓		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne National Laboratory, Applied Geosciences & Environmental Mgt. Group, Environmental Science Division, 9700 S. Cass Avenue, Argonne, IL 60439

EVS-160 (6-07)

3. Volatiles Sample Data

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNQCTB-W-25981

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: ARG0114

Matrix: (soil/water) WATER Lab Sample ID: 0080114-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000361

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/07/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:__________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	3.5	J
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNQCTB-W-25981

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: ARG0114

Matrix: (soil/water) WATER Lab Sample ID: 0080114-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000361

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/07/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: __________ (uL) Soil Aliquot Volume: ________ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP2-W-26084

Lab Name: ENVIROSYSTEMS, INC.   Contract: N/A

Lab Code: ENVSYS   Case No.:   SAS No.: N/A   SDG No.: ARG0114

Matrix: (soil/water) WATER   Lab Sample ID: 0080114-02

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: F000362

Level: (low/med) LOW   Date Received: 01/25/08

% Moisture: not dec. ________   Date Analyzed: 02/07/08

GC Column: RTX-624 ID: 0.18 (mm)   Dilution Factor: 1.0

Soil Extract Volume: __________ (uL)   Soil Aliquot Volume: ________ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	44	
75-15-0	Carbon Disulfide	random (not related to original application) 2.1	J
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	11	
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	98	
67-66-3	Chloroform	930	E
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	140	
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP2-W-26084

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: ARG0114

Matrix: (soil/water) WATER Lab Sample ID: 0080114-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000362

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/07/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:__________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP-2-26084DL

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080114-02RE1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000376

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/08/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 10.0

Soil Extract Volume: __________ (uL) Soil Aliquot Volume: ________ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	50	U
74-87-3	Chloromethane	50	U
75-01-4	Vinyl Chloride	50	U
74-83-9	Bromomethane	50	U
75-00-3	Chloroethane	50	U
75-69-4	Trichlorofluoromethane	50	U
75-35-4	1,1-Dichloroethene	50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	50	U
67-64-1	Acetone	50	U
75-15-0	Carbon Disulfide	50	U
79-20-9	Methyl Acetate	50	U
75-09-2	Methylene Chloride	50	U
156-60-5	trans-1,2-Dichloroethene	50	U
1634-04-4	Methyl tert-Butyl Ether	50	U
75-34-3	1,1-Dichloroethane	50	U
156-59-2	cis-1,2-Dichloroethene	50	U
78-93-3	2-Butanone	100	D
67-66-3	Chloroform	960	D
71-55-6	1,1,1-Trichloroethane	50	U
110-82-7	Cyclohexane	50	U
56-23-5	Carbon Tetrachloride	61	D
71-43-2	Benzene	50	U
107-06-2	1,2-Dichloroethane	50	U
79-01-6	Trichloroethene	15	DJ
108-87-2	Methylcyclohexane	50	U
78-87-5	1,2-Dichloropropane	50	U
75-27-4	Bromodichloromethane	50	U
10061-01-5	cis-1,3-Dichloropropene	50	U
108-10-1	4-Methyl-2-Pentanone	50	U
108-88-3	Toluene	50	U
10061-02-6	trans-1,3-Dichloropropene	50	U
79-00-5	1,1,2-Trichloroethane	50	U
127-18-4	Tetrachloroethene	50	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP-2-26084DL

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080114-02RE1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000376

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/08/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 10.0

Soil Extract Volume:__________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	50	U
124-48-1	Dibromochloromethane	50	U
106-93-4	1,2-Dibromoethane	50	U
108-90-7	Chlorobenzene	50	U
100-41-4	Ethylbenzene	50	U
1330-20-7	Xylene (Total)	50	U
100-42-5	Styrene	50	U
75-25-2	Bromoform	50	U
98-82-8	Isopropylbenzene	50	U
79-34-5	1,1,2,2-Tetrachloroethane	50	U
541-73-1	1,3-Dichlorobenzene	50	U
106-46-7	1,4-Dichlorobenzene	50	U
95-50-1	1,2-Dichlorobenzene	50	U
96-12-8	1,2-Dibromo-3-chloropropane	50	U
120-82-1	1,2,4-Trichlorobenzene	50	U
91-20-3	Naphthalene	100	U
75-65-0	tert-Butanol	50	U
108-20-3	Diisopropyl ether	100	U
637-92-3	Ethyl-tert-butyl ether	100	U
994-05-8	tert-Amyl methyl ether	100	U
919-94-8	tert-Amyl ethyl ether	100	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP2-W-26088

Lab Name: ENVIROSYSTEMS, INC.   Contract: N/A

Lab Code: ENVSYS   Case No.:   SAS No.: N/A   SDG No.: ARG0114

Matrix: (soil/water) WATER   Lab Sample ID: 0080114-03

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: F000363

Level: (low/med) LOW   Date Received: 01/25/08

% Moisture: not dec. ________   Date Analyzed: 02/07/08

GC Column: RTX-624   ID: 0.18 (mm)   Dilution Factor: 1.0

Soil Extract Volume:__________(uL)   Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.0	U
67-64-1	Acetone	3.0	J
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	3.2	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	100	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	150	
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	55	
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

not present at samples analyzed at ~~ACEM~~ laboratory. Maybe contamination from lab. Use as depressing
common solvent

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP2-W-26088

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: ARG0114

Matrix: (soil/water) WATER Lab Sample ID: 0080114-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000363

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/07/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:__________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

ENVIROSYSTEMS, INC.

9200 Rumsey Road • Suite B102 • Columbia, Maryland 21045-1934
Phone (410) 964-0330 • Fax (410) 740-9306
Email: info@envsystems.com • Webpage: www.envsystems.com/envsys

March 14, 2008

Jorge S. Alvarado, Ph.D
Argonne National Laboratory
Environmental Sciences Division
Applied Geoscience and Environmental
Management Section
9700 South Cass Avenue, EV-203-A137
Argonne, Illinois 60439

RE: ENVSYS Report 080139

Dear Jorge:

Enclosed is the Analytical Data Package for the samples received on February 26, 2008 for volatile organics analysis by US EPA CLP SOW OLM04.3

Please do not hesitate to call me if you have any questions, comments, or require additional information.

Sincerely,

Mohan Khare

Mohan Khare, Ph.D
President/CEO

MK/pl

Table Of Contents

1.Narrative

Narrative

Three samples were received on February 28, 2008 for VOA analysis and CLP protocols according to the chain of custody instructions. These samples were logged in and distributed for analysis. The results are present in this report along with the back up data and chain of custody records.

2. Traffic Reports/ Chain of Custody Records

Argonne NATIONAL LABORATORY

6213

ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*

MATRIX: WATER

RECEIVING LAB: ENVIROSYSTEMS

PROJECT/SITE: CENTRALIA PILOT

SAMPLER(S) (Signature) Dealing/BIERE

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): 402-429-5144

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOCS	REMARKS
2/24/08	CNSB08-W-25978	2	↓	
↓	CNQCTB-W-25983	2		
	CNPMP2-W-25986	2		

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
B. Dealing	2/25/08	21:00			2/26/08	10:30	Barbara Crook

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks
						2°C Temp

Y	N	FOR LAB USE ONLY
✓		Custody seal was intact when shipment received.
✓		Sample containers were intact when received.
✓		Shipment was at required temperature when received.
✓		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne National Laboratory, Applied Geosciences & Environmental Mgt. Group, Environmental Science Division, 9700 S. Cass Avenue, Argonne, IL 60439

EVS-160 (6-07)

3. Volatiles Data

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNSB08-W-25978

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080215-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000407

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/26/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	3.0	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	43	
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNSB08-W-25978

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080215-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000407

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/26/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	4.5	J
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNOCTB-W-25983

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080215-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000408

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/26/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	4.6	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNOCTB-W-25983

Lab Name: ENVIROSYSTEMS, INC.   Contract: N/A

Lab Code: ENVSYS   Case No.:   SAS No.: N/A   SDG No.: NA

Matrix: (soil/water) WATER   Lab Sample ID: 0080215-02

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: F000408

Level: (low/med) LOW   Date Received: 01/25/08

% Moisture: not dec. ________   Date Analyzed: 02/26/08

GC Column: RTX-624   ID: 0.18 (mm)   Dilution Factor: 1.0

Soil Extract Volume: ________ (uL)   Soil Aliquot Volume: ________ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	CONCENTRATION	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	3.5	J
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP2-W-25986

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080215-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000409

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/26/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	14	
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	13	
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	9.5	
67-66-3	Chloroform	570	E
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	720	E
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	1.1	J
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP2-W-25986

Lab Name: ENVIROSYSTEMS, INC.   Contract: N/A

Lab Code: ENVSYS   Case No.:   SAS No.: N/A   SDG No.: NA

Matrix: (soil/water) WATER   Lab Sample ID: 0080215-03

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: F000409

Level: (low/med) LOW   Date Received: 01/25/08

% Moisture: not dec. ________   Date Analyzed: 02/26/08

GC Column: RTX-624   ID: 0.18 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	2.6	J
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP2-W
-25986DL

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080215-03RE1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000415

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/26/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 10.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	UG/L	Q
75-71-8	Dichlorodifluoromethane	50	U
74-87-3	Chloromethane	50	U
75-01-4	Vinyl Chloride	50	U
74-83-9	Bromomethane	50	U
75-00-3	Chloroethane	50	U
75-69-4	Trichlorofluoromethane	50	U
75-35-4	1,1-Dichloroethene	50	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	50	U
67-64-1	Acetone	50	U
75-15-0	Carbon Disulfide	50	U
79-20-9	Methyl Acetate	50	U
75-09-2	Methylene Chloride	61	D
156-60-5	trans-1,2-Dichloroethene	50	U
1634-04-4	Methyl tert-Butyl Ether	50	U
75-34-3	1,1-Dichloroethane	50	U
156-59-2	cis-1,2-Dichloroethene	50	U
78-93-3	2-Butanone	50	U
67-66-3	Chloroform	640	D
71-55-6	1,1,1-Trichloroethane	50	U
110-82-7	Cyclohexane	50	U
56-23-5	Carbon Tetrachloride	700	D
71-43-2	Benzene	50	U
107-06-2	1,2-Dichloroethane	50	U
79-01-6	Trichloroethene	50	U
108-87-2	Methylcyclohexane	50	U
78-87-5	1,2-Dichloropropane	50	U
75-27-4	Bromodichloromethane	50	U
10061-01-5	cis-1,3-Dichloropropene	50	U
108-10-1	4-Methyl-2-Pentanone	50	U
108-88-3	Toluene	50	U
10061-02-6	trans-1,3-Dichloropropene	50	U
79-00-5	1,1,2-Trichloroethane	50	U
127-18-4	Tetrachloroethene	50	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP2-W
-25986DL

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080215-03RE1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000415

Level: (low/med) LOW Date Received: 01/25/08

% Moisture: not dec. ________ Date Analyzed: 02/26/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 10.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	UG/L	Q
591-78-6	2-Hexanone	50	U
124-48-1	Dibromochloromethane	50	U
106-93-4	1,2-Dibromoethane	50	U
108-90-7	Chlorobenzene	50	U
100-41-4	Ethylbenzene	50	U
1330-20-7	Xylene (Total)	50	U
100-42-5	Styrene	50	U
75-25-2	Bromoform	50	U
98-82-8	Isopropylbenzene	50	U
79-34-5	1,1,2,2-Tetrachloroethane	50	U
541-73-1	1,3-Dichlorobenzene	50	U
106-46-7	1,4-Dichlorobenzene	50	U
95-50-1	1,2-Dichlorobenzene	50	U
96-12-8	1,2-Dibromo-3-chloropropane	50	U
120-82-1	1,2,4-Trichlorobenzene	50	U
91-20-3	Naphthalene	12	DJ
75-65-0	tert-Butanol	50	U
108-20-3	Diisopropyl ether	100	U
637-92-3	Ethyl-tert-butyl ether	100	U
994-05-8	tert-Amyl methyl ether	100	U
919-94-8	tert-Amyl ethyl ether	100	U

ENVIROSYSTEMS, INC.

9200 Rumsey Road • Suite B102 • Columbia, Maryland 21045-1934
Phone (410) 964-0330 • Fax (410) 740-9306
Email: info@envsystems.com • Webpage: www.envsystems.com/envsys

April 17, 2008

Jorge S. Alvarado, PH. D
Argonne National Laboratory
Environmental Research Division
Applied Geosciences and Environmental
Management Section
9700 South Cass Avenue, ER-203
Argonne, Illinois 60439

RE: Report #080158

Dear Jorge,

Enclosed is the Analytical Data Package for the samples received on March 14, 2008 for volatile organics analysis by USEPA SW846 method 8260B/CLP SOW OLM04.3 protocols.

Please do not hesitate to call if you have any questions, comments, or require additional information.

Sincerely,

Mohan Khare Ph.D.
President/CEO

Enclosure (1)
MK/ncc

SDG Case Narrative

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

Envirosystems, Inc.

Contract: N/A
Client: Argonne National Laboratory
Case: N/A
SDG: ARG0080308

1. **SAMPLE RECIEPT**
   Date received: 03-14-2008
   Cooler Temperature: 2

Sample Summary

Client ID	Laboratory ID	Matrix	pH
CNMW03-W-26001	0080308-01	WATER	2
CNPMP7-W-26011	0080308-02	WATER	2
CNPMP3-W-26007	0080308-03	WATER	2
CNQCTB-W-26014	0080308-04	WATER	2

2. **HOLDING TIMES**
3.
   A. **Sample Preparation:** All holding times were met.
   B. **Sample Analysis:** Sample analysis proceeded normally.

4. **METHODS**
5.

The samples were analyzed and reported by using method SW-846 8260B and USEPA CLP SOW OLM04.3 for target compound list.

6. **INSTRUMENT AND CHROMATOGRAPHIC CONDITIONS**

A Hewlett Packard 6890 gas chromatograph equipped with a Hewlett Packard 5975 MSD was used for sample analysis. The capillary column used was a Restek 20m by 0.18 mm ID by 1.0 μm film thickness (Restek Cat. # RTX-624). The trap used with the sample concentrator is an OI Analytical Trap #10, 30cm packed with Tenax/silica gel/cms (PN#228122).

7. **PREPARATION**

The submitted samples were prepared and analyzed using method SW-846 8260B.

8. **ANALYSIS**

   A. **Calibration:**

      I. **Initial calibration**

      All acceptance criteria as stipulated by SW-846 8260b were met for all SPCC's and CCC's. All target compounds met the required percent RSD.

      II. **Blanks:**

      All acceptance criteria were met.

      II. **Surrogates:**

      All acceptance criteria were met except sample CNPMP3-W-26007 & CNPMP3-W-26007DL each had one surrogate slightly lower than QC limit.

   B. **Spikes:**

      I. **Laboratory Control Spikes (LCS)**

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

LCS sample was not analyzed with this batch of samples.

II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD were not performed for this batch but shared with work order 0080313.performed for sample CNMW04-W-26024. All QC criteria were met.

C. Internal Standards:

All acceptance criteria were met.

D. Samples

Sample analysis proceeded normally. Sample CNPMP3-W-26007 was reanalyzed diluted to bring the compound concentration within QC limits of the calibration.

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in the hard copy Sample Data Package and in the Electronic Data Deliverables has been authorized by the laboratory manager or the manager's designee, as verified by the following signatures.

Laboratory Manager

04-17-08

Date

Chain Of Custody

Argonne NATIONAL LABORATORY

6079

ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*

MATRIX: Water

RECEIVING LAB: Envirosystems

PROJECT/SITE: Centralia KS

SAMPLER(S) (Signature)

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): Bob Sedivy 402 465 9021

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC									REMARKS
March 12, 2008	CNMW03-W-26001	2	2									2 x 40mL for VOC

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	3-13-08	15:50			~~03-15-08~~ 03-14-08	11:00	

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks

Y	N	FOR LAB USE ONLY
✓		Custody seal was intact when shipment received.
✓		Sample containers were intact when received.
✓		Shipment was at required temperature when received.
✓		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne NATIONAL LABORATORY

6081

ARGONNE NATIONAL LABORATORY
CHAIN OF CUSTODY RECORD*

MATRIX: Water

RECEIVING LAB: EnviroSystems

PROJECT/SITE: Centralia KS

SAMPLER(S) (Signature)

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): Bob Sedivy 402 465 9021

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC										REMARKS
March 13, 2008	CNPMP7-W-26011	2	2										2 x 40 mL for VOC
March 13, 2008	CNPMP3-W-26007	2	2										2 x 40 mL for VOC
March 13, 2008	CNQCTB-W-26014	1	1										1 x 40 mL for VOC

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	3-13-08	15:50			D.B. 03-14-08 ~~03-15-08~~	11:00	
Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks	

Y	N	FOR LAB USE ONLY
✓		Custody seal was intact when shipment received.
✓		Sample containers were intact when received.
✓		Shipment was at required temperature when received.
✓		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne National Laboratory, Applied Geosciences & Environmental Mgt. Group, Environmental Science Division, 9700 S. Cass Avenue, Argonne, IL 60439

EVS-160 (6-07)

Low/Medium Volatiles Data

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNMW03-W-26001

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000444

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ________ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	3.5	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNMW03-W-26001

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000444

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ________ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP7-W-26011

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000445

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	4.4	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	16	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	67	
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	1.2	J
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP7-W-26011

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000445

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP3-W-26007

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000448

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	1400	E
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	8.9	
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	2100	E
67-66-3	Chloroform	140	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP3-W-26007

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000448

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	12	
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP3-W
-26007DL

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-03RE1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000447

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	250	U
74-87-3	Chloromethane	250	U
75-01-4	Vinyl Chloride	250	U
74-83-9	Bromomethane	250	U
75-00-3	Chloroethane	250	U
75-69-4	Trichlorofluoromethane	250	U
75-35-4	1,1-Dichloroethene	250	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	250	U
67-64-1	Acetone	1900	D
75-15-0	Carbon Disulfide	250	U
79-20-9	Methyl Acetate	250	U
75-09-2	Methylene Chloride	250	D
156-60-5	trans-1,2-Dichloroethene	250	U
1634-04-4	Methyl tert-Butyl Ether	250	U
75-34-3	1,1-Dichloroethane	250	U
156-59-2	cis-1,2-Dichloroethene	250	U
78-93-3	2-Butanone	2100	D
67-66-3	Chloroform	150	DJ
71-55-6	1,1,1-Trichloroethane	250	U
110-82-7	Cyclohexane	250	U
56-23-5	Carbon Tetrachloride	250	U
71-43-2	Benzene	250	U
107-06-2	1,2-Dichloroethane	250	U
79-01-6	Trichloroethene	250	U
108-87-2	Methylcyclohexane	250	U
78-87-5	1,2-Dichloropropane	250	U
75-27-4	Bromodichloromethane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
108-10-1	4-Methyl-2-Pentanone	250	U
108-88-3	Toluene	250	U
10061-02-6	trans-1,3-Dichloropropene	250	U
79-00-5	1,1,2-Trichloroethane	250	U
127-18-4	Tetrachloroethene	250	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.
CNPMP3-W
-26007DL

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-03RE1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000447

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 50.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	250	U
124-48-1	Dibromochloromethane	250	U
106-93-4	1,2-Dibromoethane	250	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
1330-20-7	Xylene (Total)	250	U
100-42-5	Styrene	250	U
75-25-2	Bromoform	250	U
98-82-8	Isopropylbenzene	250	U
79-34-5	1,1,2,2-Tetrachloroethane	250	U
541-73-1	1,3-Dichlorobenzene	250	U
106-46-7	1,4-Dichlorobenzene	250	U
95-50-1	1,2-Dichlorobenzene	250	U
96-12-8	1,2-Dibromo-3-chloropropane	250	U
120-82-1	1,2,4-Trichlorobenzene	250	U
91-20-3	Naphthalene	500	U
75-65-0	tert-Butanol	250	U
108-20-3	Diisopropyl ether	500	U
637-92-3	Ethyl-tert-butyl ether	500	U
994-05-8	tert-Amyl methyl ether	500	U
919-94-8	tert-Amyl ethyl ether	500	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNQCTB-W-26014

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-04

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000446

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	3.9	J
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNQCTB-W-26014

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080308-04

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000446

Level: (low/med) LOW Date Received: 03/14/08

% Moisture: not dec. ________ Date Analyzed: 03/14/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

ENVIROSYSTEMS, INC.

9200 Rumsey Road • Suite B102 • Columbia, Maryland 21045-1934
Phone (410) 964-0330 • Fax (410) 740-9306
Email: info@envsystems.com • Webpage: www.envsystems.com/envsys

April 17, 2008

Jorge S. Alvarado, PH. D
Argonne National Laboratory
Environmental Research Division
Applied Geosciences and Environmental
Management Section
9700 South Cass Avenue, ER-203
Argonne, Illinois 60439

RE: Report #080163

Dear Jorge,

Enclosed is the Analytical Data Package for the samples received on March 20, 2008 for volatile organics analysis by USEPA SW846 method 8260B/CLP SOW OLM04.3 protocols.

Please do not hesitate to call if you have any questions, comments, or require additional information.

Sincerely,

Mohan Khare Ph.D.
President/CEO

Enclosure (1)
MK/ncc

SDG Case Narrative

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

Envirosystems, Inc.

Contract: N/A
Client: Argonne National Laboratory
Case: N/A
SDG: ARG032008

1. SAMPLE RECIEPT
   Date received: 03-20-2008
   Cooler Temperature: 2

Sample Summary

Client ID	Laboratory ID	Matrix	pH
CNMW04-W-26024	0080313-01	WATER	2
CNMW04-W-26026	0080313-02	WATER	2
CNQCTB-W26035	0080313-03	WATER	2

2. HOLDING TIMES
3.
   A. **Sample Preparation:** All holding times were met.
   B. **Sample Analysis:** Sample analysis proceeded normally.

4. METHODS
5.
   The samples were analyzed and reported by using method SW-846 8260B and USEPA CLP SOW OLM04.3 for target compound list.

6. INSTRUMENT AND CHROMATOGRAPHIC CONDITIONS

   A Hewlett Packard 6890 gas chromatograph equipped with a Hewlett Packard 5975 MSD was used for sample analysis. The capillary column used was a Restek 20m by 0.18 mm ID by 1.0 µm film thickness (Restek Cat. # RTX-624). The trap used with the sample concentrator is an OI Analytical Trap #10, 30cm packed with Tenax/silica gel/cms (PN#228122).

7. PREPARATION

   The submitted samples were prepared and analyzed using method SW-846 8260B.

8. ANALYSIS

   A. **Calibration:**

      I. **Initial calibration**

         All acceptance criteria as stipulated by SW-846 8260b were met for all SPCC's and CCC's. All target compounds met the required percent RSD.

      II. **Blanks:**

         All acceptance criteria were met.

      II. **Surrogates:**

         All acceptance criteria were met.

   B. Spikes:

      I. **Laboratory Control Spikes (LCS)**

      II. LCS sample was analyzed which met all the QC criteria.

SDG NARRATIVE
VOLATILE ORGANICS (VOC)

III. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD were performed for sample CNMW04-W-26024. All QC criteria were met.

C. Internal Standards:

All acceptance criteria were met.

D. Samples

Sample analysis proceeded normally.

I certify that this Sample Data Package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in the hard copy Sample Data Package and in the Electronic Data Deliverables has been authorized by the laboratory manager or the manager's designee, as verified by the following signatures.

Mohan for

Laboratory Manager

4/17/08

Date

CHAIN OF CUSTODY

SDG ~~Case Sheet/Traffic~~ Report

Argonne NATIONAL LABORATORY

6084

ARGONNE NATIONAL LABORATORY
CHAIN OF CUSTODY RECORD*

MATRIX: Water

RECEIVING LAB: EnviroSystems

PROJECT/SITE: Centralia KS

SAMPLER(S) (Signature)

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): Bob Sedivy (402) 465 9021

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC	REMARKS
March 19, 2008	CNMW04-W-26024	2	2	2 x 40mL for VOC
March 19, 2008	CNMW06-W-26026	2	2	2 x ~~4~~40mL for VOC
March 19, 2008	CNQCTB-W-26035	1	1	1 x 40mL for VOC

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	3-19-08	17:22			03-20-08	11:30	

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks

Y	N	FOR LAB USE ONLY
✓		Custody seal was intact when shipment received.
✓		Sample containers were intact when received.
✓		Shipment was at required temperature when received.
		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne National Laboratory, Applied Geosciences & Environmental Mgt. Group, Environmental Science Division, 9700 S. Cass Avenue, Argonne, IL 60439

EVS-160 (6-07)

Low/Medium Volatiles Data

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNMW04-W-26024

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080313-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000458

Level: (low/med) LOW Date Received: 03/20/08

% Moisture: not dec. ________ Date Analyzed: 03/21/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	6.8	
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	1.2	J
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNMW04-W-26024

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080313-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000458

Level: (low/med) LOW Date Received: 03/20/08

% Moisture: not dec. ________ Date Analyzed: 03/21/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNMW06-W-26026

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080313-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000461

Level: (low/med) LOW Date Received: 03/20/08

% Moisture: not dec. ________ Date Analyzed: 03/21/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ________ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	CONCENTRATION (UG/L)	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	7.0	
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	1.4	J
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNMW06-W-26026

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080313-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000461

Level: (low/med) LOW Date Received: 03/20/08

% Moisture: not dec. ________ Date Analyzed: 03/21/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNQCTB-W-26035

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080313-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000462

Level: (low/med) LOW Date Received: 03/20/08

% Moisture: not dec. ________ Date Analyzed: 03/21/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	6.6	
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNQCTB-W-26035

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080313-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: F000462

Level: (low/med) LOW Date Received: 03/20/08

% Moisture: not dec. ________ Date Analyzed: 03/21/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

ENVIROSYSTEMS, INC.

9200 Rumsey Road • Suite B102 • Columbia, Maryland 21045-1934
Phone (410) 964-0330 • Fax (410) 740-9306
Email: info@envsystems.com • Webpage: www.envsystems.com/envsys

Date: June-11-2008

Name: Jorge S. Alvarado Ph.D
Company: Argonne National Laboratory
Address: Enviromental Research Division
Applied Geosciences and Enviromental
Management Section
9700 South Cass Avenue
Bldg: 203, Room # A137
Lemont, IL 60439

RE: Report# ~~008041~~ 080190 6.

Dear Jorge,

Enclosed are the results of analyses for samples received by the laboratory on ~~May 09~~ 4-25, 2008 . If you have any questions concerning this report, please feel free to contact me.

Please do not hesitate to call if you have any questions, comments or require additional information

Sincerely,

Mohan Khare

Mohan Khare, Ph.D
President/ CEO

Report # 080190

Narrative

This analytical data package contains the volatile organic analysis by USEPA SW-846 Method 8260B and CLP protocols for samples received April 25, 2008

The chain of custody document for this report is in section 2, the analytical data summary, sample data, and standard data is in section 3.

2. Traffic Reports/ Chain of Custody Records

4795

ARGONNE NATIONAL LABORATORY
CHAIN OF CUSTODY RECORD*

MATRIX: Water

RECEIVING LAB: EnviroSystems

PROJECT/SITE: Centralia KS

SAMPLER(S) (Signature)

Shipping Container No.

Shipping Info:

ANL Field Contact (Name & Temporary Phone): Bob Sedivy (402) 465-9021

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC	REMARKS
April 24, 2008	CNSB04-W-26047	2	2	2 x 40 mL for VOC
April 24, 2008	CNPMP5-W-26054	2	2	2 x 40 mL for VOC
April 24, 2008	CNQCTB-W-26059	1	1	1 X 40 mL for VOC

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	4-24-08	16:00			4/25/08	9 30	Barbara Crook

Relinquished by (Signature)	Date	Time	Received for Laboratory by	Date	Time	Remarks
						Temp 2°C

Y	N	FOR LAB USE ONLY
		Custody seal was intact when shipment received.
		Sample containers were intact when received.
		Shipment was at required temperature when received.
		Sample labels, Tags and COC agree.

*A sample is under custody if:
1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

Argonne National Laboratory, Applied Geosciences & Environmental Mgt. Group, Environmental Research Division, 9700 S. Cass Avenue, Argonne, IL 60439

ER-160 (4-01)

3. VOA Data

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNSB04-W-26047

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080416-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H001287

Level: (low/med) LOW Date Received: 04/25/08

% Moisture: not dec. ________ Date Analyzed: 05/05/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ________ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	11	
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	9.0	
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	1.4	J
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNSB04-W-26047

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080416-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H001287

Level: (low/med) LOW Date Received: 04/25/08

% Moisture: not dec. ________ Date Analyzed: 05/05/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP5-W-26054

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080416-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H001288

Level: (low/med) LOW Date Received: 04/25/08

% Moisture: not dec. ________ Date Analyzed: 05/05/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ________ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	14	
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	10	
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	72	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	240	E
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP5-W-26054

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080416-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H001288

Level: (low/med) LOW Date Received: 04/25/08

% Moisture: not dec. ________ Date Analyzed: 05/05/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP5-W
-26054DL

Lab Name: ENVIROSYSTEMS, INC. Contract:

Lab Code: ENVSYS Case No.: SAS No.: SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080416-02RE1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H001307

Level: (low/med) LOW Date Received: 04/25/08

% Moisture: not dec. ________ Date Analyzed: 05/06/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 5.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	25	U
74-87-3	Chloromethane	25	U
75-01-4	Vinyl Chloride	25	U
74-83-9	Bromomethane	25	U
75-00-3	Chloroethane	25	U
75-69-4	Trichlorofluoromethane	25	U
75-35-4	1,1-Dichloroethene	25	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	25	U
67-64-1	Acetone	25	U
75-15-0	Carbon Disulfide	25	U
79-20-9	Methyl Acetate	25	U
75-09-2	Methylene Chloride	20	DJ
156-60-5	trans-1,2-Dichloroethene	25	U
1634-04-4	Methyl tert-Butyl Ether	25	U
75-34-3	1,1-Dichloroethane	25	U
156-59-2	cis-1,2-Dichloroethene	25	U
78-93-3	2-Butanone	25	U
67-66-3	Chloroform	81	D
71-55-6	1,1,1-Trichloroethane	25	U
110-82-7	Cyclohexane	25	U
56-23-5	Carbon Tetrachloride	280	D
71-43-2	Benzene	25	U
107-06-2	1,2-Dichloroethane	25	U
79-01-6	Trichloroethene	25	U
108-87-2	Methylcyclohexane	25	U
78-87-5	1,2-Dichloropropane	25	U
75-27-4	Bromodichloromethane	25	U
10061-01-5	cis-1,3-Dichloropropene	25	U
108-10-1	4-Methyl-2-Pentanone	25	U
108-88-3	Toluene	25	U
10061-02-6	trans-1,3-Dichloropropene	25	U
79-00-5	1,1,2-Trichloroethane	25	U
127-18-4	Tetrachloroethene	25	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNPMP5-W
-26054DL

Lab Name: ENVIROSYSTEMS, INC. Contract:

Lab Code: ENVSYS Case No.: SAS No.: SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080416-02RE1

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H001307

Level: (low/med) LOW Date Received: 04/25/08

% Moisture: not dec. ________ Date Analyzed: 05/06/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 5.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ________ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	25	U
124-48-1	Dibromochloromethane	25	U
106-93-4	1,2-Dibromoethane	25	U
108-90-7	Chlorobenzene	25	U
100-41-4	Ethylbenzene	25	U
1330-20-7	Xylene (Total)	25	U
100-42-5	Styrene	25	U
75-25-2	Bromoform	25	U
98-82-8	Isopropylbenzene	25	U
79-34-5	1,1,2,2-Tetrachloroethane	25	U
541-73-1	1,3-Dichlorobenzene	25	U
106-46-7	1,4-Dichlorobenzene	25	U
95-50-1	1,2-Dichlorobenzene	25	U
96-12-8	1,2-Dibromo-3-chloropropane	25	U
120-82-1	1,2,4-Trichlorobenzene	25	U
91-20-3	Naphthalene	50	U
75-65-0	tert-Butanol	25	U
108-20-3	Diisopropyl ether	50	U
637-92-3	Ethyl-tert-butyl ether	50	U
994-05-8	tert-Amyl methyl ether	50	U
919-94-8	tert-Amyl ethyl ether	50	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNQCTB-W-26059

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080416-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H001289

Level: (low/med) LOW Date Received: 04/25/08

% Moisture: not dec. ________ Date Analyzed: 05/05/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	14	
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	7.7	
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

ARGONNE SAMPLE NO.

CNQCTB-W-26059

Lab Name: ENVIROSYSTEMS, INC. Contract: N/A

Lab Code: ENVSYS Case No.: SAS No.: N/A SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080416-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H001289

Level: (low/med) LOW Date Received: 04/25/08

% Moisture: not dec. ________ Date Analyzed: 05/05/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ________ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

ENVIROSYSTEMS, INC.

9200 Rumsey Road • Suite B102 • Columbia, Maryland 21045-1934
Phone (410) 964-0330 • Fax (410) 740-9306
Email: info@envsystems.com • Webpage: www.envsystems.com/envsys

Jorge S. Alvarado, PH. D
Argonne National Laboratory
Environmental Research Division
Applied Geosciences and Environmental
Management Section
9700 South Cass Avenue, ER-203
Argonne, Illinois 60439

RE: Report #080205

Dear Jorge,

Enclosed is the Analytical Data Package for the samples received on June 6, 2008 for volatile organics analysis by USEPA SW846 method 8260B/CLP SOW OLM04.3 protocols.

Please do not hesitate to call if you have any questions, comments, or require additional information.

Sincerely,

Mohan Khare

Mohan Khare Ph.D.
President/CEO

Enclosure (1)
MK/ncc

1. Narrative

Narrative

This analytical data package contains Volatile analysis by US EPA SW-846 and CLP protocols for samples received June 6, 2008.

The Chain of Custody document for report is in section 2, the analytical data, QC summary, Sample data, Standards data and Raw QC data is present in section 3.

Please note that these samples were inadvertently analyzed out of holding time due to analyst's oversight. All the data Quality Control criteria for Surrogate Recovery, Matrix Spike/ Matrix Spike Duplicate, Initial and Continuing Calibration, BFB Tuning and Method Blanks are compliant for this case.

Laboratory regrets very much the noncompliance for analytical holding time and late data and apologizes for any inconvenience it may have caused.

2. Traffic Reports/ Chain of Custody Records

Argonne NATIONAL LABORATORY

ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*

MATRIX: Water

RECEIVING LAB: EnviroSystems

PROJECT/SITE: Centralia KS

SAMPLER(S) (Signature)

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): Bob Sedivy (402) 465-9021

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC	ANALYSIS: VOC	REMARKS
June 4, 2008	CNSB04-W-26622	2[illegible]	[illegible]	2	2x40mL for VOC
June 5, 2008	CNPMP7-W-26631	2		2	2x40mL for VOC
June 5, 2008	CNQCTB-W-26638	1		1	1x40mL for VOC

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	6-5-08	1613					

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks
						Temp 2°C

Y	N	FOR LAB USE ONLY
✓		Custody seal was intact when shipment received.
✓		Sample containers were intact when received.
✓		Shipment was at required temperature when received.
✓		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

3. VOA Data

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

Argonne. SAMPLE NO.

CNSB04-W-26622

Lab Name: ENVIROSYSTEMS, INC. Contract:

Lab Code: ENVSYS Case No.: SAS No.: SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080607-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H002490

Level: (low/med) LOW Date Received: 06/06/08

% Moisture: not dec. ________ Date Analyzed: 07/11/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	16	
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

Argonne. SAMPLE NO.

CNSB04-W-26622

Lab Name: ENVIROSYSTEMS, INC. Contract:

Lab Code: ENVSYS Case No.: SAS No.: SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080607-01

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H002490

Level: (low/med) LOW Date Received: 06/06/08

% Moisture: not dec. ________ Date Analyzed: 07/11/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

Argonne. SAMPLE NO.

CNPMP7-W-26631

Lab Name: ENVIROSYSTEMS, INC. Contract:

Lab Code: ENVSYS Case No.: SAS No.: SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080607-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H002491

Level: (low/med) LOW Date Received: 06/06/08

% Moisture: not dec. ________ Date Analyzed: 07/11/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	9.1	
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	130	
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

Argonne. SAMPLE NO.

CNPMP7-W-26631

Lab Name: ENVIROSYSTEMS, INC. Contract:

Lab Code: ENVSYS Case No.: SAS No.: SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080607-02

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H002491

Level: (low/med) LOW Date Received: 06/06/08

% Moisture: not dec. ________ Date Analyzed: 07/11/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

Argonne. SAMPLE NO.

CNQCTB-W-26638

Lab Name: ENVIROSYSTEMS, INC. Contract:

Lab Code: ENVSYS Case No.: SAS No.: SDG No.: NA

Matrix: (soil/water) WATER Lab Sample ID: 0080607-03

Sample wt/vol: 5.000 (g/mL) ML Lab File ID: H002494

Level: (low/med) LOW Date Received: 06/06/08

% Moisture: not dec. ________ Date Analyzed: 07/11/08

GC Column: RTX-624 ID: 0.18 (mm) Dilution Factor: 1.0

Soil Extract Volume:________(uL) Soil Aliquot Volume: ________(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5.0	U
74-87-3	Chloromethane	5.0	U
75-01-4	Vinyl Chloride	5.0	U
74-83-9	Bromomethane	5.0	U
75-00-3	Chloroethane	5.0	U
75-69-4	Trichlorofluoromethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
76-13-1	1,1,2-Trichloro-1,2,2-triflu	5.0	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	5.0	U
79-20-9	Methyl Acetate	5.0	U
75-09-2	Methylene Chloride	5.0	U
156-60-5	trans-1,2-Dichloroethene	5.0	U
1634-04-4	Methyl tert-Butyl Ether	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	cis-1,2-Dichloroethene	5.0	U
78-93-3	2-Butanone	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
110-82-7	Cyclohexane	5.0	U
56-23-5	Carbon Tetrachloride	5.0	U
71-43-2	Benzene	5.0	U
107-06-2	1,2-Dichloroethane	5.0	U
79-01-6	Trichloroethene	5.0	U
108-87-2	Methylcyclohexane	5.0	U
78-87-5	1,2-Dichloropropane	5.0	U
75-27-4	Bromodichloromethane	5.0	U
10061-01-5	cis-1,3-Dichloropropene	5.0	U
108-10-1	4-Methyl-2-Pentanone	5.0	U
108-88-3	Toluene	5.0	U
10061-02-6	trans-1,3-Dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	5.0	U

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

Argonne. SAMPLE NO.

CNQCTB-W-26638

Lab Name: ENVIROSYSTEMS, INC.   Contract:

Lab Code: ENVSYS   Case No.:   SAS No.:   SDG No.: NA

Matrix: (soil/water) WATER   Lab Sample ID: 0080607-03

Sample wt/vol: 5.000 (g/mL) ML   Lab File ID: H002494

Level: (low/med) LOW   Date Received: 06/06/08

% Moisture: not dec. ________   Date Analyzed: 07/11/08

GC Column: RTX-624   ID: 0.18 (mm)   Dilution Factor: 1.0

Soil Extract Volume:________(uL)   Soil Aliquot Volume: ________(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	5.0	U
106-93-4	1,2-Dibromoethane	5.0	U
108-90-7	Chlorobenzene	5.0	U
100-41-4	Ethylbenzene	5.0	U
1330-20-7	Xylene (Total)	5.0	U
100-42-5	Styrene	5.0	U
75-25-2	Bromoform	5.0	U
98-82-8	Isopropylbenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U
541-73-1	1,3-Dichlorobenzene	5.0	U
106-46-7	1,4-Dichlorobenzene	5.0	U
95-50-1	1,2-Dichlorobenzene	5.0	U
96-12-8	1,2-Dibromo-3-chloropropane	5.0	U
120-82-1	1,2,4-Trichlorobenzene	5.0	U
91-20-3	Naphthalene	10	U
75-65-0	tert-Butanol	5.0	U
108-20-3	Diisopropyl ether	10	U
637-92-3	Ethyl-tert-butyl ether	10	U
994-05-8	tert-Amyl methyl ether	10	U
919-94-8	tert-Amyl ethyl ether	10	U

July 29, 2008

TestAmerica Laboratories, Inc.

Mr. Clyde Dennis
Argonne National Laboratory
9700 S. Cass Avenue
Building 203, Office B149
Argonne, IL 60439

Re: Laboratory Project No. 21005
Case: CENTRALI; SDG: 126456

Dear Mr. Dennis:

Enclosed are analytical results for samples that were received by TestAmerica Burlington on July 10th, 2008. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
	Received: 07/10/08 ETR No: 126456		
759110	CNMW03-W-26640	07/07/08	WATER
759111	CNPMP3-W-26646	07/08/08	WATER
759112	CNQCTB-W-26657	07/08/08	WATER
759113	VHBLK01	07/10/08	WATER

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal. The samples, as received, were not acid preserved. On that basis the laboratory did provide for the analytical work to be performed within seven days of sample collection.

In order to accommodate field length limitations in processing the data summary forms, the laboratory did, in certain instances, abbreviate the sample identifier. The electronically formatted data provides for the full sample identifier.

SOM01.2 Volatile Organics (Trace Level Water)

A storage blank was prepared for volatile organics analysis, and stored in association with the storage of the sample. That storage blank, identified as VHBLK01, was carried through the holding period with the samples, and analyzed.

Sample CNPMP3-W-26646 was analyzed at a 6.3-fold dilution, based on the results of preliminary screening and the need to provide for a lower level of reporting. An additional,

30 Community Drive Suite 11 South Burlington, VT 05403 tel 802.660.1990 fax 802.660.1919 www.testamericainc.com

dilution analysis was performed on sample CNPMP3-W-26646 in order to provide for the quantification of acetone and 2-butanone within the range of calibrated instrument response. That analysis was performed at a 110-fold dilution. Both sets of results for the analysis of sample CNPMP3-W-26646 are included in this submittal. Each of the analyses associated with the sample set exhibited an acceptable internal standard performance. There was an acceptable recovery of each deuterated monitoring compound (DMC) in the analysis of the method blank and the analysis of the storage blank. The analysis of the samples in this sample set did meet the technical acceptance criteria specific to DMC recoveries, although not all DMC recoveries were within the control range in each analysis. The technical acceptance criteria does provide for the recovery of up to three DMCs to fall outside of the control range in the analysis of field samples. The recoveries of 2-butanone-d_5 and 2-hexanone-d_5 were elevated in the analysis of sample CNMW03-W-26640, and the dilution analysis that was performed on sample CNPMP3-W-26646. Matrix spike and matrix spike duplicate analyses were not performed on the samples in this sample set. The analysis of the method blank associated with the analytical work was free of target analyte contamination, as was the analysis of the storage blank. Present in the storage blank and method blank analyses was a non-target constituent that represented a compound that is related to either the DMC formulation or to column bleed. The fact that the presence of this compound is not within the laboratory's control is at issue. The derived results for that compound have been qualified with an "X" qualifier to reflect the source of the contamination. An instrument blank was analyzed following the more concentrated analysis of sample CNPMP3-W-26646. That analysis was performed without the introduction of the DMCs, and that is apparent in the DMC recovery summary. The analysis of the instrument blank was free of target analyte contamination.

The responses for each target analyte met the relative standard deviation criterion in the initial calibration. The response for each target analyte met the percent difference criterion in the continuing calibration check acquisition. The response for each target analyte met the 50.0 percent difference criterion in the closing calibration check acquisition. In the initial calibration and the calibration check acquisitions, the response for acetone did not meet the minimum relative response criterion of 0.010 in each instance. The relative response for acetone was above 0.009 in all instances.

The primary quantitation mass for methylcyclohexane that is specified in the Statement of Work is mass 83. The laboratory did identify a contribution to mass 83 from 1,2-dichloropropane-d_6, one of the deuterated monitoring compounds (DMCs). The laboratory did change the primary quantitation mass assignment to mass 55 for the quantification of methylcyclohexane.

Manual integration was employed in deriving certain of the analytical results. The values that have been derived from manual integration are qualified on the quantitation reports. Extracted ion current profiles for each manual integration are included in the data package, and further documented in the Sample Preparation section of this submittal.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Kirk F. Young
Project Manager

Enclosure

TestAmerica Burlington Data Qualifier Definitions

Organic

U: Compound analyzed but not detected at a concentration above the reporting limit.

J: Estimated value.

N: Indicates presumptive evidence of a compound. This flag is used only for tentatively identified compounds (TICs) where the identification of a compound is based on a mass spectral library search.

P: SW-846: The relative percent difference for detected concentrations between two GC columns is greater than 40%. Unless otherwise specified the higher of the two values is reported on the Form I.

CLP SOW: Greater than 25% difference for detected concentrations between two GC columns. Unless otherwise specified the lower of the two values is reported on the Form I.

C: Pesticide result whose identification has been confirmed by GC/MS.

B: Analyte is found in the sample and the associated method blank. The flag is used for tentatively identified compounds as well as positively identified compounds.

E: Compounds whose concentrations exceed the upper limit of the calibration range of the instrument for that specific analysis.

D: Concentrations identified from analysis of the sample at a secondary dilution.

A: Tentatively identified compound is a suspected aldol condensation product.

X,Y,Z: Laboratory defined flags that may be used alone or combined, as needed. If used, the description of the flag is defined in the project narrative.

Inorganic/Metals

E: Reported value is estimated due to the presence of interference.

N: Matrix spike sample recovery is not within control limits.

* Duplicate sample analysis is not within control limits.

B: The result reported is less than the reporting limit but greater than the instrument detection limit.

U: Analyte was analyzed for but not detected above the reporting limit.

Method Codes:

P ICP-AES
MS ICP-MS
CV Cold Vapor AA
AS Semi-Automated Spectrophotometric

Argonne NATIONAL LABORATORY

6132

ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*

MATRIX: Water

RECEIVING LAB: Test America

PROJECT/SITE: Centralia KS

SAMPLER(S) (Signature)

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): Bob Sedivy (402) 465-9021

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC	REMARKS
July 7, 2008	CNMW03-W-26640	2	2	2x40mL for VOC
July 8, 2008	CNPMP3-W-26646	2	2	2x40mL for VOC
July 8, 2008	CNQCTB-W-26657	1	1	1x40mL for VOC

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	7-8-08	16:34	TestAmerica		07/09/08	1500	07.10.08 0920

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks

Y	N	FOR LAB USE ONLY
		Custody seal was intact when shipment received.
		Sample containers were intact when received.
		Shipment was at required temperature when received.
		Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Sample Data Summary – SOM01.2 Volatiles – Trace

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNMW03W26640

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALI   Mod. Ref No.:   SDG No.: 126456

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 759110

Sample wt/vol: 25.0   (g/mL) mL   Lab File ID: 759110

Level: (TRACE/LOW/MED) TRACE   Date Received: 07/10/2008

% Moisture: not dec.   Date Analyzed: 07/14/2008

GC Column: DB-624   ID: 0.53   (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0   (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	2.5	
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.: CNMW03W26640

Lab Name: TestAmerica BURLINGTON Contract: 8E-00302

Lab Code: STLV Case No.: CENTRALI Mod. Ref No.: SDG No.: 126456

Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 759110

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 759110

Level: (TRACE/LOW/MED) TRACE Date Received: 07/10/2008

% Moisture: not dec. Date Analyzed: 07/14/2008

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNQCTBW26657

Lab Name: TestAmerica BURLINGTON Contract: 8E-00302

Lab Code: STLV Case No.: CENTRALI Mod. Ref No.: SDG No.: 126456

Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 759112

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 759112

Level: (TRACE/LOW/MED) TRACE Date Received: 07/10/2008

% Moisture: not dec. Date Analyzed: 07/14/2008

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNQCTBW26657

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALI   Mod. Ref No.:   SDG No.: 126456

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 759112

Sample wt/vol: 25.0   (g/mL) mL   Lab File ID: 759112

Level: (TRACE/LOW/MED) TRACE   Date Received: 07/10/2008

% Moisture: not dec.   Date Analyzed: 07/14/2008

GC Column: DB-624   ID: 0.53   (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0   (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	2.4	
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PMP3W26646

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALI   Mod. Ref No.:   SDG No.: 126456

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 759111

Sample wt/vol: 25.0   (g/mL) mL   Lab File ID: 759111D

Level: (TRACE/LOW/MED) TRACE   Date Received: 07/10/2008

% Moisture: not dec.   Date Analyzed: 07/14/2008

GC Column: DB-624   ID: 0.53   (mm)   Dilution Factor: 6.3

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0   (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	3.2	U
74-87-3	Chloromethane	3.2	U
75-01-4	Vinyl chloride	3.2	U
74-83-9	Bromomethane	3.2	U
75-00-3	Chloroethane	3.2	U
75-69-4	Trichlorofluoromethane	3.2	U
75-35-4	1,1-Dichloroethene	3.2	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	3.2	U
67-64-1	Acetone	1500	E
75-15-0	Carbon disulfide	3.2	U
79-20-9	Methyl acetate	3.2	U
75-09-2	Methylene chloride	17	
156-60-5	trans-1,2-Dichloroethene	3.2	U
1634-04-4	Methyl tert-butyl ether	3.2	U
75-34-3	1,1-Dichloroethane	3.2	U
156-59-2	cis-1,2-Dichloroethene	3.2	U
78-93-3	2-Butanone	1300	E
74-97-5	Bromochloromethane	3.2	U
67-66-3	Chloroform	92	
71-55-6	1,1,1-Trichloroethane	3.2	U
110-82-7	Cyclohexane	3.2	U
56-23-5	Carbon tetrachloride	33	
71-43-2	Benzene	3.2	U
107-06-2	1,2-Dichloroethane	3.2	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PMP3W26646

Lab Name: TestAmerica BURLINGTON Contract: 8E-00302

Lab Code: STLV Case No.: CENTRALI Mod. Ref No.: SDG No.: 126456

Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 759111

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 759111D

Level: (TRACE/LOW/MED) TRACE Date Received: 07/10/2008

% Moisture: not dec. Date Analyzed: 07/14/2008

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 6.3

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	3.2	U
108-87-2	Methylcyclohexane	3.2	U
78-87-5	1,2-Dichloropropane	3.2	U
75-27-4	Bromodichloromethane	3.2	U
10061-01-5	cis-1,3-Dichloropropene	3.2	U
108-10-1	4-Methyl-2-pentanone	32	U
108-88-3	Toluene	3.2	U
10061-02-6	trans-1,3-Dichloropropene	3.2	U
79-00-5	1,1,2-Trichloroethane	3.2	U
127-18-4	Tetrachloroethene	3.2	U
591-78-6	2-Hexanone	32	U
124-48-1	Dibromochloromethane	3.2	U
106-93-4	1,2-Dibromoethane	3.2	U
108-90-7	Chlorobenzene	3.2	U
100-41-4	Ethylbenzene	3.2	U
95-47-6	o-Xylene	3.2	U
179601-23-1	m,p-Xylene	3.2	U
100-42-5	Styrene	3.2	U
75-25-2	Bromoform	3.2	U
98-82-8	Isopropylbenzene	3.2	U
79-34-5	1,1,2,2-Tetrachloroethane	3.2	U
541-73-1	1,3-Dichlorobenzene	3.2	U
106-46-7	1,4-Dichlorobenzene	3.2	U
95-50-1	1,2-Dichlorobenzene	3.2	U
96-12-8	1,2-Dibromo-3-chloropropane	3.2	U
120-82-1	1,2,4-Trichlorobenzene	3.2	U
87-61-6	1,2,3-Trichlorobenzene	3.2	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PMP3W26646DL

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALI   Mod. Ref No.:   SDG No.: 126456

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 759111D1

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 759111D2

Level: (TRACE/LOW/MED) TRACE   Date Received: 07/10/2008

% Moisture: not dec.   Date Analyzed: 07/14/2008

GC Column: DB-624   ID: 0.53 (mm)   Dilution Factor: 110.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	55	U
74-87-3	Chloromethane	55	U
75-01-4	Vinyl chloride	55	U
74-83-9	Bromomethane	55	U
75-00-3	Chloroethane	55	U
75-69-4	Trichlorofluoromethane	55	U
75-35-4	1,1-Dichloroethene	55	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	55	U
67-64-1	Acetone	1600	D
75-15-0	Carbon disulfide	55	U
79-20-9	Methyl acetate	55	U
75-09-2	Methylene chloride	29	DJ
156-60-5	trans-1,2-Dichloroethene	55	U
1634-04-4	Methyl tert-butyl ether	55	U
75-34-3	1,1-Dichloroethane	55	U
156-59-2	cis-1,2-Dichloroethene	55	U
78-93-3	2-Butanone	1400	D
74-97-5	Bromochloromethane	55	U
67-66-3	Chloroform	93	D
71-55-6	1,1,1-Trichloroethane	55	U
110-82-7	Cyclohexane	55	U
56-23-5	Carbon tetrachloride	33	DJ
71-43-2	Benzene	55	U
107-06-2	1,2-Dichloroethane	55	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PMP3W26646DL

Lab Name: TestAmerica BURLINGTON Contract: 8E-00302

Lab Code: STLV Case No.: CENTRALI Mod. Ref No.: SDG No.: 126456

Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 759111D1

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 759111D2

Level: (TRACE/LOW/MED) TRACE Date Received: 07/10/2008

% Moisture: not dec. Date Analyzed: 07/14/2008

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 110.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	55	U
108-87-2	Methylcyclohexane	55	U
78-87-5	1,2-Dichloropropane	55	U
75-27-4	Bromodichloromethane	55	U
10061-01-5	cis-1,3-Dichloropropene	55	U
108-10-1	4-Methyl-2-pentanone	550	U
108-88-3	Toluene	55	U
10061-02-6	trans-1,3-Dichloropropene	55	U
79-00-5	1,1,2-Trichloroethane	55	U
127-18-4	Tetrachloroethene	55	U
591-78-6	2-Hexanone	550	U
124-48-1	Dibromochloromethane	55	U
106-93-4	1,2-Dibromoethane	55	U
108-90-7	Chlorobenzene	55	U
100-41-4	Ethylbenzene	55	U
95-47-6	o-Xylene	55	U
179601-23-1	m,p-Xylene	55	U
100-42-5	Styrene	55	U
75-25-2	Bromoform	55	U
98-82-8	Isopropylbenzene	55	U
79-34-5	1,1,2,2-Tetrachloroethane	55	U
541-73-1	1,3-Dichlorobenzene	55	U
106-46-7	1,4-Dichlorobenzene	55	U
95-50-1	1,2-Dichlorobenzene	55	U
96-12-8	1,2-Dibromo-3-chloropropane	55	U
120-82-1	1,2,4-Trichlorobenzene	55	U
87-61-6	1,2,3-Trichlorobenzene	55	U

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

August 27, 2008

TestAmerica Laboratories, Inc.

Mr. Clyde Dennis
Argonne National Laboratory
Chief Financial Officer
9700 S. Cass Avenue, Bldg. 201
Argonne, IL 60439

Re: Laboratory Project No. 21005
Case: CENTRALIA; SDG: 126998

Dear Mr. Dennis:

Enclosed are analytical results for samples that were received by TestAmerica Burlington on August 8th, 2008. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
	Received: 08/08/08 ETR No: 126998		
762961	CNSB07R-W-26661	08/06/08	WATER
762962	CNPMP6-W-26668	08/06/08	WATER
762963	CNQCTB-W-26672	08/06/08	WATER
762964	VHBLK01	08/08/08	WATER

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal. The samples, as received, were not acid preserved. On that basis the laboratory did provide for the analytical work to be performed within seven days of sample collection.

In order to accommodate field length limitations in processing the data summary forms, the laboratory did, in certain instances, abbreviate the sample identifier. The electronically formatted data provides for the full sample identifier.

SOM01.2 Volatile Organics (Trace Level Water)

A storage blank was prepared for volatile organics analysis, and stored in association with the storage of the sample. That storage blank, identified as VHBLK01, was carried through the holding period with the samples, and analyzed.

Sample CNPMP6-W-26668 was analyzed at a dilution, based on the results of preliminary screening. An additional, more concentrated analysis was performed on the sample in order to

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provide a lower reporting limit for those target analytes that were not identified as constituents in the primary analysis. Both sets of results for the analysis of sample CNPMP6-W-26668 are included in this submittal. Each of the analyses associated with the sample set exhibited an acceptable internal standard performance. There was an acceptable recovery of each deuterated monitoring compound (DMC) in the analysis of the method blank and the analysis of the storage blank. The analysis of the samples in this sample set did meet the technical acceptance criteria specific to DMC recoveries, although not all DMC recoveries were within the control range in each analysis. The technical acceptance criteria does provide for the recovery of up to three DMCs to fall outside of the control range in the analysis of field samples. With the exception of that performed on sample CNQCTB-W-26672, the recovery of 2-hexanone-d_5 was elevated in the analysis of each of the field samples, as was the recovery of 2-butanone-d_5 in the analysis of sample CNSB07R-W-26661 and the more dilute analysis of sample CNPMP6-W-26668. Matrix spike and matrix spike duplicate analyses were not performed on the samples in this sample set. Trace concentrations of 1,2,3-trichlorobenzene were identified in the analysis of each method blank associated with the analytical work. The derived concentration of that compound in each analysis was below the established reporting limit, and each analysis did meet the technical acceptance criteria for a compliant method blank acquisition. A trace concentration of acetone was identified in the analysis of the storage blank associated with the sample set. The derived concentration of acetone in that analysis was below the established reporting limit, and the analysis did meet the technical acceptance criteria for a compliant storage blank acquisition. Present in the storage blank and method blank analyses was a non-target constituent that represented a compound that is related to either the DMC formulation or to column bleed. The fact that the presence of this compound is not within the laboratory's control is at issue. The derived results for that compound have been qualified with an "X" qualifier to reflect the source of the contamination.

The responses for each target analyte met the relative standard deviation criterion in the initial calibration. The response for each target analyte met the percent difference criterion in each continuing calibration check acquisition. The response for each target analyte met the 50.0 percent difference criterion in each closing calibration check acquisition.

The primary quantitation mass for methylcyclohexane that is specified in the Statement of Work is mass 83. The laboratory did identify a contribution to mass 83 from 1,2-dichloropropane-d_6, one of the deuterated monitoring compounds (DMCs). The laboratory did change the primary quantitation mass assignment to mass 55 for the quantification of methylcyclohexane.

Manual integration was employed in deriving certain of the analytical results. The values that have been derived from manual integration are qualified on the quantitation reports. Extracted ion current profiles for each manual integration are included in the data package, and further documented in the Sample Preparation section of this submittal.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.) The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.

TestAmerica

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If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Kirk F. Young
Project Manager

Enclosure

TestAmerica Burlington Data Qualifier Definitions

Organic

U: Compound analyzed but not detected at a concentration above the reporting limit.

J: Estimated value.

N: Indicates presumptive evidence of a compound. This flag is used only for tentatively identified compounds (TICs) where the identification of a compound is based on a mass spectral library search.

P: SW-846: The relative percent difference for detected concentrations between two GC columns is greater than 40%. Unless otherwise specified the higher of the two values is reported on the Form I.

CLP SOW: Greater than 25% difference for detected concentrations between two GC columns. Unless otherwise specified the lower of the two values is reported on the Form I.

C: Pesticide result whose identification has been confirmed by GC/MS.

B: Analyte is found in the sample and the associated method blank. The flag is used for tentatively identified compounds as well as positively identified compounds.

E: Compounds whose concentrations exceed the upper limit of the calibration range of the instrument for that specific analysis.

D: Concentrations identified from analysis of the sample at a secondary dilution.

A: Tentatively identified compound is a suspected aldol condensation product.

X,Y,Z: Laboratory defined flags that may be used alone or combined, as needed. If used, the description of the flag is defined in the project narrative.

Inorganic/Metals

E: Reported value is estimated due to the presence of interference.

N: Matrix spike sample recovery is not within control limits.

* Duplicate sample analysis is not within control limits.

B: The result reported is less than the reporting limit but greater than the instrument detection limit.

U: Analyte was analyzed for but not detected above the reporting limit.

Method Codes:

P ICP-AES
MS ICP-MS
CV Cold Vapor AA
AS Semi-Automated Spectrophotometric

FedEx Tracking # 8389 2393 0384

Argonne NATIONAL LABORATORY

6116

ARGONNE NATIONAL LABORATORY CHAIN OF CUSTODY RECORD*

MATRIX: Water

RECEIVING LAB: Test America

PROJECT/SITE: Centralia KS

SAMPLER(S) (Signature)

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): Bob Sedivy (402) 465 9021

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC									REMARKS
Aug 6, 2008	CNSB07R-W-26661	2	2									2 X 40mL for VOC
Aug 6, 2008	CNPMP6-W-26668	2	2									2 X 40mL for VOC
Aug 6, 2008	CNQCTB-W-26672	1	1									1 X 40mL for VOC

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	8-7-08	17:30	08-08-08 0920				

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks

Y	N	FOR LAB USE ONLY
Y		Custody seal was intact when shipment received.
Y		Sample containers were intact when received.
Y		Shipment was at required temperature when received.
	N	Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

TestAmerica

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Sample Data Summary – SOM01.2 Volatiles – Trace

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PMP6W26668

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 126998

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 762962

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 762962

Level: (TRACE/LOW/MED) TRACE   Date Received: 08/08/2008

% Moisture: not dec.   Date Analyzed: 08/11/2008

GC Column: DB-624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.29	J
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	8.5	
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	95	E
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
PMP6W26668

Lab Name: TestAmerica BURLINGTON Contract: 8E-00302

Lab Code: STLV Case No.: CENTRALIA Mod. Ref No.: SDG No.: 126998

Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 762962

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 762962

Level: (TRACE/LOW/MED) TRACE Date Received: 08/08/2008

% Moisture: not dec. Date Analyzed: 08/11/2008

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.39	J
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.25	J
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
PMP6W26668DL

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 126998

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 762962D1

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 762962D

Level: (TRACE/LOW/MED) TRACE   Date Received: 08/08/2008

% Moisture: not dec.   Date Analyzed: 08/11/2008

GC Column: DB-624 ID: 0.53 (mm)   Dilution Factor: 6.3

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	3.2	U
74-87-3	Chloromethane	3.2	U
75-01-4	Vinyl chloride	3.2	U
74-83-9	Bromomethane	3.2	U
	Chloroethane	3.2	U
75-69-4	Trichlorofluoromethane	3.2	U
75-35-4	1,1-Dichloroethene	3.2	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	3.2	U
67-64-1	Acetone	32	U
75-15-0	Carbon disulfide	3.2	U
79-20-9	Methyl acetate	3.2	U
75-09-2	Methylene chloride	3.2	U
156-60-5	trans-1,2-Dichloroethene	3.2	U
1634-04-4	Methyl tert-butyl ether	3.2	U
75-34-3	1,1-Dichloroethane	3.2	U
156-59-2	cis-1,2-Dichloroethene	3.2	U
78-93-3	2-Butanone	32	U
74-97-5	Bromochloromethane	3.2	U
67-66-3	Chloroform	8.6	D
71-55-6	1,1,1-Trichloroethane	3.2	U
110-82-7	Cyclohexane	3.2	U
56-23-5	Carbon tetrachloride	110	D
71-43-2	Benzene	3.2	U
107-06-2	1,2-Dichloroethane	3.2	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
PMP6W26668DL

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 126998

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 762962D1

Sample wt/vol: 25.0   (g/mL) mL   Lab File ID: 762962D

Level: (TRACE/LOW/MED) TRACE   Date Received: 08/08/2008

% Moisture: not dec.   Date Analyzed: 08/11/2008

GC Column: DB-624   ID: 0.53   (mm)   Dilution Factor: 6.3

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0   (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	3.2	U
108-87-2	Methylcyclohexane	3.2	U
78-87-5	1,2-Dichloropropane	3.2	U
75-27-4	Bromodichloromethane	3.2	U
10061-01-5	cis-1,3-Dichloropropene	3.2	U
108-10-1	4-Methyl-2-pentanone	32	U
108-88-3	Toluene	3.2	U
10061-02-6	trans-1,3-Dichloropropene	3.2	U
79-00-5	1,1,2-Trichloroethane	3.2	U
127-18-4	Tetrachloroethene	3.2	U
591-78-6	2-Hexanone	32	U
124-48-1	Dibromochloromethane	3.2	U
106-93-4	1,2-Dibromoethane	3.2	U
108-90-7	Chlorobenzene	3.2	U
100-41-4	Ethylbenzene	3.2	U
95-47-6	o-Xylene	3.2	U
179601-23-1	m,p-Xylene	3.2	U
100-42-5	Styrene	3.2	U
75-25-2	Bromoform	3.2	U
98-82-8	Isopropylbenzene	3.2	U
79-34-5	1,1,2,2-Tetrachloroethane	3.2	U
541-73-1	1,3-Dichlorobenzene	3.2	U
106-46-7	1,4-Dichlorobenzene	3.2	U
95-50-1	1,2-Dichlorobenzene	3.2	U
96-12-8	1,2-Dibromo-3-chloropropane	3.2	U
120-82-1	1,2,4-Trichlorobenzene	3.2	U
87-61-6	1,2,3-Trichlorobenzene	3.2	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

QCTBW26672

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 126998

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 762963

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 762963

Level: (TRACE/LOW/MED) TRACE   Date Received: 08/08/2008

% Moisture: not dec.   Date Analyzed: 08/11/2008

GC Column: DB-624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	4.8	J
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.26	J
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
QCTBW26672

Lab Name: TestAmerica BURLINGTON Contract: 8E-00302

Lab Code: STLV Case No.: CENTRALIA Mod. Ref No.: SDG No.: 126998

Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 762963

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 762963

Level: (TRACE/LOW/MED) TRACE Date Received: 08/08/2008

% Moisture: not dec. Date Analyzed: 08/11/2008

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.92	
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.34	J
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SB07RW26661

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 126998

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 762961

Sample wt/vol: 25.0   (g/mL) mL   Lab File ID: 762961

Level: (TRACE/LOW/MED) TRACE   Date Received: 08/08/2008

% Moisture: not dec.   Date Analyzed: 08/11/2008

GC Column: DB-624   ID: 0.53   (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0   (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	1.1	
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	15	
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SB07RW26661

Lab Name: TestAmerica BURLINGTON   Contract: 8E-00302

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 126998

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 762961

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 762961

Level: (TRACE/LOW/MED) TRACE   Date Received: 08/08/2008

% Moisture: not dec.   Date Analyzed: 08/11/2008

GC Column: DB-624 ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

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THE LEADER IN ENVIRONMENTAL TESTING

September 29, 2008

TestAmerica Laboratories, Inc.

Mr. Clyde Dennis
Argonne National Laboratory
9700 S. Cass Avenue
Building 203, Office B149
Argonne, IL 60439

Re: Laboratory Project No. 21005
Case: CENTRALIA; SDG: 127561

Dear Mr. Dennis:

Enclosed are analytical results for samples that were received by TestAmerica Burlington on September 11th, 2008. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
	Received: 09/11/08 ETR No: 127561		
767257	CNMW01-W-26673	09/09/08	WATER
767258	CNMW04-W-26676	09/09/08	WATER
767259	CNPMP1-W-26689	09/09/08	WATER
767260	CNQCTB-W-26702	09/10/08	WATER
767261	VHBLK01	09/11/08	WATER

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal. The samples, as received, were not acid preserved. On that basis the laboratory did provide for the analytical work to be performed within seven days of sample collection.

In order to accommodate field length limitations in processing the data summary forms, the laboratory did, in certain instances, abbreviate the sample identifier. The electronically formatted data provides for the full sample identifier.

SOM01.2 Volatile Organics (Trace Level Water)

A storage blank was prepared for volatile organics analysis, and stored in association with the storage of the sample. That storage blank, identified as VHBLK01, was carried through the holding period with the samples, and analyzed.

30 Community Drive • Suite 11 South Burlington, VT 05403 tel 802.660.1990 fax 802.660.1919 www.testamericainc.com

Sample CNPMP1-W-26689 was analyzed at a dilution, based on the results of preliminary screening. An additional, more concentrated analysis was performed on the sample in order to provide a lower reporting limit for those target analytes that were not identified as constituents in the primary analysis. Both sets of results for the analysis of sample CNPMP1-W-26689 are included in this submittal. Each of the analyses associated with the sample set exhibited an acceptable internal standard performance. There was an acceptable recovery of each deuterated monitoring compound (DMC) in the analysis of the method blank and the analysis of the storage blank. The analysis of the samples in this sample set did meet the technical acceptance criteria specific to DMC recoveries, although not all DMC recoveries were within the control range in each analysis. The technical acceptance criteria does provide for the recovery of up to three DMCs to fall outside of the control range in the analysis of field samples. With the exception of that performed on sample CNQCTB-W-26702, the derived recovery of 2-hexanone-d_5 was elevated in the analysis of each of the field samples. Additionally, the recovery of 2-butanone-d_5 was high in the analysis of sample CNMW01-W-26673. Matrix spike and matrix spike duplicate analyses were not performed on the samples in this sample set. A trace concentration of acetone was identified in the analysis of the method blank associated with the analytical work. The derived concentration of acetone in that analysis was below the established reporting limit, and the analysis did meet the technical acceptance criteria for a compliant method blank acquisition. A trace concentration of acetone was identified in the analysis of the storage blank associated with the sample set. The derived concentration of acetone in that analysis was below the established reporting limit, and the analysis did meet the technical acceptance criteria for a compliant storage blank acquisition. Present in the storage blank and method blank analyses was a non-target constituent that represented a compound that is related to either the DMC formulation or to column bleed. The fact that the presence of this compound is not within the laboratory's control is at issue. The derived results for that compound have been qualified with an "X" qualifier to reflect the source of the contamination. An instrument blank was analyzed following the more concentrated analysis of sample CNPMP1-W-26689. A trace concentration of acetone was identified in that analysis at a concentration below the established reporting limit, and the analysis did meet the technical acceptance criteria for a compliant instrument blank acquisition.

The responses for each target analyte met the relative standard deviation criterion in the initial calibration. The response for each target analyte met the percent difference criterion in the continuing calibration check acquisition. The response for each target analyte met the 50.0 percent difference criterion in the closing calibration check acquisition.

The primary quantitation mass for methylcyclohexane that is specified in the Statement of Work is mass 83. The laboratory did identify a contribution to mass 83 from 1,2-dichloropropane-d_6, one of the deuterated monitoring compounds (DMCs). The laboratory did change the primary quantitation mass assignment to mass 55 for the quantification of methylcyclohexane.

Manual integration was employed in deriving certain of the analytical results. The values that have been derived from manual integration are qualified on the quantitation reports. Extracted ion current profiles for each manual integration are included in the data package, and further documented in the Sample Preparation section of this submittal.

Any reference within this report to Severn Trent Laboratories, Inc. or STL, should be understood to refer to TestAmerica Laboratories, Inc. (formerly known as Severn Trent Laboratories, Inc.)

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The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.

If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Kirk F. Young
Project Manager

KFY/hsf
Enclosure

TestAmerica Burlington Data Qualifier Definitions

Organic

U: Compound analyzed but not detected at a concentration above the reporting limit.

J: Estimated value.

N: Indicates presumptive evidence of a compound. This flag is used only for tentatively identified compounds (TICs) where the identification of a compound is based on a mass spectral library search.

P: SW-846: The relative percent difference for detected concentrations between two GC columns is greater than 40%. Unless otherwise specified the higher of the two values is reported on the Form I.

CLP SOW: Greater than 25% difference for detected concentrations between two GC columns. Unless otherwise specified the lower of the two values is reported on the Form I.

C: Pesticide result whose identification has been confirmed by GC/MS.

B: Analyte is found in the sample and the associated method blank. The flag is used for tentatively identified compounds as well as positively identified compounds.

E: Compounds whose concentrations exceed the upper limit of the calibration range of the instrument for that specific analysis.

D: Concentrations identified from analysis of the sample at a secondary dilution.

A: Tentatively identified compound is a suspected aldol condensation product.

X,Y,Z: Laboratory defined flags that may be used alone or combined, as needed. If used, the description of the flag is defined in the project narrative.

Inorganic/Metals

E: Reported value is estimated due to the presence of interference.

N: Matrix spike sample recovery is not within control limits.

* Duplicate sample analysis is not within control limits.

B: The result reported is less than the reporting limit but greater than the instrument detection limit.

U: Analyte was analyzed for but not detected above the reporting limit.

Method Codes:

P ICP-AES
MS ICP-MS
CV Cold Vapor AA
AS Semi-Automated Spectrophotometric

Argonne NATIONAL LABORATORY

FedEx # 8389 2393 0351

6134

MATRIX: Water

RECEIVING LAB: Test America

PROJECT/SITE: Centralia KS

SAMPLER(S) (Signature)

ARGONNE NATIONAL LABORATORY
CHAIN OF CUSTODY RECORD*

Shipping Container:

Shipping Info:

Field Contact (Name & Temporary Phone): Bob Sedivy (402) 465-9021

DATE OF COLLECTION	SAMPLE ID NUMBER(S)	Number of containers	ANALYSIS: VOC	REMARKS
Sept 9, 2008	CNMW01-W-26673	2	2	2 x 40 mL for VOC
Sept 9, 2008	CNMW04-W-26676	2	2	2 x 40 mL for VOC
Sept 9, 2008	CNPMP1-W-26689	2	2	2 x 40 mL for VOC
Sept 10, 2008	CNQCTB-W-26702	1	1	1 x 40 mL for VOC

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	9-10-08	15:52	09.11.08 0940				

Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time	Remarks

Y	N	FOR LAB USE ONLY
X		Custody seal was intact when shipment received.
X		Sample containers were intact when received.
X		Shipment was at required temperature when received.
	X	Sample labels, Tags and COC agree.

*A sample is under custody if:

1. It is in your possession; or,
2. It is in your view, after having been in your possession; or,
3. It was in your possession and you locked it up; or,
4. It is in a designated secure area.

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Sample Data Summary – SOM01.2 Volatiles – Trace

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNMW01W26673

Lab Name: TestAmerica BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALIA Mod. Ref No.: SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 767257

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 767257

Level: (TRACE/LOW/MED) TRACE Date Received: 09/11/2008

% Moisture: not dec. Date Analyzed: 09/12/2008

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	1.0	JB
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNMW01W26673

Lab Name: TestAmerica BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALIA Mod. Ref No.: SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 767257

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 767257

Level: (TRACE/LOW/MED) TRACE Date Received: 09/11/2008

% Moisture: not dec. Date Analyzed: 09/12/2008

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNMW04W26676

Lab Name: TestAmerica BURLINGTON   Contract: 21005

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 767258

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 767258

Level: (TRACE/LOW/MED) TRACE   Date Received: 09/11/2008

% Moisture: not dec.   Date Analyzed: 09/12/2008

GC Column: DB-624 ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	1.6	JB
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	1.8	
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
CNMW04W26676

Lab Name: TestAmerica BURLINGTON Contract: 21005

Lab Code: STLV Case No.: CENTRALIA Mod. Ref No.: SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water Lab Sample ID: 767258

Sample wt/vol: 25.0 (g/mL) mL Lab File ID: 767258

Level: (TRACE/LOW/MED) TRACE Date Received: 09/11/2008

% Moisture: not dec. Date Analyzed: 09/12/2008

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNQCTBW26702

Lab Name: TestAmerica BURLINGTON   Contract: 21005

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 767260

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 767260

Level: (TRACE/LOW/MED) TRACE   Date Received: 09/11/2008

% Moisture: not dec.   Date Analyzed: 09/12/2008

GC Column: DB-624 ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	2.5	JB
75-15-0	Carbon disulfide	0.50	U
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CNQCTBW26702

Lab Name: TestAmerica BURLINGTON   Contract: 21005

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 767260

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 767260

Level: (TRACE/LOW/MED) TRACE   Date Received: 09/11/2008

% Moisture: not dec.   Date Analyzed: 09/12/2008

GC Column: DB-624 ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PMP1W26689

Lab Name: TestAmerica BURLINGTON   Contract: 21005

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 767259

Sample wt/vol: 25.0   (g/mL) mL   Lab File ID: 767259

Level: (TRACE/LOW/MED) TRACE   Date Received: 09/11/2008

% Moisture: not dec.   Date Analyzed: 09/12/2008

GC Column: DB-624   ID: 0.53   (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0   (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	32	B
75-15-0	Carbon disulfide	0.26	J
79-20-9	Methyl acetate	0.50	U
75-09-2	Methylene chloride	0.29	J
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-butyl ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.5	
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	23	E
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon tetrachloride	87	E
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PMP1W26689

Lab Name: TestAmerica BURLINGTON   Contract: 21005

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 767259

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 767259

Level: (TRACE/LOW/MED) TRACE   Date Received: 09/11/2008

% Moisture: not dec.   Date Analyzed: 09/12/2008

GC Column: DB-624 ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	33	E
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.33	J
95-47-6	o-Xylene	0.50	U
179601-23-1	m,p-Xylene	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1A - FORM I VOA-1
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PMP1W26689DL

Lab Name: TestAmerica BURLINGTON   Contract: 21005

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 767259D1

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 767259D

Level: (TRACE/LOW/MED) TRACE   Date Received: 09/11/2008

% Moisture: not dec.   Date Analyzed: 09/12/2008

GC Column: DB-624   ID: 0.53 (mm)   Dilution Factor: 9.6

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
75-71-8	Dichlorodifluoromethane	4.8	U
74-87-3	Chloromethane	4.8	U
75-01-4	Vinyl chloride	4.8	U
74-83-9	Bromomethane	4.8	U
75-00-3	Chloroethane	4.8	U
75-69-4	Trichlorofluoromethane	4.8	U
75-35-4	1,1-Dichloroethene	4.8	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	4.8	U
67-64-1	Acetone	39	DJB
75-15-0	Carbon disulfide	4.8	U
79-20-9	Methyl acetate	4.8	U
75-09-2	Methylene chloride	4.8	U
156-60-5	trans-1,2-Dichloroethene	4.8	U
1634-04-4	Methyl tert-butyl ether	4.8	U
75-34-3	1,1-Dichloroethane	4.8	U
156-59-2	cis-1,2-Dichloroethene	4.8	U
78-93-3	2-Butanone	5.3	DJ
74-97-5	Bromochloromethane	4.8	U
67-66-3	Chloroform	24	D
71-55-6	1,1,1-Trichloroethane	4.8	U
110-82-7	Cyclohexane	4.8	U
56-23-5	Carbon tetrachloride	120	D
71-43-2	Benzene	4.8	U
107-06-2	1,2-Dichloroethane	4.8	U

Report 1,4-Dioxane for Low-Medium VOA analysis only

1B - FORM I VOA-2
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

PMP1W26689DL

Lab Name: TestAmerica BURLINGTON   Contract: 21005

Lab Code: STLV   Case No.: CENTRALIA Mod. Ref No.:   SDG No.: 127561

Matrix: (SOIL/SED/WATER) Water   Lab Sample ID: 767259D1

Sample wt/vol: 25.0 (g/mL) mL   Lab File ID: 767259D

Level: (TRACE/LOW/MED) TRACE   Date Received: 09/11/2008

% Moisture: not dec.   Date Analyzed: 09/12/2008

GC Column: DB-624 ID: 0.53 (mm)   Dilution Factor: 9.6

Soil Extract Volume: (uL)   Soil Aliquot Volume: (uL)

Purge Volume: 25.0 (mL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/L	Q
79-01-6	Trichloroethene	4.8	U
108-87-2	Methylcyclohexane	4.8	U
78-87-5	1,2-Dichloropropane	4.8	U
75-27-4	Bromodichloromethane	4.8	U
10061-01-5	cis-1,3-Dichloropropene	4.8	U
108-10-1	4-Methyl-2-pentanone	48	U
108-88-3	Toluene	46	D
10061-02-6	trans-1,3-Dichloropropene	4.8	U
79-00-5	1,1,2-Trichloroethane	4.8	U
127-18-4	Tetrachloroethene	4.8	U
591-78-6	2-Hexanone	48	U
124-48-1	Dibromochloromethane	4.8	U
106-93-4	1,2-Dibromoethane	4.8	U
108-90-7	Chlorobenzene	4.8	U
100-41-4	Ethylbenzene	4.8	U
95-47-6	o-Xylene	4.8	U
179601-23-1	m,p-Xylene	4.8	U
100-42-5	Styrene	4.8	U
75-25-2	Bromoform	4.8	U
98-82-8	Isopropylbenzene	4.8	U
79-34-5	1,1,2,2-Tetrachloroethane	4.8	U
541-73-1	1,3-Dichlorobenzene	4.8	U
106-46-7	1,4-Dichlorobenzene	4.8	U
95-50-1	1,2-Dichlorobenzene	4.8	U
96-12-8	1,2-Dibromo-3-chloropropane	4.8	U
120-82-1	1,2,4-Trichlorobenzene	4.8	U
87-61-6	1,2,3-Trichlorobenzene	4.8	U

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