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Revision 0

Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Fiscal Year 2009

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company

P.O. Box 1600
Richland, Washington 99352

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Executive Summary

Soil vapor extraction (SVE) is being used to remove carbon tetrachloride from the vadose zone at the 200-PW-1 Operable Unit (OU). The purpose of this document is to report the SVE system operating data and the effectiveness of SVE in remediating carbon tetrachloride contamination based on the existing remedial design. This report covers operations for fiscal year (FY) 2009 (October 1, 2008, through September 30, 2009) and provides a general overview of the entire operating period from February 25, 1992, through September 30, 2009.

The 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib (216-Z-9, 216-Z-1A, and 216-Z-18 sites, respectively) were used from 1955 through 1973 for soil column disposal of aqueous and organic liquid wastes containing carbon tetrachloride. The SVE operations are focused on the vadose zone in the vicinity of these three waste sites.

Two 14.2 m^3/min (500 ft^3/min) SVE systems were operated from April through September 2009. One system extracted soil vapor at the combined 216-Z-1A/216-Z-18 Well Field, and one system extracted soil vapor at the 216-Z-9 Well Field. During this time, the two SVE systems extracted 177 kg (390 lb) of carbon tetrachloride from the vadose zone. Between April 1991 (when the pilot test was conducted) and September 2009, approximately 79,557 kg (175,391 lb) of carbon tetrachloride were removed from the vadose zone. Of this total, 54,711 kg (120,616 lb) were removed from the 216-Z-9 Well Field, and 24,845 kg (54,773 lb) were removed from the 216-Z-1A/216-Z-18 Well Field.

Approximately 5 kg (11 lb) of carbon tetrachloride were removed from the vadose zone in FY 2009 using passive SVE systems installed on eight wells in the 216-Z-1A/216-Z-18 Well Field. Passive SVE is a naturally occurring process driven by barometric pressure fluctuations and is often referred to as "barometric pumping."

The primary source of the remaining carbon tetrachloride appears to be the relatively low-permeability zones within and overlying the Cold Creek unit (CCU). As carbon tetrachloride from these lower permeability zones migrates into the overlying and underlying higher permeability zones, it can be removed using SVE. However, the rate of removal will be controlled by the rates of carbon tetrachloride desorption and diffusion. At many monitoring locations, including locations within the higher permeability zones,

the relatively low carbon tetrachloride rebound concentrations indicate that the readily available mass (i.e., carbon tetrachloride already in the vapor phase or volatizing directly from residual nonaqueous phase liquid) has been removed.

Recommendations for SVE operations include continuing operation of active and passive extraction systems and continuing development of a final remedial action determined through the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*[1] (CERCLA) remedial investigation (RI)/feasibility study (FS) process for the 200-PW-1 OU.

[1] *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 U.S.C. 9601, et seq. Available at: http://www.epa.gov/oecaagct/lcla.html#Hazardous%20Substance%20Responses.

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Terms

B&K™	Brüel & Kjaer™
bgs	below ground surface
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CCU	Cold Creek unit
CPT	cone penetrometer
DNAPL	dense nonaqueous phase liquid
ERA	expedited response action
ERDF	Environmental Restoration Disposal Facility
FS	feasibility study
FY	fiscal year
GAC	granular activated carbon
HMI	human machine interface
OU	operable unit
PFP	Plutonium Finishing Plant
PLC	programmable logic controller
ppmv	parts per million by volume
RECUPLEX	Recovery of Uranium and Plutonium by Extraction
RI	remedial investigation
ROD	record of decision
SVE	soil vapor extraction

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1 Introduction and Summary of Fiscal Year 2009 Activities

In the mid-1980s, carbon tetrachloride was found in the unconfined aquifer beneath the 200 West Area of the Hanford Site. During this time, groundwater monitoring results indicated that the carbon tetrachloride plume was widespread and that concentrations were increasing. The source of the carbon tetrachloride contamination was determined to be waste liquids discharged to the vadose zone through engineered disposal sites.

Soil vapor extraction (SVE) was initiated in February 1992 to remove carbon tetrachloride contamination from the vadose zone in the vicinity of these disposal sites. The purpose of the remediation using SVE is to mitigate the threat to the environment caused by the migration of carbon tetrachloride vapors through the soil column and into the groundwater.

Since February 1992, SVE has been operated as an interim action taken pending final cleanup activities for these waste sites. The final cleanup activities will be determined as part of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) remedial investigation (RI)/feasibility study (FS) process currently being conducted for the 200-PW-1 Operable Unit (OU). The 200-PW-1 OU includes the waste sites and associated vadose zone that received the carbon tetrachloride waste liquids. The nature and extent of the carbon tetrachloride contamination in the 200-PW-1 OU is provided in DOE/RL-2006-51.

The purpose of this report is to evaluate the SVE system operating data and the effectiveness of SVE in remediating the carbon tetrachloride contamination based on the existing remedial design. This report covers operations for fiscal year (FY) 2009 (October 1, 2008, through September 30, 2009) and provides a general overview of operations from February 25, 1992, through September 30, 2009. The following activities were completed during FY 2009 to support SVE system operations.

- Two new, 14.2-m^3/min (500-ft^3/min) SVE systems were installed and operated at the carbon tetrachloride site. One system operated at the combined 216-Z-1A/216-Z-18 well field from April through September 2009, and one system operated at the 216-Z-9 well field from April through September 2009. During this time, the two SVE systems extracted 177 kg (390 lb) of carbon tetrachloride from the vadose zone.
- Approximately 5 kg (11 lb) of carbon tetrachloride were removed from the vadose zone using passive SVE in FY 2009.
- Soil vapor monitoring continued monthly throughout FY 2009 at wells and probes that were not on-line to the SVE system. Based on evaluation of soil vapor concentrations measured near the vadose zone/groundwater interface, temporarily suspending operation of the SVE system from October 2008 through March 2009 appears to have had no negative impact on groundwater quality.

2 200-PW-1 Operable Unit Soil Vapor Extraction

During FY 2009, carbon tetrachloride was removed from the vadose zone using two active SVE systems and eight passive SVE systems.

2.1 Soil Vapor Extraction System Description

The active SVE systems use an applied vacuum to extract carbon tetrachloride vapor from the vadose zone. These systems extract vapor through multiple vadose zone borings at the following three primary carbon tetrachloride disposal sites:

- 216-Z-9 Trench (216-Z-9)
- 216-Z-1A Tile Field (216-Z-1A)
- 216-Z-18 Crib (216-Z-18)

One of the active SVE systems may also be used to extract vapor through wells at the 216-Z-12 Crib (216-Z-12). The 216-Z-1A, 216-Z-18, and 216-Z-12 sites are discussed together because the well fields at these sites overlap.

The passive SVE systems use naturally occurring changes in barometric pressure to drive the extraction of carbon tetrachloride vapor. This process is also referred to as "barometric pumping." In general, falling atmospheric pressure causes subsurface vapor to move to the atmosphere through wells, while rising atmospheric pressure causes atmospheric air to move into the subsurface. The eight passive SVE systems were installed at eight individual vadose zone borings at the 216-Z-1A and 216-Z-18 sites.

The soil vapor extracted by the active and passive SVE systems is treated above-ground using canisters of granular activated carbon (GAC). The GAC adsorbs the carbon tetrachloride from the vapor. The treated, clean soil vapor is then vented to the atmosphere.

2.1.1 Active Soil Vapor Extraction

Each SVE system operated in FY 2009 consists of a filter skid, a process trailer, and GAC canisters which are described as follows.

- Each filter skid includes a filter, piping, and quick-disconnect fittings for connection of process hoses.
- Each process trailer is divided into two sections separated by a dividing wall. The rear section (approximately 3/4 of the trailer) contains process equipment, and the front section is the control room.
  - The process section in the rear of each trailer includes a primary water separator, a positive displacement air blower, an air-to-air heat exchanger vapor cooler, a secondary water separator, and an exhaust stack.
  - The control room in the front of each trailer contains the SVE control and monitoring system, which includes a programmable logic controller (PLC) and human machine interface (HMI) computer for control, monitoring, and data logging; a gas chromatograph for measurement of volatile organic compound (VOC) concentrations in process air; and electrical distribution equipment. The SVE control and monitoring system also includes local instrumentation, distributed controls, and interlocks for monitoring and control of system parameters.

- GAC canisters are located outside the process trailer and are connected to it by flexible hoses with quick disconnect fittings. Each canister contains GAC to adsorb the VOCs from the extracted soil vapor.

Flexible hoses are connected from the extraction wells to manifolds installed inside each process trailer. Soil vapor from the wells is drawn through the manifold into the primary water separator (dropout tank). From the primary water separator, the vapor passes through a demister out of the trailer, through a filter, and then back into the trailer to the suction side of the positive displacement blower. The vapor stream leaving the blower passes through the air-to-air cooler, the secondary water separator, and then out of the trailer through a flexible hose to the primary GAC canister. From the primary GAC canister, the vapor line loops back into the trailer, through a sample point, and then back out to the polishing GAC canister. The vapor stream leaving the polishing GAC canister goes back into the trailer through a sample point and is then exhausted out of the stack.

2.1.2 Passive Soil Vapor Extraction

The minimum component for a passive SVE system is a well to provide the preferential pathway from the subsurface zone to the surface. On the systems designed for use at the carbon tetrachloride site, additional components include the following:

- An aboveground canister of GAC to collect the venting carbon tetrachloride
- Hoses to connect the well to the canister
- A one-way, flow-activated valve that lets soil vapor flow out through the well but prevents atmospheric air from flowing in through the well

2.2 History of Operations

Carbon tetrachloride was discharged to the subsurface through engineered disposal facilities from 1955 through 1973. Following discharge, the carbon tetrachloride migrated throughout the vadose zone underlying the disposal sites. Soil vapor extraction has been in operation since 1992 to remove the carbon tetrachloride.

2.2.1 Carbon Tetrachloride Waste Disposal

Carbon tetrachloride contained in aqueous and organic liquid wastes generated during plutonium-processing operations at Z Plant, currently called the Plutonium Finishing Plant (PFP), was discharged primarily to the following three subsurface infiltration facilities (Figure 2-1):

- 216-Z-9 Trench from 1955 to 1962
- 216-Z-1A Tile Field from 1964 to 1969
- 216-Z-18 Crib from 1969 to 1973

The Recovery of Uranium and Plutonium by Extraction (RECUPLEX) plutonium-processing operation was discontinued after a criticality incident in April 1962 and was replaced in May 1964 by the Plutonium Reclamation Facility. No liquid organic waste associated with these operations was discharged to cribs between April 1962 and May 1964. No liquid organic waste was discharged to the cribs after 1973. An estimated total of 570,000 to 920,000 kg (1,257,000 to 2,028,000 lb) of carbon tetrachloride may have been discharged to soil through these three waste sites between 1955 and 1973 (DOE/RL-91-32).
The 216-Z-12 Crib received analytical and development laboratory waste from Z Plant from 1959 to 1973 and is estimated to have received a small volume of organics, which included carbon tetrachloride (RHO-ST-44).

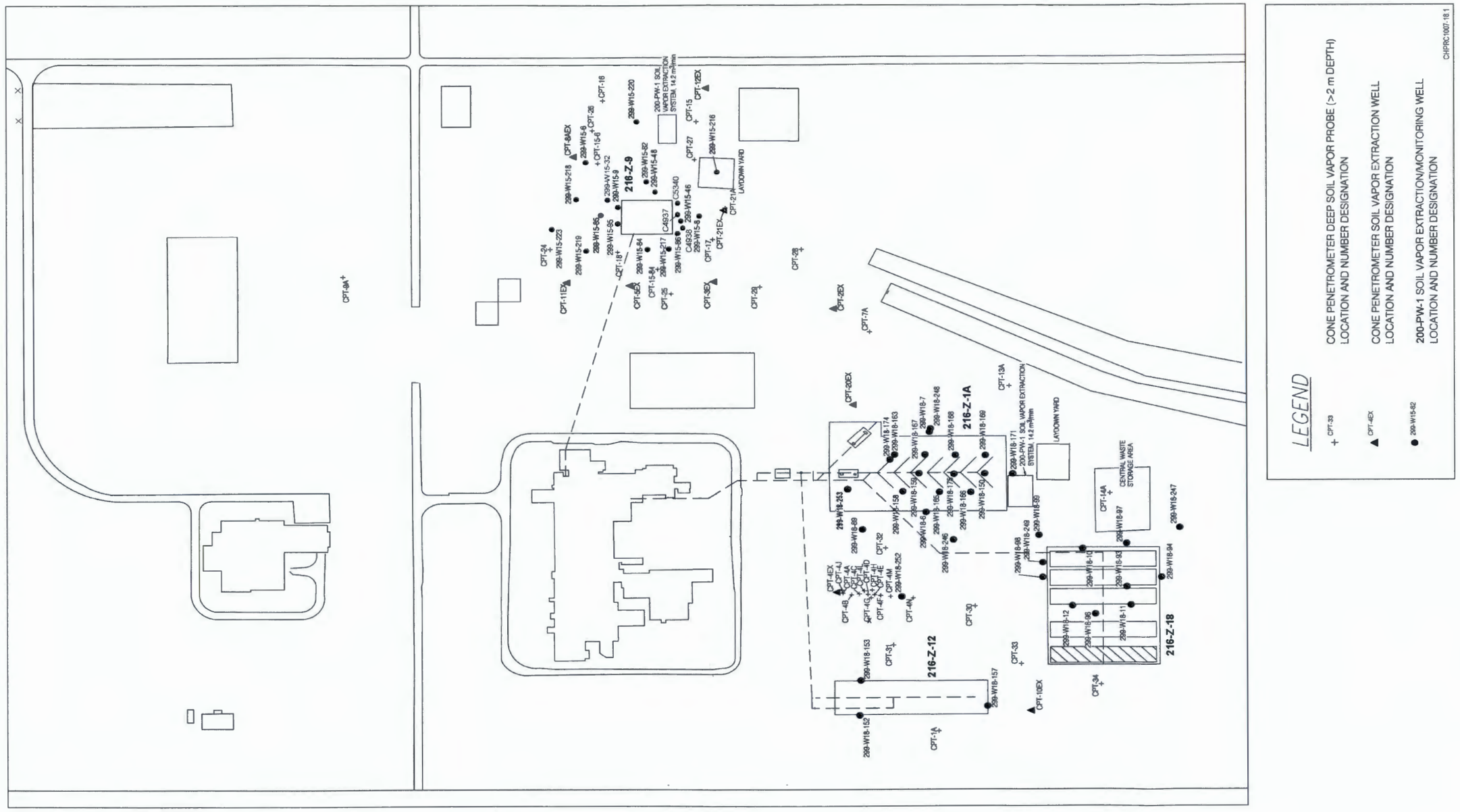


Figure 2-1. Extraction and Monitoring Wells and Deep (>2 m [>6.6 ft]) Soil Vapor Probes at the Carbon Tetrachloride Soil Vapor Extraction Sites

2.2.2 Carbon Tetrachloride Well Field

The vadose zone underlying the primary carbon tetrachloride disposal sites consists of approximately 70 m (230 ft) of relatively permeable sand and gravel within the Ringold Formation (lower portion) and Hanford formation (upper portion). This section is interrupted from a depth of 38 to 45 m (125 to 148 ft) by the Cold Creek unit (CCU), a less-permeable interval composed of 4 m (13 ft) of silt and sand and 3 m (10 ft) of carbonate-rich silt and sand (Figure 2-2, Figure 2-3, and Figure 2-4). Because of its higher concentration of calcium carbonate, the less permeable CCU is informally referred to as the "caliche layer." The less-permeable CCU interval constitutes a relatively low-flow zone and effectively divides the subsurface into the following two distinct higher flow zones:

- An upper zone from the ground surface to the top of the less permeable layer
- A lower zone from the bottom of the less permeable layer to the water table (>70 m [230 ft] below ground surface [bgs])

During FY 2009, 52 wells were available for SVE (Figure 2-1). Thirteen of the 52 wells have two open intervals (i.e., screened or perforated casing), creating 65 intervals for vapor extraction. Open interval lengths range from 1.5 to 22 m (5 to 71 ft). Well diameters range from 2 to 20 cm (0.75 to 8 in.). The active SVE system extracts simultaneously from multiple wells that are open above, within, and/or below the CCU layer. All of the passive SVE systems extract from well intervals that are open below the CCU. Cross-sections through the 216-Z-18/216-Z-12, 216-Z-1A, and 216-Z-9 Well Fields are shown in Figure 2-2, Figure 2-3, and Figure 2-4, respectively.

The following subsurface vapor monitoring probes have been installed within the vadose zone around the carbon tetrachloride sites at a depth of >2 m (6.6 ft) (Figure 2-1 through Figure 2-4).

- A cone penetrometer (CPT) was used to install 107 subsurface vapor monitoring probes at 35 locations at the carbon tetrachloride site (Figure 2-1 through Figure 2-4). The deepest monitoring probe installed at the vapor extraction sites using the CPT is 36 m (118 ft) bgs.
- During well completion, 10 stainless steel tubes were strapped to the outside of the casing of four wells to enable monitoring above and below the screened intervals.

2.2.3 Carbon Tetrachloride Soil Vapor Extraction, Fiscal Years 1992 Through 2009

Between 1992 and 1997, the strategy for SVE was to operate year-round using up to three SVE systems with design capacities of 14.2 m^3/min, 28.3 m^3/min, and 42.5 m^3/min (500 ft^3/min; 1,000 ft^3/min; and 1,500 ft^3/min). During this time, operation of the three SVE systems was temporarily suspended in June 1993 because a GAC canister overheated at the 216-Z-9 site (WHC-SD-EN-TI-203). The first system was restarted 5 months later; the last system was restarted 12 months later.

In FY 1997, a rebound study was conducted throughout the carbon tetrachloride SVE sites to determine the increase in carbon tetrachloride vapor concentrations following temporary system shutdown (BHI-01105). Operation of all three SVE systems (14.2 m^3/min, 28.3 m^3/min, and 42.5 m^3/min [500 ft^3/min; 1,000 ft^3/min; and 1,500 ft^3/min]) was temporarily suspended in November 1996 and then restarted in July 1997. All three SVE systems continued to operate through September 1997.

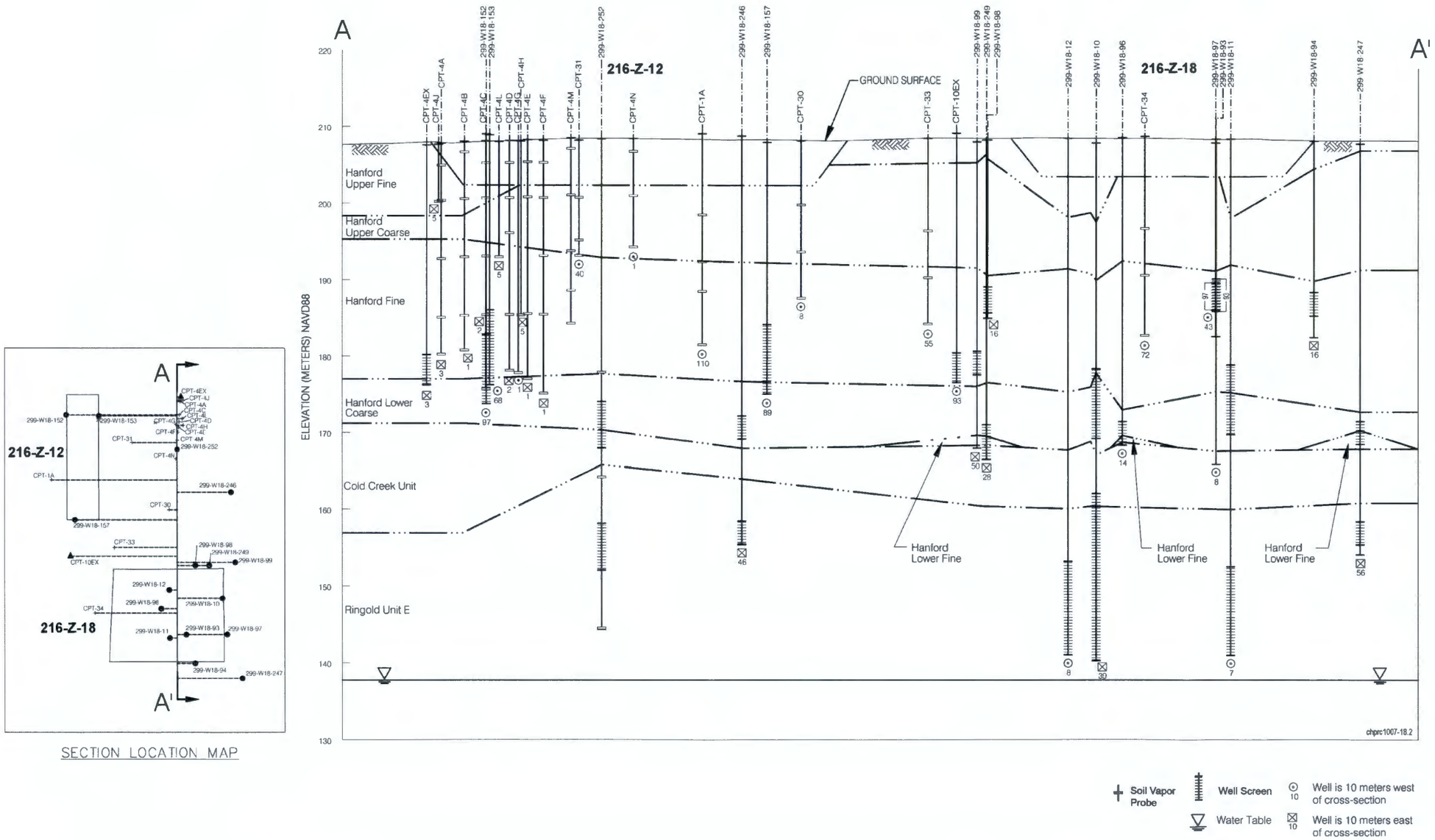


Figure 2-2. Cross-Section Through the 216-Z-18/216-Z-12 Well Field

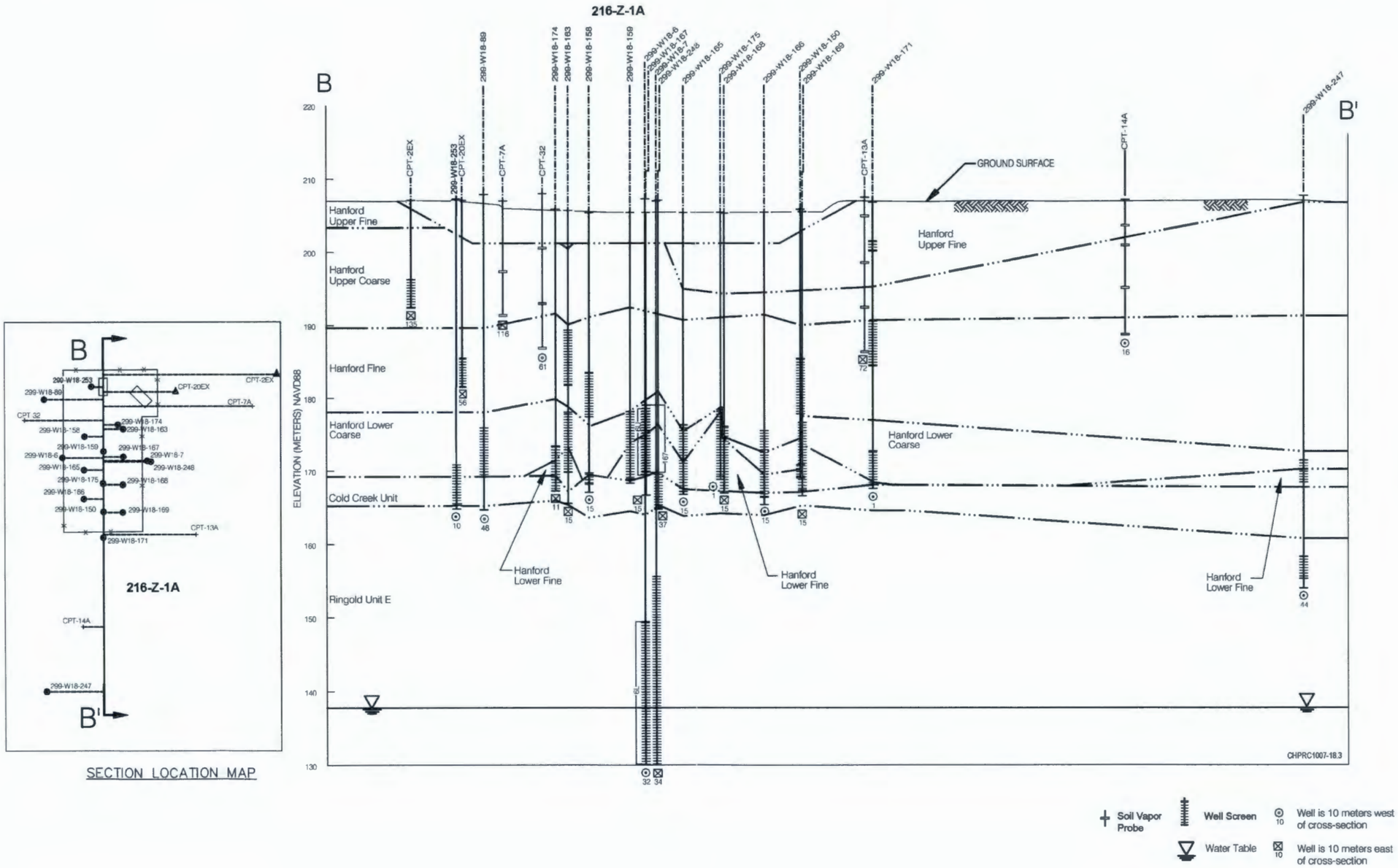


Figure 2-3. Cross-Section Through the 216-Z-1A Well Field

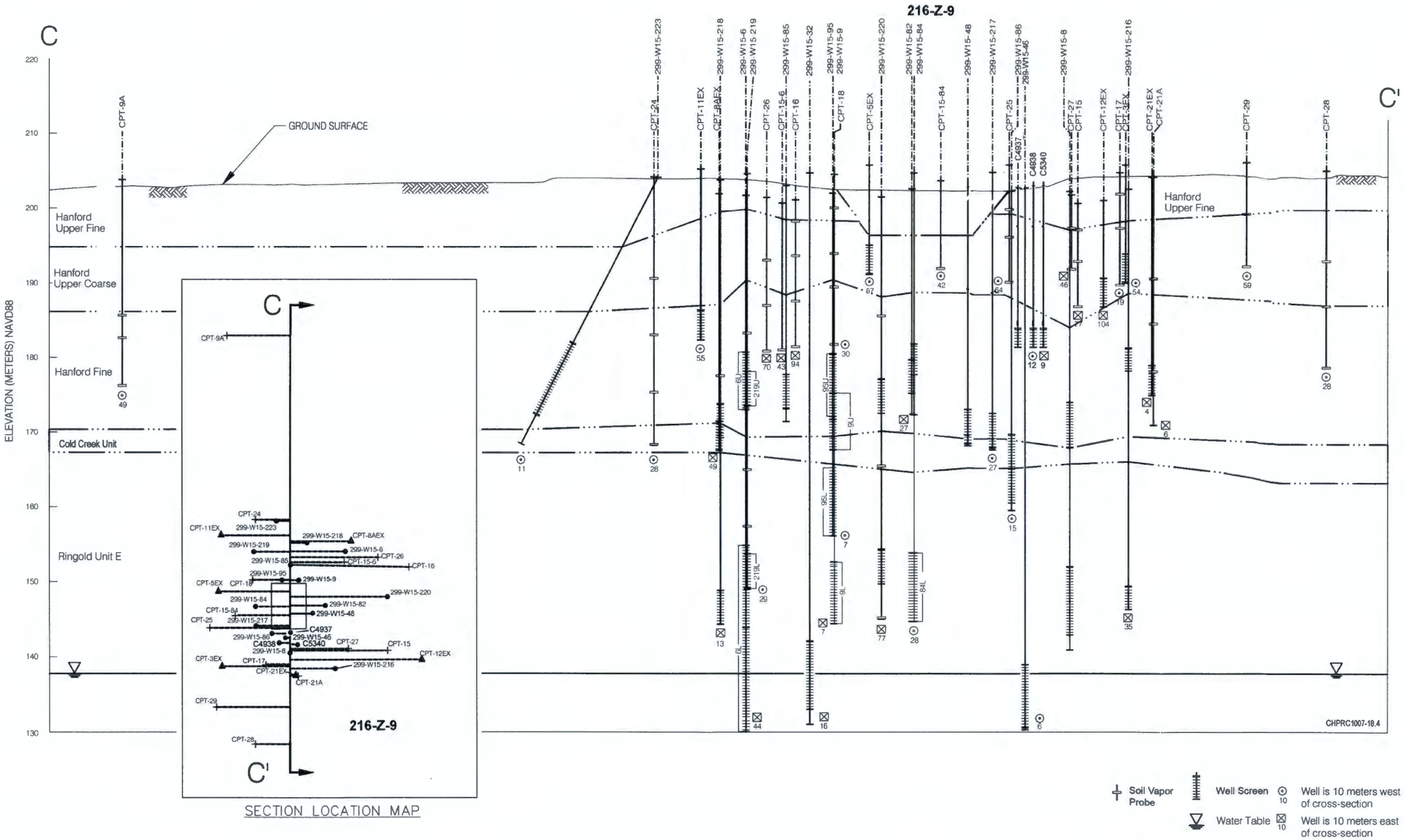


Figure 2-4. Cross-Section Through the 216-Z-9 Well Field

The operating strategy was modified in 1998 based on the results of the rebound study and the declining rate of carbon tetrachloride removal during continuous extraction operations. Instead of operating all three SVE systems, only the 14.2-m^3/min (500-ft^3/min) system was used for carbon tetrachloride removal from 1998 through 2008. Rather than operating year-round, this SVE system was operated in a cyclic or periodic mode during these years. The 14.2-m^3/min (500-ft^3/min) system typically operated from April through September each year, alternating between the 216-Z-9 site and the 216-Z-1A/216-Z-18 site (for approximately three months at each site). The system was maintained in standby mode from October through March to allow time for carbon tetrachloride vapor concentrations to rebound. During this time, operation of the SVE system was temporarily suspended during FY 2000 as a result of higher priority remediation activities competing for limited funding.

Two new SVE systems, each with a design capacity of 14.2 m^3/min (500 ft^3/min), were installed and operated in 2009. One new SVE system was operated at the 216-Z-1A site, and one was operated at the 216-Z-9 site. Each system operated from April 1 through September 30, 2009.

Table 2-1 summarizes the history of the cyclic SVE operations, and additional details are provided in Appendix A. The wells used for cyclic operations at the 216-Z-9 site are summarized in Figure 2-5; the wells used for cyclic operations at the 216-Z-1A/216-Z-18/216-Z-12 site are summarized in Figure 2-6.

The masses of carbon tetrachloride removed by year, by waste site, and cumulatively are summarized in Table 2-2.

Table 2-1. Summary of Cyclic Soil Vapor Extraction Operations

Operational Period	Number of Months of Rebound Prior to Operational Period	Average Flow Rate[a] (m^3/min)	Number of Wells Operated	Soil Vapor Extraction Wells[b]
216-Z-9 Site				
7/14/97-9/30/97 (3 months)	8	44	19	W15-6L, W15-6U, W15-9L, W15-9U, W15-82, W15-84U, W15-85, W15-86, W15-95U, W15-216L, W15-216U, W15-217, W15-218L, W15-218U, W15-219L, W15-219U, W15-220L, W15-220U, W15-223
7/7/98-9/30/98 (3 months)	9	13	14	W15-6L, W15-9U, W15-9L, W15-82, W15-84U, W15-85, W15-86, W15-95U, W15-216U, W15-216L, W15-217, W15-218U, W15-219L, W15-220L
3/29/99-6/28/99 (3 months)	6	14	14	W15-6L, W15-9U, W15-9L, W15-82, W15-84U, W15-86, W15-95U, W15-217, W15-218U, W15-218L, W15-219L, W15-220U, W15-220L, W15-223
7/20/01-10/01/01 (2 months)	24	7	9	W15-9U, W15-9L, W15-82, W15-84L, W15-86, W15-95L, W15-217, W15-218L, W15-223
4/1/02-7/22/02 (4 months)	6	10	16	W15-6L, W15-9U, W15-9L, W15-82, W15-84L, W15-86, W15-95L, W15-216U, W15-216L, W15-217, W15-218U, W15-218L, W15-219U, W15-219L, W15-220U, W15-220L

Table 2-1. Summary of Cyclic Soil Vapor Extraction Operations

Operational Period	Number of Months of Rebound Prior to Operational Period	Average Flow Rate[a] (m^3/min)	Number of Wells Operated	Soil Vapor Extraction Wells[b]
10/6/04-1/1/04 (1 month)	27	4	7	W15-9U, W15-9L, W15-82, W15-86, W15-95L, W15-217, W15-218L
3/31/05-7/26/05 (4 months)	5	10	10	W15-8U, W15-8L, W15-86, W15-95U, W15-95L, W15-217, W15-218U, W15-218L, W15-220U, W15-220L
7/31/06-9/29/06 (2 months)	12	5	10	W15-8U, W15-8L, W15-9U, W15-9L, W15-48, W15-82, W15-86, W15-95U, W15-95L, W15-217
3/29/07-8/7/07 (4 months)	6	8	14	W15-8U, W15-8L, W15-9U, W15-9L, W15-48, W15-82, W15-86, W15-95U, W15-95L, W15-217, W15-223, C4937, C4938, C5340
7/1/08-10/6/08 (3 months)	12	8	11	W15-8U, W15-9U, W15-9L, W15-32, W15-48, W15-82, W15-86, W15-95U, W15-217, C4937, C5340
4/1/09-9/30/09 (6 months)	6	5	10	W15-8U, W15-9U, W15-9L, W15-48, W15-82, W15-86, W15-217, C4937, C4938, C5340
216-Z-1A/216-Z-18 Site				
7/18/97-9/30/97 (3 months)	8	216-Z-1A: 27	18	W18-6U, W18-6L, W18-7, W18-89, W18-158U, W18-158L, W18-159, W18-163U, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-171U, W18-171L, W18-174, W18-248
		216-Z-18/216-Z-12: 12	6	W18-152, W18-153, W18-246U, W18-246L, W18-252U, W18-252L
3/30/98-6/30/98 (3 months)	6	14	15	W18-6L, W18-7, W18-12, W18-89, W18-96, W18-152, W18-165, W18-167, W18-168, W18-174, W18-246U, W18-248, W18-249, W18-252U, W18-252L
6/30/99-9/30/99 (3 months)	12	14	9	W18-89, W18-158L, W18-165, W18-166, W18-167, W18-168, W18-174, W18-248, W18-249
4/4/01-7/18/01 (4 months)	18	12	19	W18-6U, W18-7, W18-89, W18-96, W18-158L, W18-159, W18-163U, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-171L, W18-174, W18-246U, W18-246L, W18-248, W18-249
7/24/02-10/1/02 (2 months)	12	10	14	W18-6U, W18-6L, W18-7, W18-89, W18-159, W18-165, W18-166, W18-167, W18-168, W18-174, W18-246L, W18-248, W18-249, W18-252L

Table 2-1. Summary of Cyclic Soil Vapor Extraction Operations

Operational Period	Number of Months of Rebound Prior to Operational Period	Average Flow Rate[a] (m^3/min)	Number of Wells Operated	Soil Vapor Extraction Wells[b]
4/1/03-9/30/03 (6 months)	6	11	19	W18-6U, W18-6L, W18-7, W18-89, W18-96, W18-159, W18-163U, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-246U, W18-246L, W18-248, W18-149, W18-252U, W18-252L
4/1/04-9/23/04 (6 months)	6	9	14	W18-6L, W18-7, W18-10L, W18-12, W18-89, W18-163U, W18-165, W18-166, W18-167, W18-168, W18-174, W18-246L, W18-248, W18-252L
7/29/05-10/18/05 (3 months)	9	8	7	W18-89, W18-165, W18-166, W18-167, W18-168, W18-174, W18-248
4/3/06-7/25/06 (4 months)	6	8	3	W18-165, W18-166, W18-174
8/15/07-10/1/07 (2 months)	13	11	7	W18-89, W18-165, W18-167, W18-174, W18-166, W18-168, W18-248
4/1/08-6/23/08 (3 months)	6	10	9	W18-89, W18-150L, W18-165, W18-166, W18-167, W18-168, W18-174, W18-175, W18-248
4/1/09-9/30/09 (6 months)	9	7	9	W18-89, W18-165, W18-166, W18-167, W18-168, W18-174, W18-175, W18-248, W18-253

a. System downtimes of two days or more are not included in the calculation of the average flow rate.

b. All soil vapor extraction well names are prefixed by "299-." Well name suffix (L ["lower"] or U ["upper"]) are informal designations used in this report to identify multiple screens or perforated intervals in the same well; these are shown schematically in Figure 2-2 through Figure 2-4.

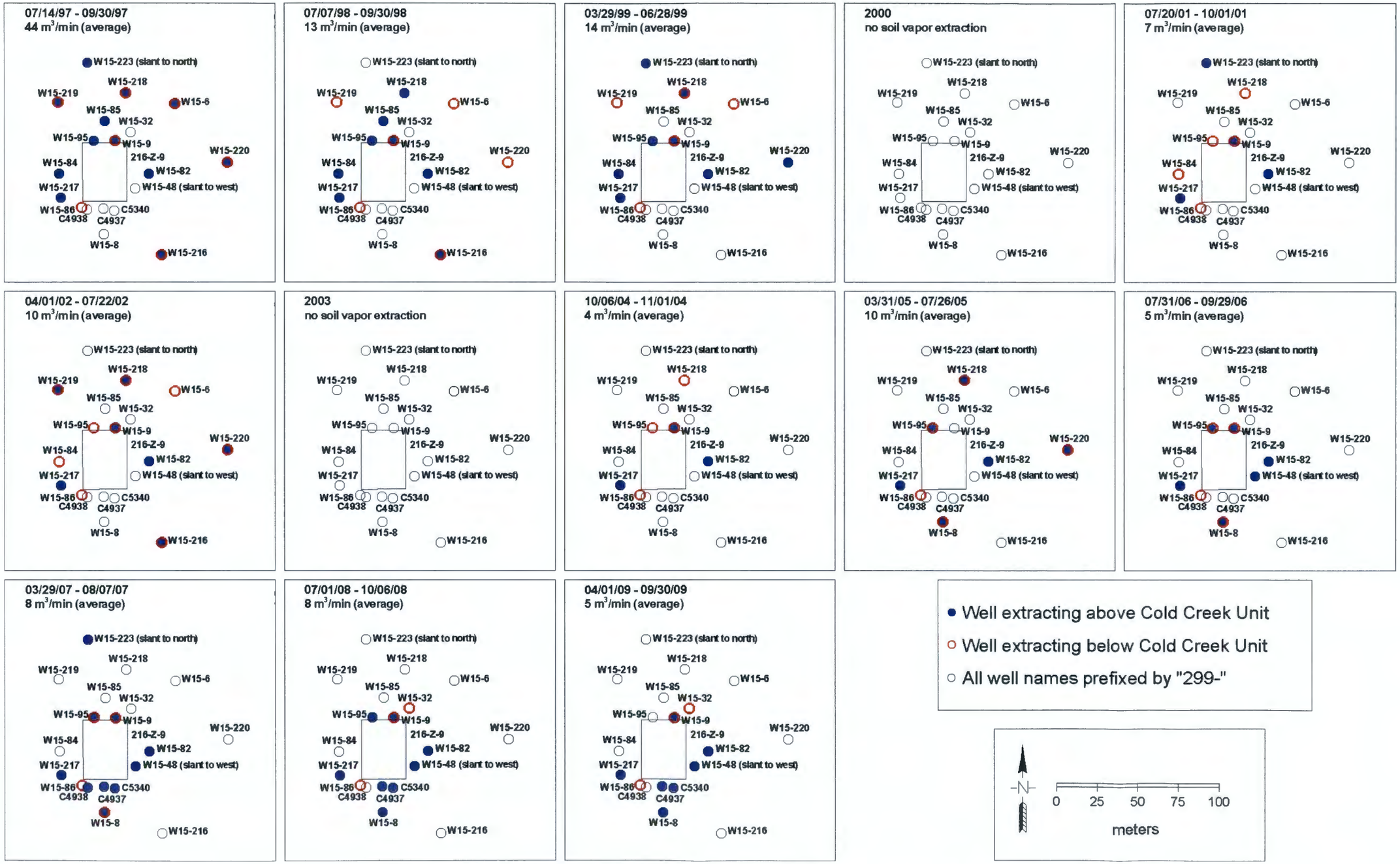
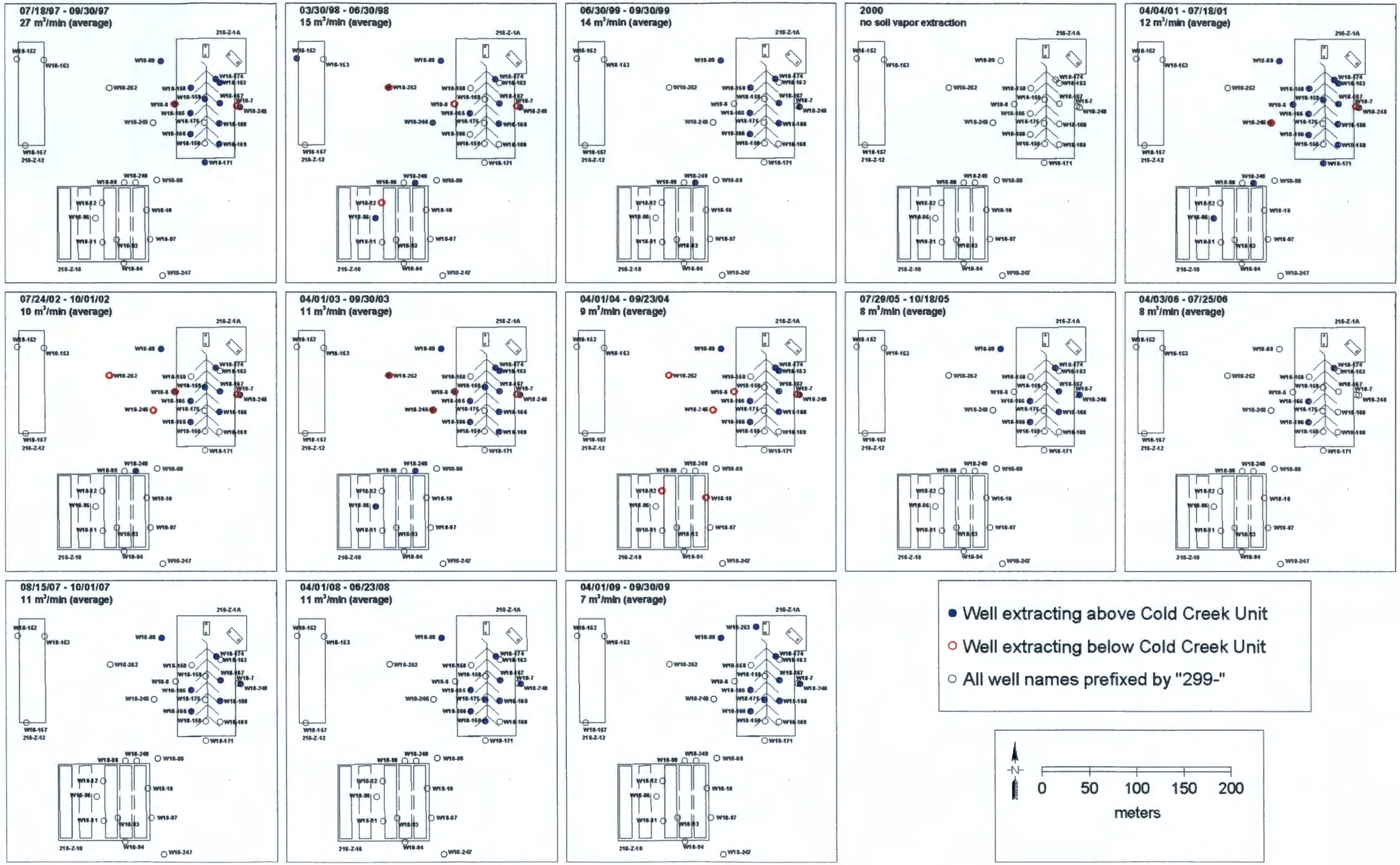


Figure 2-5. Soil Vapor Extraction Wells Operated at the 216-Z-9 Site During Cyclic Operations, 1997–2009



Notes: The wells and average flow rate shown for 1997 are for the 216-Z-1A site only.

Figure 2-6. Soil Vapor Extraction Wells Operated at the 216-Z-1A/216-Z-18/216-Z-12 Site During Cyclic Operations, 1997–2009

Table 2-2. Carbon Tetrachloride Mass Removed Using Active Soil Vapor Extraction

Site	Carbon Tetrachloride Removed Each Calendar Year (kg)																			Total
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
216-Z-9	--	--	1,065	35,029	11,500	3,150	1,239	524	436	0	375	480	0	90	295	97	217	111	103	54,711
216-Z-1A/ 216-Z-18/216-Z-12	140	959	2,541	8,757	7,307	2,581	583	258	375	0	335	164	294	167	67	76	63	105	73	24,845
Yearly Total	**140**	**959**	**3,606**	**43,786**	**18,807**	**5,731**	**1,822**	**782**	**811**	**0**	**710**	**644**	**294**	**257**	**362**	**173**	**280**	**216**	**177**	**79,557**
Cumulative Total	**140**	**1,099**	**4,705**	**48,491**	**67,298**	**73,029**	**74,851**	**75,633**	**76,444**	**76,444**	**77,154**	**77,798**	**78,092**	**78,349**	**78,711**	**78,884**	**79,164**	**79,380**	**79,557**	
Volume of Vapor Recovered Per Year of System Operation (1,000 m^3)																				
216-Z-9	--	--	9	3,064	15,685	12,181	4,856	1,585	1,718	0	745	1,632	0	190	1,109	634	1,493	1,046	991	**46,937**
216-Z-1A/216-Z-18/216-Z-12	47	153	1,418	6,287	15,369	15,740	4,053	1,907	1,837	0	1,776	1,030	2,637	1,678	688	1,228	734	1,152	1,502	**59,235**
Ratio of Carbon Tetrachloride Removed to Volume of Vapor Recovered (kg/[1,000 m^3])																				
216-Z-9	--	--	--	--	--	--	0.26	**0.33**	**0.25**	**0.00**	**0.50**	**0.29**	**0.00**	**0.47**	**0.27**	**0.15**	**0.15**	**0.11**	**0.10**	
216-Z-1A/216-Z-18/216-Z-12	--	--	--	--	--	--	0.14	**0.14**	**0.20**	**0.00**	**0.19**	**0.16**	**0.11**	**0.10**	**0.10**	**0.06**	**0.09**	**0.09**	**0.05**	
Weeks that the SVE System Operated Each Year																				
216-Z-9	--	--	--	--	--	--	11	13	13	0	11	16	0	4	17	9	19	14	26	153
216-Z-1A/ 216-Z-18/216-Z-12	--	--	--	--	--	--	11	13	13	0	15	10	26	18	12	16	7	12	26	179

SVE has been operated in a cyclic, or periodic, mode since 1997. In 1997, the 42.5 m^3/min SVE system was operated at the 216-Z-9 site, and the 28.3 m^3/min SVE system and the 14.2 m^3/min SVE system were operated at the 216-Z-1A/216-Z-18/216-Z-12 site. From 1998 through 2008, the 14.2 m^3/min SVE system was operated at both sites; the other two SVE systems were not operated. In 2009, two new 14.2 m^3/min SVE systems were operated, one at the 216-Z-1A/216-Z-18/216-Z-12 site and one at the 216-Z-9 site.

SVE = soil vapor extraction

2.2.4 Carbon Tetrachloride Soil Vapor Extraction in Fiscal Year 2009

During FY 2009, each of the two 14.2-m^3/min (500-ft^3/min) SVE systems operated from April 1 through September 30. One system was used for extraction at the 216-Z-1A Well Field, and one system was used for extraction at the 216-Z-9 Well Field. At each location, the extraction strategy followed in FY 2009 was similar to that used in previous years.

At the 216-Z-1A site, extraction wells open near or within the CCU in the 216-Z-1A Tile Field were selected to optimize mass removal. The initial extraction wells were 299-W18-165, 299-W18-166, 299-W18-167, 299-W18-168, and 299-W18-174 (Figure 2-1). Two additional wells (299-W18-175 and 299-W18-253) were added on-line on April 29, and two additional wells (299-W18-89 and 299-W18-248) were added on-line on May 4 (Appendix A).

At the 216-Z-9 site, initial on-line wells were selected close to the 216-Z-9 Trench, and wells farther away from the trench were brought on-line as extraction continued. The four initial extraction wells were 299-W15-9U, 299-W15-9L, 299-W15-82, and 299-W15-217 (Figure 2-1). Four additional wells (299-W15-8U, 299-W15-48 [the slant well under the waste site], 299-W15-86, and C5340) were added on-line on May 4, and two additional wells (C4937 and C4938) were added on-line on May 21 (Appendix A).

At the 216-Z-1A/216-Z-18 site, passive SVE systems continued to operate from October 1, 2008, through September 30, 2009 on the following eight wells: 299-W18-6L, 299-W18-7, 299-W18-10L, 299-W18-11L, 299-W18-12, 299-W18-246L, 299-W18-247L, and 299-W18-252L.

2.3 Soil Vapor Extraction System Performance

The operating data that are routinely recorded for each SVE system include carbon tetrachloride concentrations, hours of operation, and system flow rates (Appendix B). These parameters are monitored at the inlet to each SVE system to represent the combined contribution of all extraction wells currently on-line. In addition, samples are periodically collected at individual wells to obtain well-specific data (Appendix C). Flow meters, vacuum/pressure transmitters, and volatile organic monitors are calibrated, and the calibration data are retained and available for review. The VOC monitoring instruments are checked periodically with gas standards. The detection limit for carbon tetrachloride using this instrumentation is 1 part per million by volume (ppmv).

2.3.1 Concentration Changes over Time

Carbon tetrachloride concentrations in the extracted soil vapor have decreased significantly at the 216-Z-9 and 216-Z-1A/216-Z-18/216-Z-12 Well Fields during operation of SVE. Carbon tetrachloride concentrations in soil vapor extracted from the 216-Z-9 Well Field using the SVE systems have declined from approximately 30,000 ppmv at startup in March 1993 to a maximum of 14 ppmv in FY 2009 (Figure 2-7). Carbon tetrachloride concentrations in soil vapor extracted from the 216-Z-1A/216-Z-18/216-Z-12 Well Field using the SVE systems have declined from approximately 1,500 ppmv at startup in February 1992 to a maximum of 9 ppmv in FY 2009 (Figure 2-8).

This decrease in concentrations with continued extraction is typical of SVE operations and represents removal of the volatile contaminant readily available in the swept pore spaces. Extracted contaminant vapor concentration approaches an asymptotic level as the supply of volatile contaminant to the high-flow zone becomes limited by desorption and diffusion of carbon tetrachloride from sediment particles and soil moisture. Diffusion also controls contaminant migration from the pore spaces between sediment particles in the lower permeability/lower flow zones to pore spaces in the higher permeability/higher flow zones.

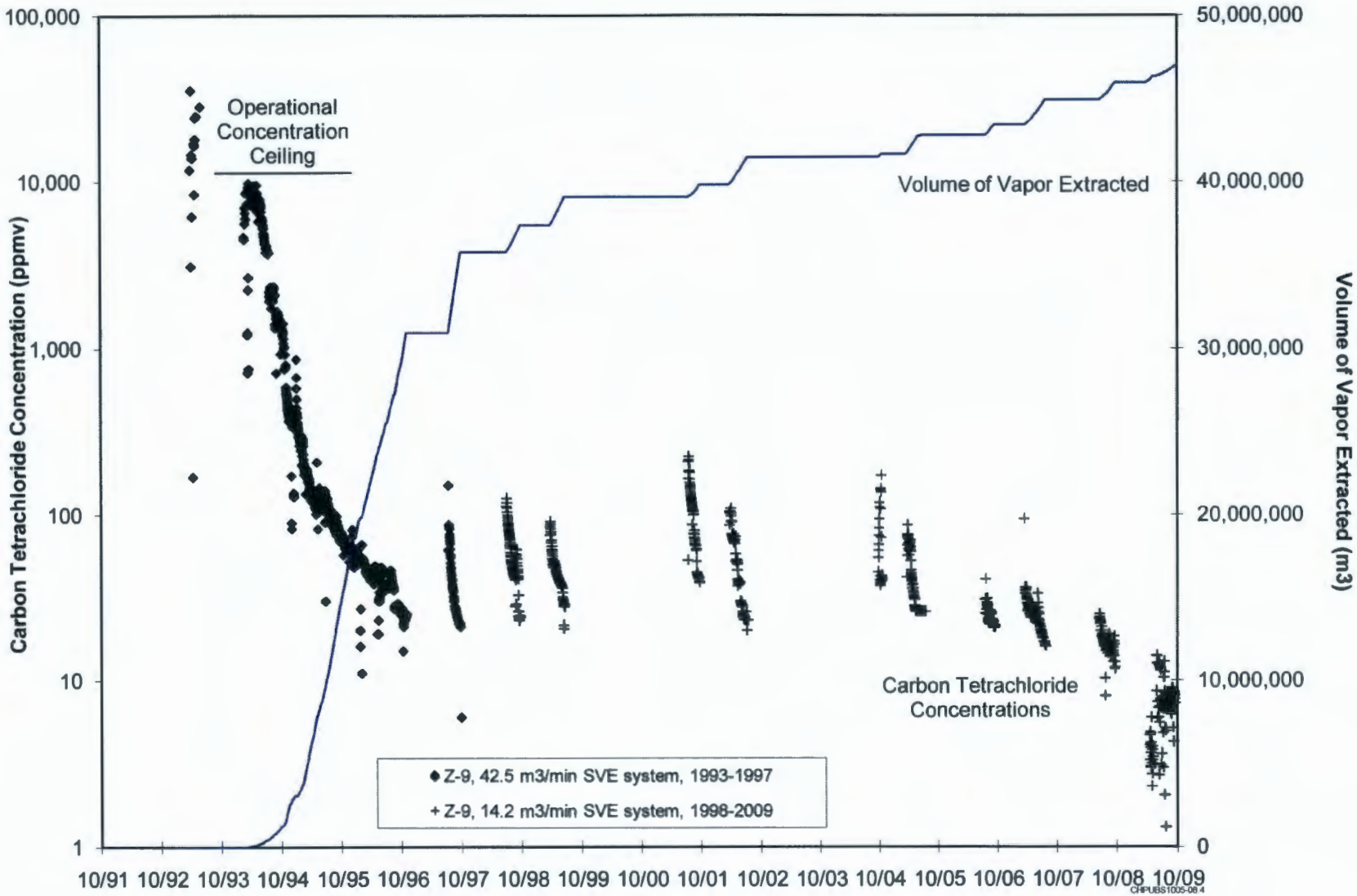


Figure 2-7. Daily Carbon Tetrachloride Concentrations at the 216-Z-9 Site, 1993-2009

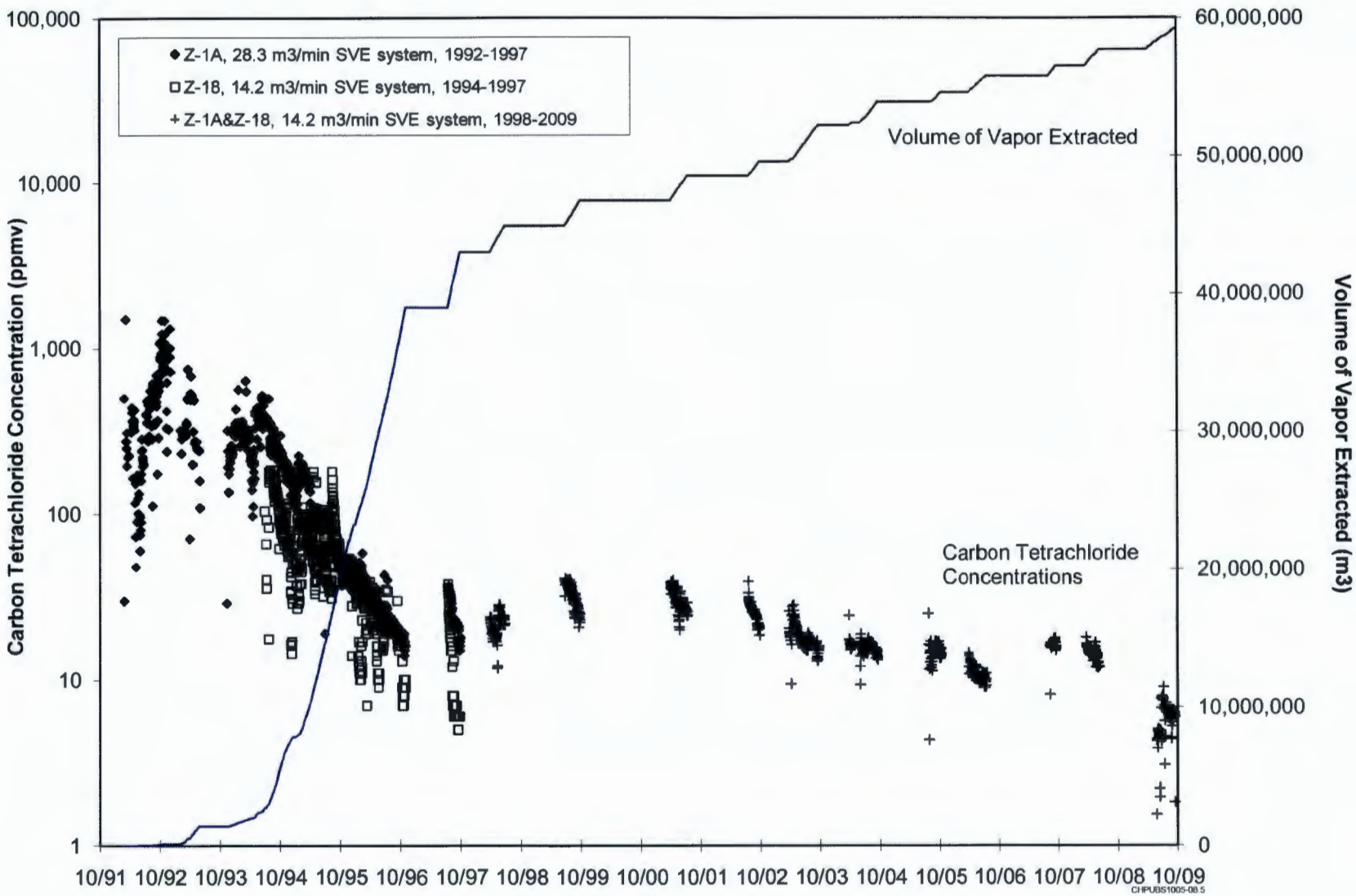


Figure 2-8. Daily Carbon Tetrachloride Concentrations at the 216-Z-1A/Z-18/Z-12 Site, 1992-2009

The maximum concentrations measured in FY 2009 were approximately half of those measured in FY 2008. During initial SVE operations in FY 2009, representative carbon tetrachloride concentrations were not recorded because of equipment problems. Representative data are not available for the first four weeks at the 216-Z-9 site and for the first ten weeks at the 216-Z-1A site. At both sites, the maximum concentrations were measured after approximately three months of operation. Typically, the maximum concentration is measured during the first week of operation. This suggests that if concentration data were available during initial operations, the maximum values measured in FY 2009 would have been larger.

In FY 2009, vapor extracted from the 216-Z-1A site using the active SVE system showed only a slight decrease in carbon tetrachloride concentrations from mid-July, when concentrations were highest, through September (Figure 2-9). A slight decrease in concentrations from July through September was also observed at the 216-Z-9 site (Figure 2-10).

In previous years, the carbon tetrachloride concentrations at the 216-Z-9 site declined to approximately the same asymptotic value at the end of each operating period. In FY 2009, the ending (tailing) concentrations are lower than those of previous years (Figure 2-11). A decrease in tailing concentrations also is evident at the 216-Z-1A site (Figure 2-12). The lower concentrations in recent years are most likely due to an overall reduction in the mass of carbon tetrachloride available for extraction at these locations. Extending the duration of the operating period at each location in FY 2009 also likely contributed to the decrease in tailing concentrations. During SVE operations each year, extraction wells are added on-line and others are taken off-line (Table 2-1). In addition, the length of time prior to initiation of operations for concentrations to rebound varies from year to year. These differences in on-line wells and rebound times also contribute to differences in the relative magnitudes of the extracted carbon tetrachloride concentrations shown in Figure 2-11 and Figure 2-12.

Although the initial (1992 through 1993) carbon tetrachloride concentrations were an order of magnitude higher at the 216-Z-9 site (30,000 ppmv) than at the 216-Z-1A site (1,500 ppmv), the concentrations at the two sites at the end of FY 2009 operations were similar. Carbon tetrachloride concentrations in extracted soil vapor were approximately 6 to 8 ppmv at both well fields at the end of September 2009 when active SVE operations ended in FY 2009.

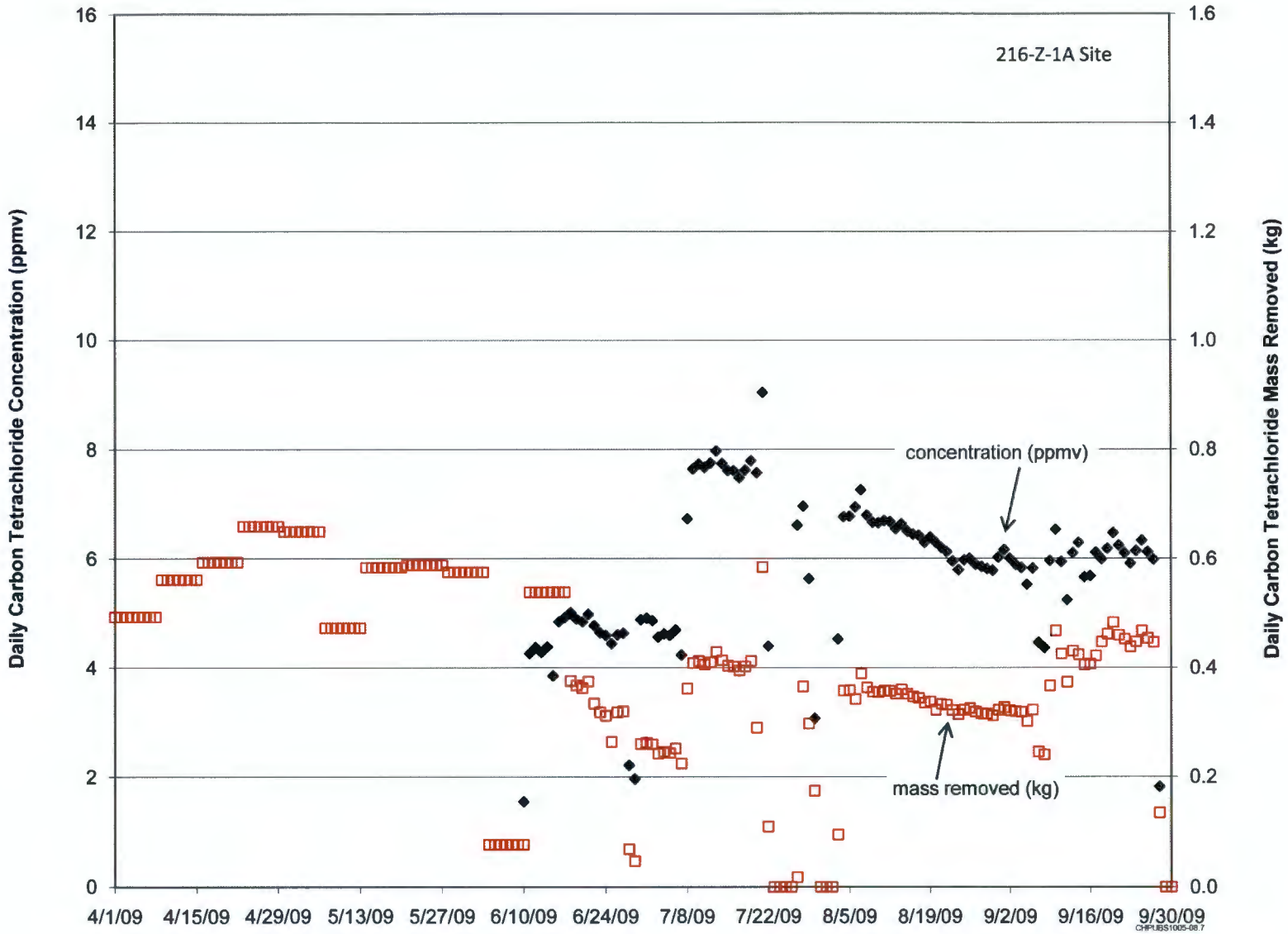


Figure 2-9. Daily Carbon Tetrachloride Concentrations and Mass Removed, 216-Z-1A Site, Fiscal Year 2009

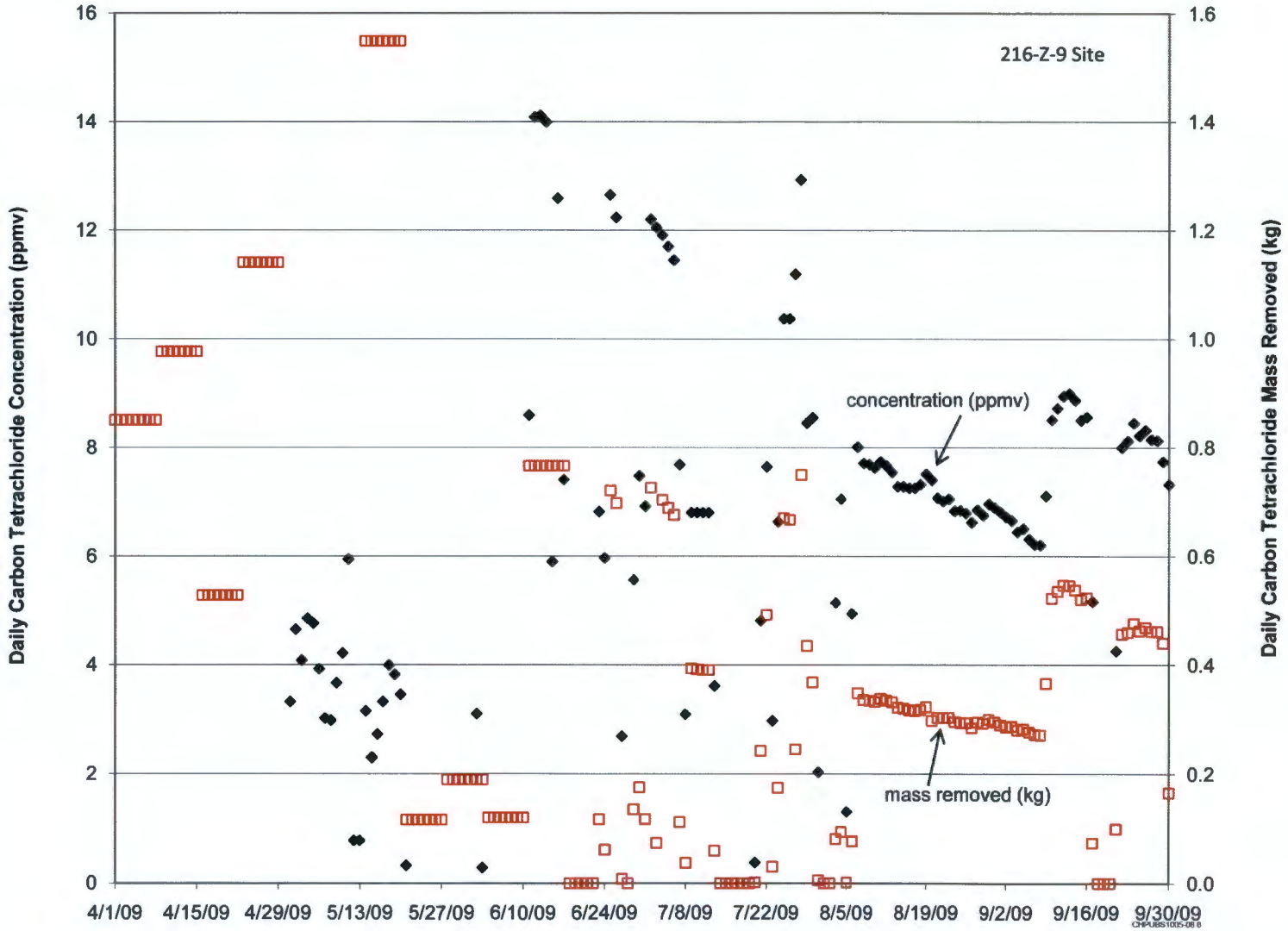


Figure 2-10. Daily Carbon Tetrachloride Concentrations and Mass Removed, 216-Z-9 Site, Fiscal Year 2009

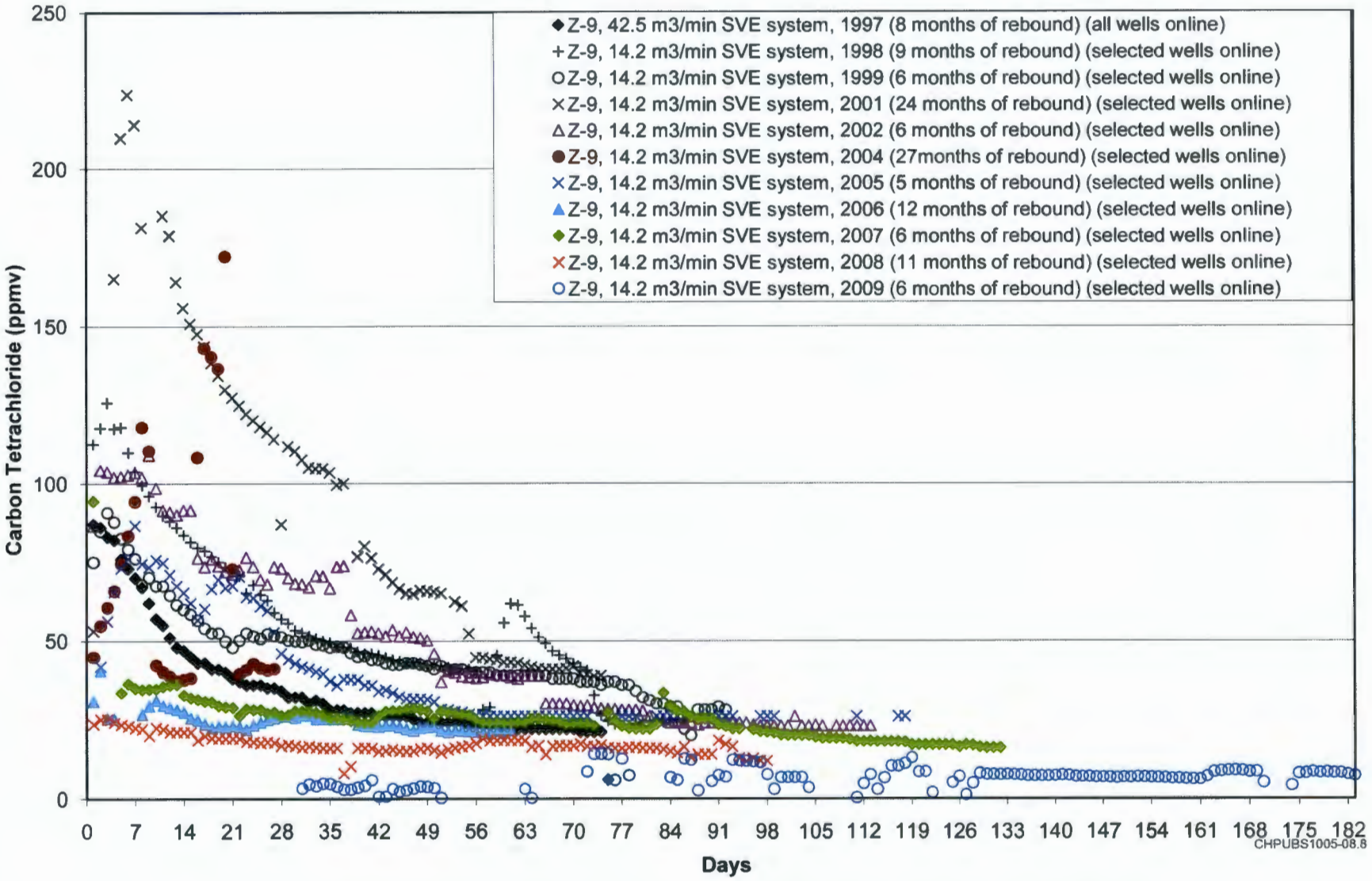


Figure 2-11. Carbon Tetrachloride Concentrations in Vapor Extracted from the 216-Z-9 Site, 1997-2009

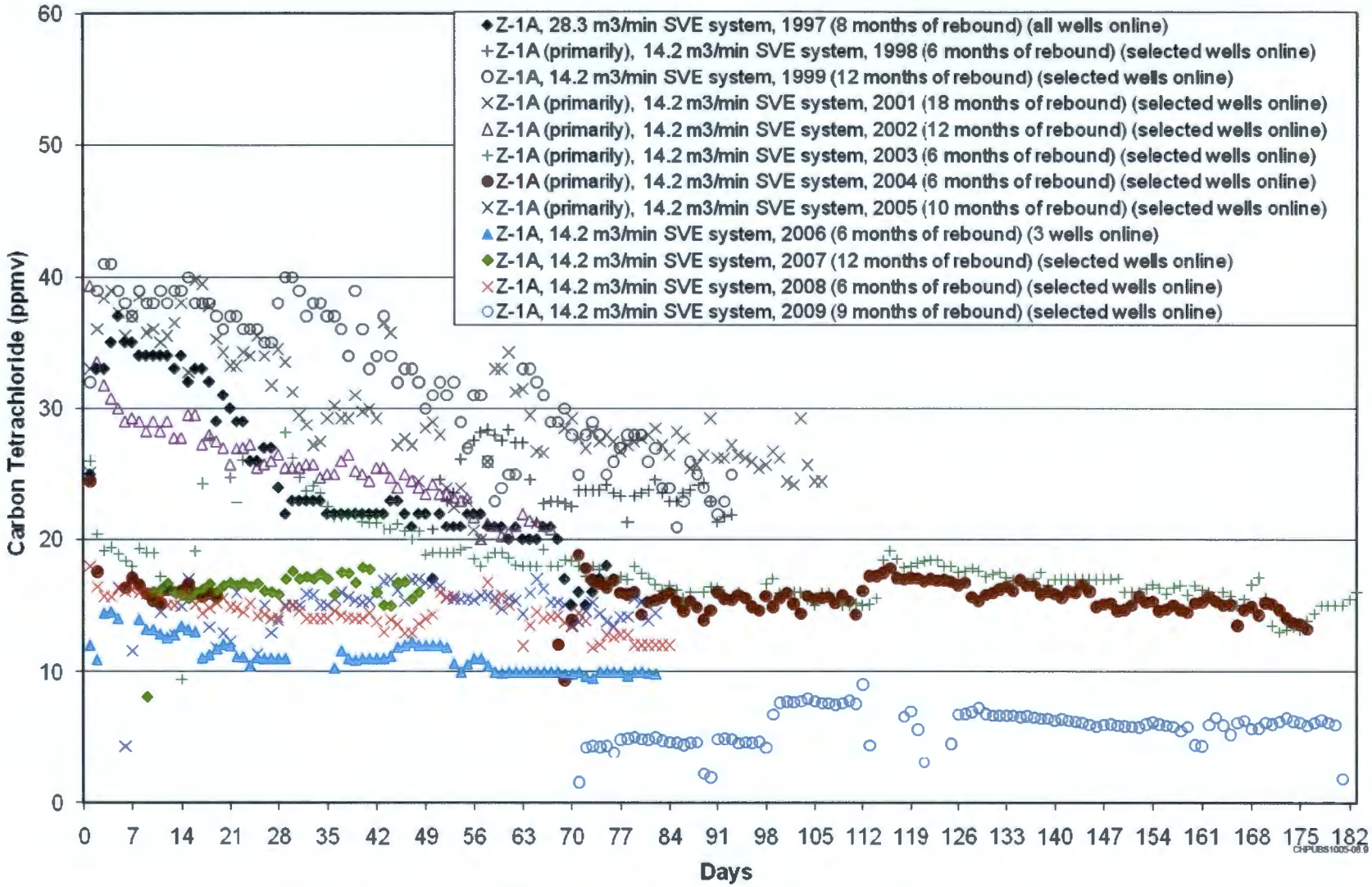


Figure 2-12. Carbon Tetrachloride Concentrations in Vapor Extracted from the 216-Z-1A Site, 1997-2009

2.3.2 Volume of Soil Vapor Treated

For each SVE system, the volume of soil vapor processed was calculated using the hours that the system operated and the measured flow rates. The flow rate measured at the SVE system represents the combined flow from all on-line wells and may change as the selection of on-line wells changes. For a given applied vacuum, the flow produced from each well is a function of the air permeability of the soil, open area of the screened or perforated interval, and well diameter.

During FY 2009 operations, 2.5 million m^3 of extracted vapor were treated (1.5 million m^3 were extracted from 216-Z-1A, and 1 million m^3 were extracted from 216-Z-9). Between April 1991 (pilot testing) and September 2009, 106.2 million m^3 of soil vapor were extracted and treated. This volume was extracted from two well fields, with 46.9 million m^3 extracted from the 216-Z-9 Well Field and 59.2 million m^3 extracted from the 216-Z-1A/216-Z-18/216-Z-12 Well Field.

The flow rates at individual extraction wells were estimated by apportioning the flow rates measured at the SVE systems among the on-line wells (Appendix A of BHI-00720). To estimate the flow rate at each well on each day of operation, the system flow rate was multiplied by the ratio of the well's open area to the sum of the open areas for all of the wells operating on that system on that particular day. The daily flow rates and the number of operating hours were then used to estimate the cumulative flow from each extraction well. At the 216-Z-9 Well Field, an estimated 31.2 million m^3 of soil vapor were extracted from wells open above the CCU (Table 2-3), and 15.7 million m^3 of soil vapor were extracted from wells open below the CCU (Table 2-4). For the 216-Z-1A/216-Z-18/216-Z-12 Well Field, an estimated 38.7 million m^3 of soil vapor were extracted from wells open above the CCU (Table 2-3), and 20.5 million m^3 were extracted from wells open below the CCU (Table 2-4).

Since system startup, 75 pore volumes of soil vapor have been extracted by the SVE systems above the CCU in the 216-Z-9 area, based on an average lateral zone of influence of 55,000 m^2 (592,000 ft^2) above the CCU in the 216-Z-9 area; an average Hanford formation thickness of 38 m (125 ft); an average porosity of 20 percent; and an assumed uniform distribution of flow. Similarly, for the 216-Z-1A/216-Z-18/216-Z-12 area, based on an average lateral zone of influence of 155,000 m^2 (1,668,000 ft^2), 33 pore volumes of soil vapor have been extracted by the SVE systems above the CCU.

Based on an average lateral zone of influence of 40,000 m^2 (431,000 ft^2) below the CCU in the 216-Z-9 area, an average Ringold Unit E thickness of 21 m (69 ft) in the unsaturated zone, an average porosity of 20 percent, and an assumed uniform distribution of flow, 93 pore volumes of soil vapor have been extracted by the SVE systems below the CCU. Similarly, for the 216-Z-1A/216-Z-18/216-Z-12 site, based on an average lateral zone of influence of 100,000 m^2 (1,076,000 ft^2), 49 pore volumes of soil vapor have been extracted by the SVE systems below the CCU.

2.3.3 Carbon Tetrachloride Mass Removed

The mass of carbon tetrachloride removed from each well field was calculated using the measured flow, concentration, and hours of operation data (Appendix B). In FY 2009, approximately 177 kg (390 lb) of carbon tetrachloride were removed from the vadose zone using the SVE system. Of the 177 kg (390 lb), approximately 103 kg (228 lb) of carbon tetrachloride were removed from the 216-Z-9 site and 73 kg (162 lb) were removed from the 216-Z-1A site (Table 2-2).

In the absence of representative carbon tetrachloride concentrations measured at the inlet to the SVE systems during initial operations in FY 2009 (section 2.3.1), the characterization data collected weekly at individual on-line extraction wells was used to estimate the mass removed.

Table 2-3. Volume of Vapor Extracted from Each Extraction Well Above the Cold Creek Unit Between April 1991 and September 2009

216-Z-9 Wells, March 1993-September 2009	Extracted Vapor (1,000 m^3)	216-Z-18/ 216-Z-12 Wells, February 1992-September 2009	Extracted Vapor (1,000 m^3)	216-Z-1A Wells April 1991-September 2009	Extracted Vapor (1,000 m^3)
299-W15-6U	150	299-W18-10U	660	299-W18-6U	190
299-W15-8U	190	299-W18-93	10	299-W18-87L	40
299-W15-9U	1,260	299-W18-94	0	299-W18-87M	20
299-W15-48	610	299-W18-96	450	299-W18-87U	40
299-W15-82	6,260	299-W18-97	230	299-W18-89	8,950
299-W15-84U	2,490	299-W18-98	0	299-W18-150L	260
299-W15-85	2,630	299-W18-99	160	299-W18-150M	40
299-W15-95U	1,010	299-W18-152	1,770	299-W18-150U	40
299-W15-216U	590	299-W18-153	480	299-W18-158L	230
299-W15-217	6,040	299-W18-246U	780	299-W18-158M	0
299-W15-218U	3,420	299-W18-249	800	299-W18-158U	820
299-W15-219U	2,820	299-W18-252U	1,290	299-W18-159	950
299-W15-220U	2,100			299-W18-163L	170
299-W15-223	1,600			299-W18-163M	10
C4937	10			299-W18-163U	520
C4938	10			299-W18-165	2,860
C5340	20			299-W18-166	1,660
				299-W18-167	2,220
				299-W18-168	2,270
				299-W18-169	150
				299-W18-171L	500
				299-W18-171M	390
				299-W18-171U	460
				299-W18-174	5,310
				299-W18-175	460
				299-W18-248	3,310
				299-W18-253	180
Total	**31,220**	**Total**	**6,640**	**Total**	**32,060**

Table 2-4. Volume of Vapor Extracted from Each Extraction Well Below the Cold Creek Unit Between April 1991 and September 2009

216-Z-9 Wells, March 1993 - September 2009	Extracted Vapor (1,000 m^3)	216-Z-18/ 216-Z-12 Wells, February 1992 - September 2009	Extracted Vapor (1,000 m^3)	216-Z-1A Wells April 1991 - September 2009	Extracted Vapor (1,000 m^3)
299-W15-6L	2,430	299-W18-10L*	2,720	299-W18-6L*	2,360
299-W15-8L	160	299-W18-11L*	240	299-W18-7*	8,880
299-W15-9L	1,460	299-W18-12*	1,040		
299-W15-32	90	299-W18-246L*	1,650		
299-W15-84L	230	299-W18-252L*	3,650		
299-W15-86	1,100				
299-W15-95L	820				
299-W15-216L	1,190				
299-W15-218L	3,880				
299-W15-219L	2,850				
299-W15-220L	1,520				
Total	**15,720**	**Total**	**9,290**	**Total**	**11,240**

* Based on soil vapor extraction using the active soil vapor extraction systems; the volume of vapor extracted using the passive soil vapor extraction systems is not included.

Between April 1991 (when the pilot test was conducted) and September 2009, approximately 79,557 kg (175,391 lb) of carbon tetrachloride were removed from the vadose zone. Of that total, 54,711 kg (120,616 lb) were removed from the 216-Z-9 Well Field and 24,845 kg (54,773 lb) were removed from 216-Z-1A/216-Z-18/216-Z-12 Well Field (Table 2-2).

Carbon tetrachloride removal rates have decreased significantly between SVE startup and FY 2009 (Figure 2-13 and Figure 2-14; Table 2-2). Some of the variability in mass removed each year during cyclic operations (i.e., FY 1998 through FY 2009) may be attributed to length of time for rebound, duration of SVE operations, and/or location and number of wells used for extraction. However, mass removal rates are expected to decline as extraction continues and contaminant mass is removed from the subsurface.

The SVE system efficiencies were evaluated for FY 1998 through FY 2009 by comparing the mass of carbon tetrachloride removed per volume of vapor extracted from the vadose zone (Table 2-2). At both the 216-Z-9 and 216-Z-1A sites, SVE system efficiencies have generally decreased during the 11 years of cyclic operations (Figure 2-15). The two significant increases in SVE efficiency at the 216-Z-9 site occurred during extraction following extended periods of rebound.

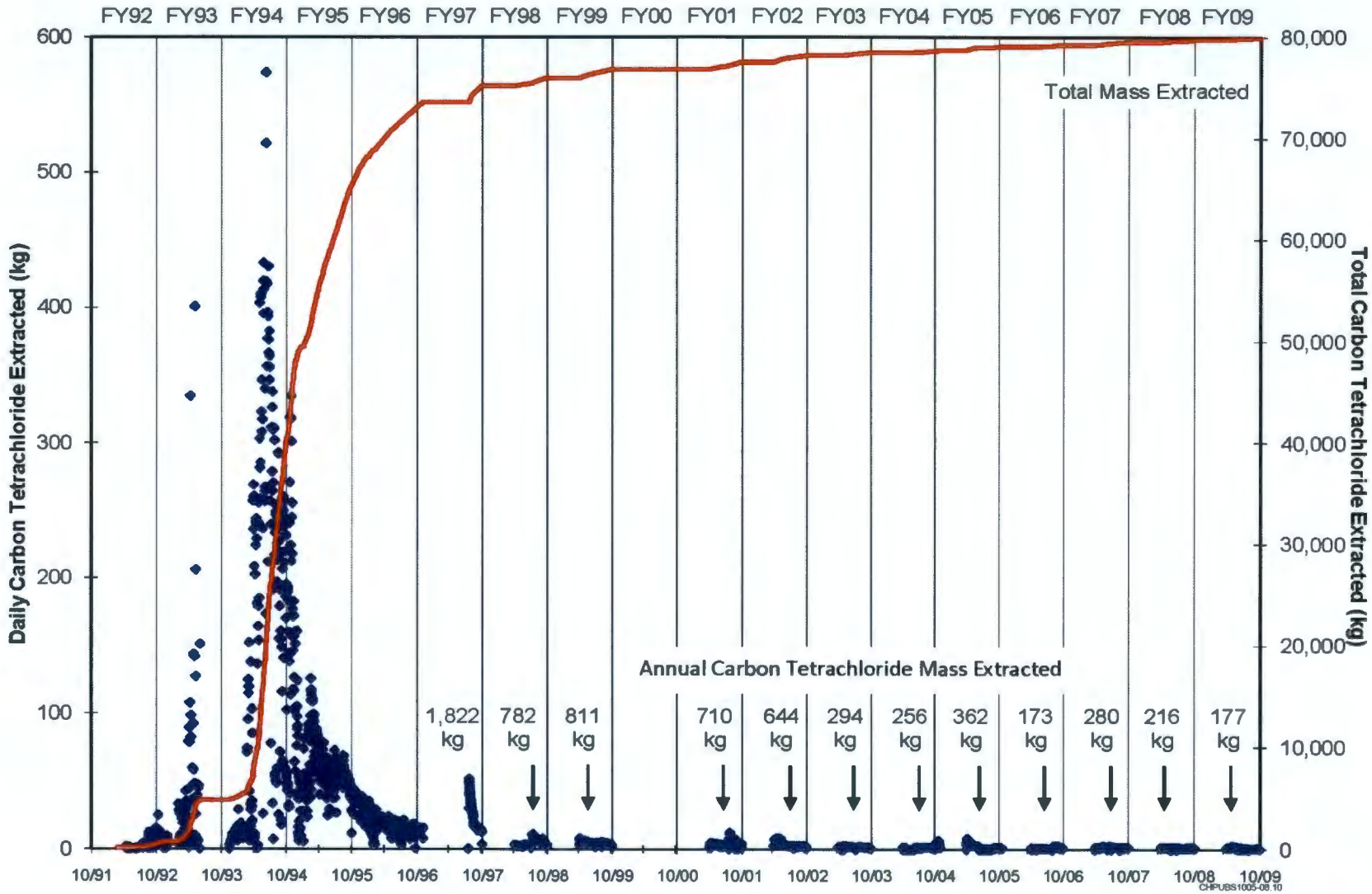


Figure 2-13. Daily Carbon Tetrachloride Mass Extracted, Fiscal Years 1992-2009

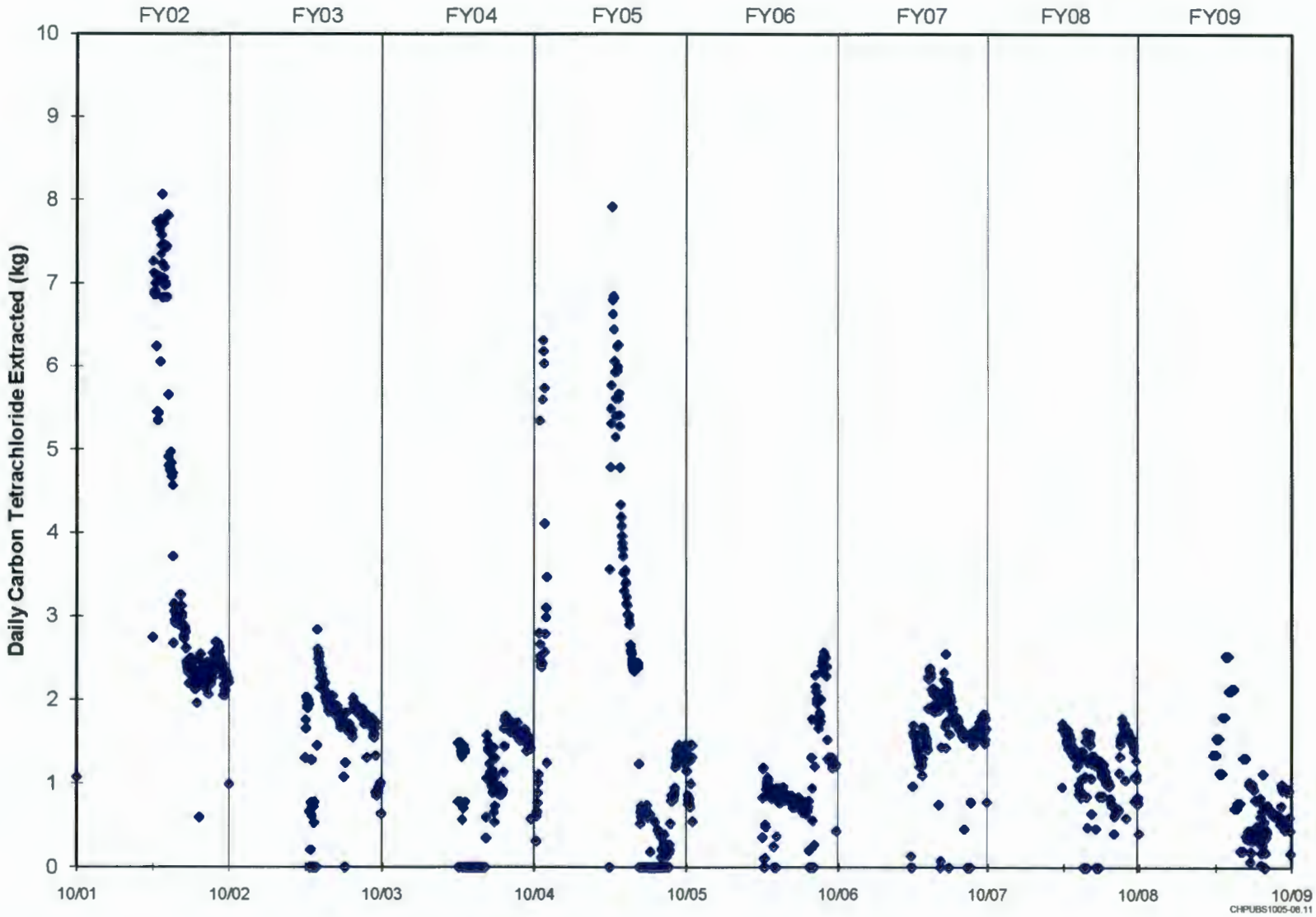
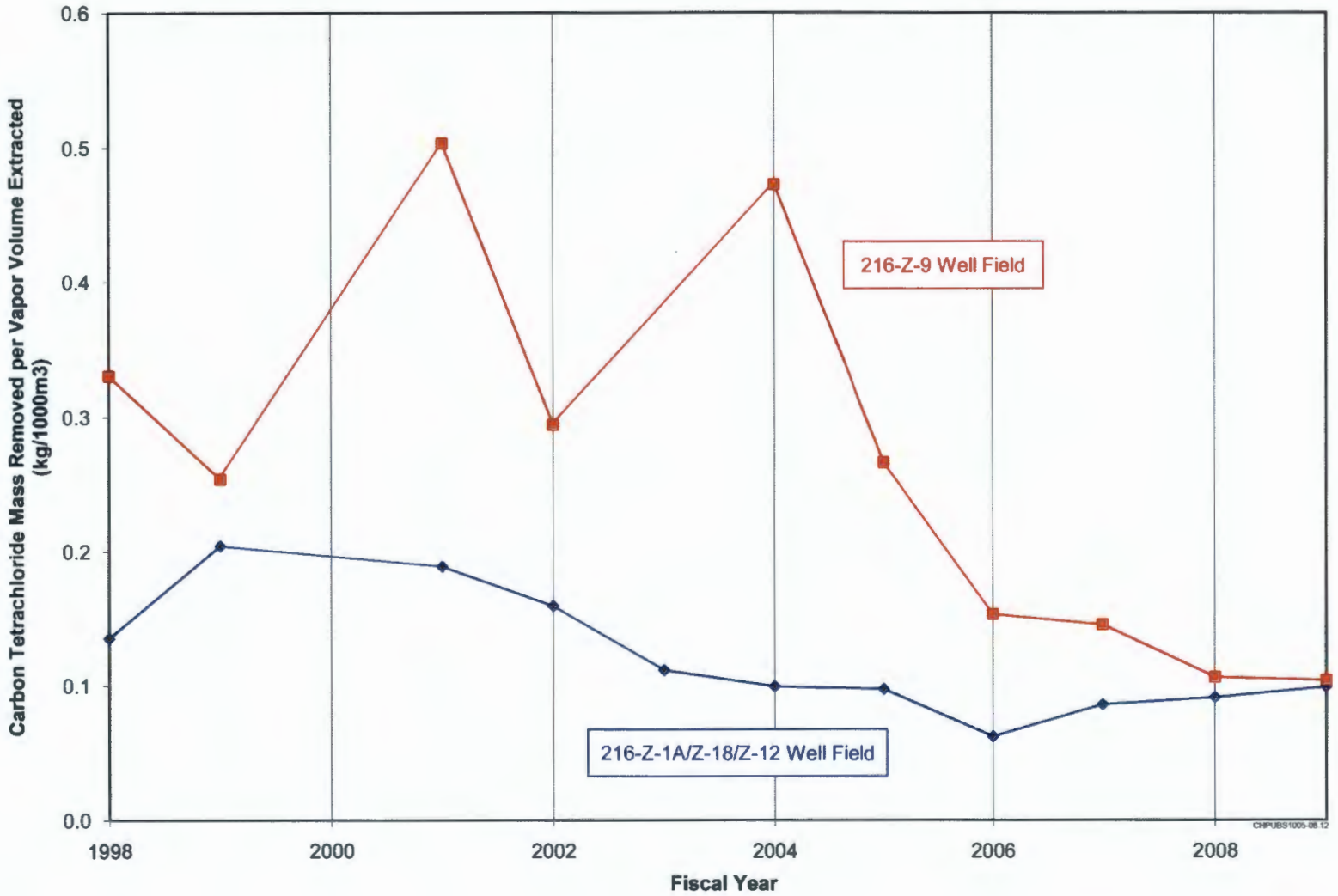


Figure 2-14. Daily Carbon Tetrachloride Mass Extracted, Fiscal Years 2002-2009



Notes:

The soil vapor extraction system was off-line in fiscal year 2000.
Extraction was not conducted at the 216-Z-9 Well Field in 2003 due to site characterization activities.

Figure 2-15. Carbon Tetrachloride Mass Removed Per Volume of Vapor Recovered from the Vadose Zone, Fiscal Years 1998-2009

Carbon tetrachloride concentrations were monitored at the eight passive wells in FY 2009 (Appendix D). These monthly concentrations were used to calculate the mass removed from each well. This calculation assumes the following.

- The wells exhale 50 percent of the time.
- During outflow, the average flow rate is one-half of the maximum flow rate.
- During outflow, the average concentration is one-half of the maximum concentration.
- The concentrations measured each month were maximum values.

The maximum flow values were the same as those used in the FY 2001 calculation (BHI-00720).

The mass of carbon tetrachloride removed using the eight passive SVE wells in FY 2009 is estimated to be approximately 5 kg (11 lb), which is similar to the mass estimated to be removed using these wells in FY 2006, FY 2007, and FY 2008 (Table 2-5).

Table 2-5. Carbon Tetrachloride Mass Removed Using Passive Soil Vapor Extraction

	Carbon Tetrachloride Mass Removed Each FY (kg)									
Well	**FY 2000**	**FY 2001**	**FY 2002**	**FY 2003**	**FY 2004**	**FY 2005**	**FY 2006**	**FY 2007**	**FY 2008**	**FY 2009**
299-W18-6L	0.8	7.5	4.3	2.8	3.0	2.9	0.5	1.0	1.1	0.6
299-W18-7	2.5	2.5	2.5	3.8	3.5	2.4	2.0	2.1	2.1	1.5
299-W18-10L	0.5	0.9	0.6	0.9	0.8	0.6	1.0	0.6	0.7	0.7
299-W18-11L	0.2	1.1	0.7	0.9	0	0.4	0.4	0.2	0.3	0.3
299-W18-12	2.0	2.5	0.7	1.2	1.6	0.5	0.3	0.4	0.1	0.2
299-W18-246L	2.3	1.7	0.4	1.5	2.3	1.4	0.1	0.5	0.5	0.5
299-W18-247L	0.3	0.7	0.4	0.5	0.4	0.4	0.2	0.2	0.2	0.2
299-W18-252L	1.2	2.8	1.6	1.7	1.6	0.9	0	0.3	0.4	0.5
Yearly Total	**10**	**20**	**11**	**13**	**13**	**9**	**5**	**5**	**5**	**4**
Cumulative Total	**10**	**30**	**41**	**54**	**67**	**77**	**81**	**86**	**91**	**96**

FY = fiscal year

2.3.4 System Operation Downtime

The availability of each SVE system is evaluated by comparing the amount of actual operating time to the potential amount of operating time (scheduled outages are excluded from this calculation). Because operation of the systems is most difficult to maintain during the winter months, temporary suspension of operation has continued each winter since 1998. This practice also allows a rebound period each year for concentrations to increase in the vapor phase in the higher flow zones.

In FY 2009, the combined availability of the two SVE systems was 82 percent (Figure 2-16). The availability of the SVE system at the 216-Z-9 site was 76 percent, and the availability of the SVE system at the 216-Z-1A site was 89 percent.

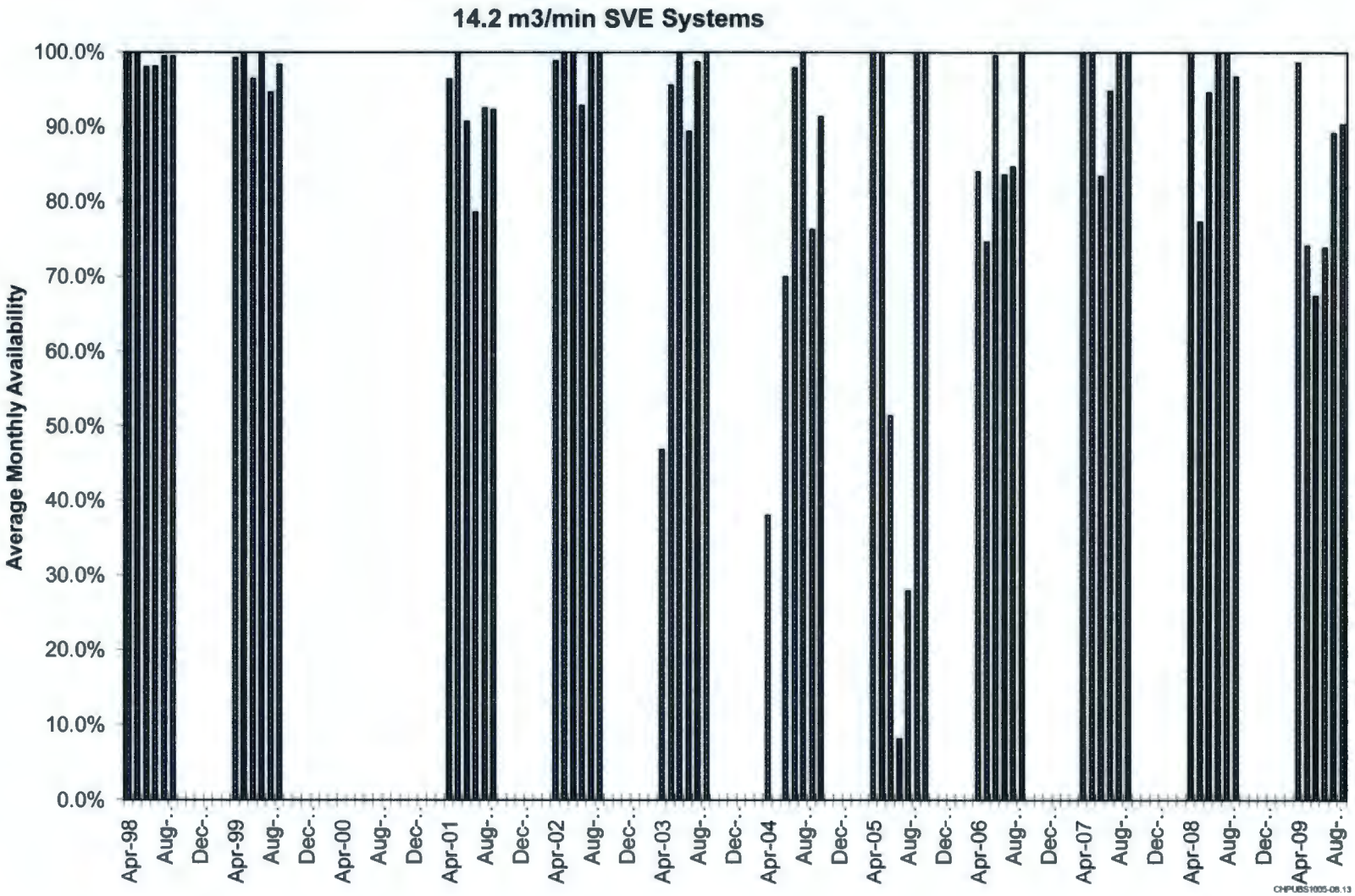


Figure 2-16. Soil Vapor Extraction System Availability During Cyclic Operations, 1998-2009

2.4 Analysis of Cyclic Soil Vapor Extraction Operational Data

Recent research associated with vadose zone transport processes for chlorinated organics (e.g., carbon tetrachloride) has provided a basis to examine the flux of vadose zone contaminants across the water table under conditions relevant to the 200-PW-1 OU (Truex et al., 2009). Additionally, the dataset from operation of the 200-PW-1 14.2-m^3/min (500-ft^3/min) SVE system in a cyclic mode (e.g., on for 6 months and off for 6 months) from 1997 through 2008 is being analyzed to estimate the contaminant mass flux of carbon tetrachloride remaining within the vadose zone (e.g., release of carbon tetrachloride from sorbed phases into the vapor phase where it can transport to the groundwater) and how this mass flux changed over time. Using this analysis, an estimate of vadose zone contaminant mass flux can be applied using an approach based on the method described in Truex et al. (2009) to evaluate the future impact of the remaining vadose zone contamination on the groundwater at the Hanford Site. This analysis is anticipated to provide the following results, which will be used in the FS for the 200-PW-1 OU to support the evaluation of remedial alternatives:

- Documentation of the decline in SVE mass extraction in a way that can be used to predict likely future carbon tetrachloride extraction given the same operating strategy
- An estimate of how the current carbon tetrachloride contamination in the vadose zone is impacting the groundwater
- Proposal of a technically defensible strategy for determining when the SVE remediation can be discontinued without future impact of vadose zone carbon tetrachloride contamination on the ability to reach groundwater cleanup goals.

3 Soil Vapor Monitoring

Non-operational soil vapor monitoring data are collected at wells and probes that are not on-line to the SVE system. The objectives of monitoring the non-operational wells and probes are as follows:

- To measure carbon tetrachloride concentrations and trends near the vadose/atmosphere and vadose/groundwater interfaces to evaluate whether non-operation of the SVE system is negatively impacting the atmosphere or groundwater
- To be cognizant of carbon tetrachloride concentrations and trends near the CCU to provide an indication of concentrations that can be expected during restart of SVE operations and to support selection of on-line wells

For each well field, the period of rebound begins when SVE operations are temporarily suspended.

Carbon tetrachloride concentrations rebound during periods of non-operation as a result of carbon tetrachloride accumulating in the pore spaces after apparent diffusion from sediment micropores, soil moisture, residual dense nonaqueous phase liquid (DNAPL), and/or low-permeability zones. When operations resume, initial extracted carbon tetrachloride concentrations are higher than the carbon tetrachloride concentrations at the previous shutdown. These initial concentrations will generally be lower than the initial concentrations following previous periods of rebound. However, the non-operational duration for each well field varies from year to year, which also affects the rebound concentrations.

3.1 Fiscal Year 2009 Monitoring

Soil vapor monitoring at off-line wells and probes was conducted in FY 2009 using sampling methods similar to those developed for the rebound study in FY 1997 (BHI-01105). A low-flow (0.8-L/min [0.2-gal/min]) sampling pump was used to draw soil vapor samples from wells and probes into a 1-L (0.3-gal) Tedlar® bag for analysis using a Brüel & Kjaer™ (B&K™) multi-gas monitor. Two purge volumes were drawn before the representative sample was collected. At the wells, a tube was lowered to the target depth where the casing is perforated to minimize the volume of air to be purged. A metal filter attached to the end of the tube also served as a weight. Each well equipped with a sampling tube remained sealed at the well head throughout the monitoring period and allowed access to the sampling tubes in the wells.

Soil vapor samples were collected monthly from approximately 30 off-line probes and wells, including the 8 passive SVE wells. As in previous years, soil vapor samples were analyzed primarily to monitor for carbon tetrachloride. However, samples were also analyzed for chloroform, methylene chloride, methyl ethyl ketone, and water vapor because the B&K™ multi-gas analyzer has been configured to monitor these constituents in support of routine operations. The passive monitoring data for FY 2009 are included in Appendix D; the soil vapor monitoring data for FY 2009 are included in Appendix E. Both sets of data are included in the FY 2009 rebound data evaluation.

Based on monitoring during FY 2009, the following maximum carbon tetrachloride soil vapor concentrations were detected in the vadose zone at the 216-Z-9 and 216-Z-1A/216-Z-18 sites.

- The maximum concentration detected near the ground surface (between 2 and 10 m [7 and 33 ft] bgs) was 7 ppmv at a depth of 8 m (25 ft) in the 216-Z-1A/216-Z-18 Well Field (at probe CPT-32). At the

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216-Z-9 Well Field, the maximum concentration detected near the ground surface was 4 ppmv at a depth of 3 m (10 ft) (at probe CPT-17).

- Near the groundwater (between 53 and 66 m [175 and 217 ft] bgs), the maximum concentration was 14 ppmv at a depth of 54.9 m (180 ft) bgs at the 216-Z-9 site (at Well 299-W15-8L). At the 216-Z-1A Well Field, the maximum concentration detected near groundwater was 17 ppmv at a depth of 60 m (197 ft) bgs at Well 299-W18-7 (Appendix D).
- Near the CCU, at depths ranging from 25 to 44 m (83 to 144 ft) bgs, the maximum concentration detected was 228 ppmv at a depth of 26.5 m (87 ft) (at probe CPT-28), approximately 90 m (295 ft) south of the 216-Z-9 Trench. This location may be beyond the zone of influence of the SVE system. Within the 216-Z-9 well field, the maximum carbon tetrachloride concentration detected near the CCU was 50 ppmv at a depth of 35 m (114 ft) bgs (at Well 299-W15-217). At the 216-Z-1A Well Field, the maximum carbon tetrachloride concentration detected near the CCU was 186 ppmv at a depth of 32 m (105 ft) bgs (at Well 299-W18-167).
- The maximum carbon tetrachloride concentrations detected in the vadose zone overlying the CCU (between 11 and 23 m [35 and 75 ft] bgs) were 327 ppmv and 397 ppmv at a depth of 20 m (65 ft) bgs on the south side of the 216-Z-9 Trench (Well C4938 and Well C4937, respectively). These relatively elevated carbon tetrachloride soil vapor concentrations are associated with a silt layer that contained DNAPL carbon tetrachloride during initial characterization (Section 3.2 of SGW-40456, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Fiscal Year 2008*).

For each period of rebound monitoring since FY 1997, the maximum rebound concentrations have been associated with fine-grained layers near the source units (Figure 3-1). In most years, the fine-grained layers exhibiting significant rebound were those near the CCU. However, in FY 2008 and FY 2009, the maximum rebound concentrations have been associated with the silt layer at a depth of 20 m (65.6 ft) on the south side of the 216-Z-9 Trench. FY 2008 was the first year that this silt layer was monitored.

Because carbon tetrachloride concentrations did not increase significantly at the near-surface probes, temporarily suspending operation of the SVE system appears to have caused minimal detectable vertical transport of carbon tetrachloride through the soil surface to the atmosphere. Because carbon tetrachloride concentrations did not increase significantly near the water table during this time, temporarily suspending operation of the SVE systems appears to have had no negative impact on groundwater quality. Soil vapor monitoring results for FY 2009 suggest that the fine-grained layers near the source sites are the most likely source zones for the observed carbon tetrachloride vapor.

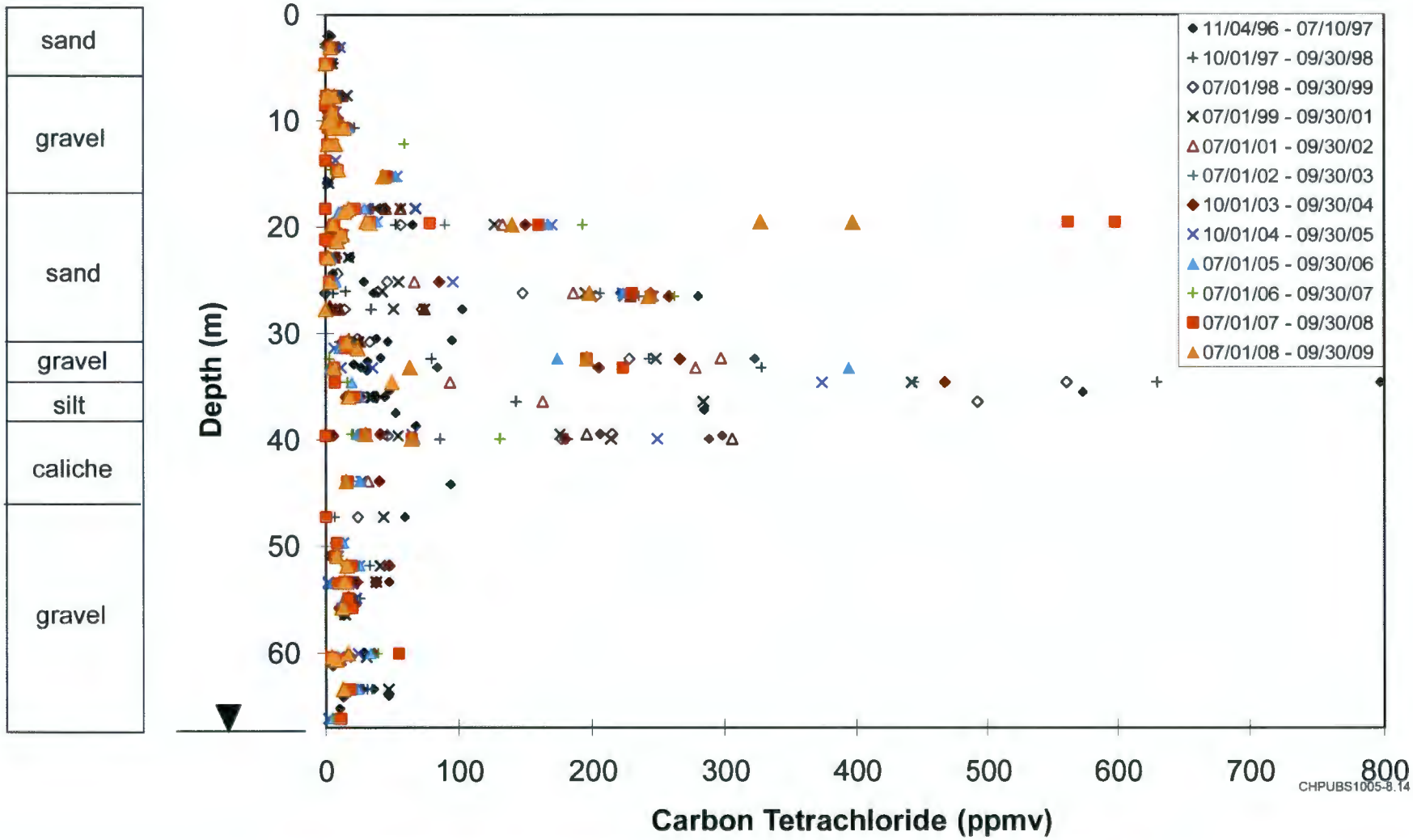

Figure 3-1. Maximum Carbon Tetrachloride Rebound Concentrations, Fiscal Years 1997-2009

4 Status of Expedited Response Action

The purpose of the expedited response action (ERA) is described as follows (Smith and Stanley, 1992, "Action Memorandum: Expedited Response Action Proposal for 200 West Area Carbon Tetrachloride Plume"):

> *The purpose of this action is to mitigate the threat to site workers, public health, and the environment caused by the migration of carbon tetrachloride vapors through the soil column and into the groundwater. The action is an interim action taken to reduce the mass of carbon tetrachloride in the soil column beneath the 200 West Area pending the final cleanup activities associated with the 200-ZP-1 and 200-ZP-2 Operable Units.*

Between 1992 and 2009, the carbon tetrachloride concentrations in the upper portion of the unconfined aquifer underlying the primary carbon tetrachloride source waste sites were reduced (DOE/RL-2010-11). This reduction likely has resulted from the dual application of SVE remediation in the vadose zone and pump-and-treat remediation in the groundwater in the vicinity of the source waste sites.

An interim remedial measure pump-and-treat system is currently operating in the 200-ZP-1 OU and will continue to operate under the requirements established in the interim record of decision (ROD) (EPA/ROD/R10-95/114) until the treatment system required by the final ROD (EPA et al., 2008) becomes operational, which is expected to occur by December 2011.

One objective for the pump-and-treat interim remediation is the reduction of the carbon tetrachloride groundwater concentration that is greater than 2,000 μg/L. This goal for groundwater has been met at both the 216-Z-1A and 216-Z-9 sites. Concentrations in groundwater in extraction well pair 299-W15-32/299-W15-47 (near the 216-Z-9 Trench) have declined from approximately 8,000 μg/L in 1997 to concentrations ranging from 820 to 1,300 μg/L in FY 2009 (DOE/RL-2010-11). Carbon tetrachloride concentrations in groundwater from Well 299-W18-16 (east of the 216-Z-1A Tile Field) ranged from 180 to 1,000 μg/L in FY 2009 (DOE/RL-2010-11).

The history of mass recovery using SVE at the carbon tetrachloride source cribs reflects two phases commonly observed during SVE remediation projects (Figure 2-13). The first phase is generally characterized by higher rates of mass removal while the readily available volatile contaminant is being removed from the higher permeability zones. With continued extraction, concentrations decrease more slowly as the supply of volatile contaminant becomes limited by desorption and diffusion of the contaminant from micropores and/or lower permeability soil. In this second phase, diffusion controls contaminant migration.

Although additional carbon tetrachloride can be recovered using SVE, the rate of removal has been decreasing. The decline in the rate of removal can be attributed primarily to the following:

- Reduction in SVE system capacity (i.e., from a total of 85 m^3/min to 14.2 m^3/min [3,000 ft^3/min to 500 ft^3/min]) in 1998, with an increase to 28.3 m^3/min (1,000 ft^3/min) in 2009
- Reduction in the yearly duration of extraction operations (i.e., from 12 months each year to 3 months each year at each site) in 1998, with an increase to 6 months each year at each site in 2009
- Reduction in the mass of carbon tetrachloride available for extraction, as a result of previous mass removal using SVE
- Diffusion-controlled contaminant migration

The reduction in SVE system capacity and yearly duration of extraction operations contributed to the decline in mass removed in 1998. Extraction rates limited by diffusion of contaminated vapors from the finer grained layers to the higher flow zones have contributed to the continuing decrease in the mass removed each year since 1998.

Because of the reduction of carbon tetrachloride mass in the soil, it is reasonable to conclude that the much higher percentage of extracted mass has been removed from the larger pore spaces and that the carbon tetrachloride that remains is in finer-grained layers.

5 Conclusions and Recommendations

5.1 Conclusions

Operation of the SVE systems between 1991 and 2009 has resulted in the removal of 79,557 kg (175,391 lb) of carbon tetrachloride from the vadose zone underlying the primary carbon tetrachloride disposal sites. Of this total mass of carbon tetrachloride removed, 177 kg (390 lb) were removed in FY 2009.

The old 14.2 m^3/min (500 ft^3/min) SVE system was operated for approximately six months each year between 1998 and 2008 (except when it was not operated in 2000). In 2009, two new 14.2 m^3/min (500 ft^3/min) SVE systems were operated simultaneously for six months. Operations during each of these years have continued to remove carbon tetrachloride from the vadose zone. Although removal rates have decreased in recent years, use of SVE still results in an annual average extraction of approximately 225 kg (500 lb) of carbon tetrachloride from the vadose zone per year (average extraction based on the FY 2007 through FY 2009 results in Table 2-2). With the readily accessible carbon tetrachloride removed, mass removal (in terms of mass removed per operation time) is more efficient with intermittent SVE operation, which allows the carbon tetrachloride vapor concentration in the higher flow zones to increase while the system is not operating.

The passive SVE systems have removed approximately 95 kg (209 lb) of carbon tetrachloride from the vadose zone between October 1999 and September 2009. Of this total mass of carbon tetrachloride removed using passive SVE systems, approximately 5 kg (11 lb) were removed in FY 2009. Mass removal per year using the passive systems has remained fairly constant at 5 to 10 kg (11 to 22 lb).

5.2 Recommendations

The following recommendations are made to maximize the effectiveness of SVE operations and monitoring and to provide information to support a final ROD.

- Evaluate the impact on operations and mass removal of operating the SVE systems for two additional months, March and October, when the ambient air temperature typically is cooler.
- Continue operation of the passive SVE systems.
- Continue monthly monitoring.
- Consider adding extraction points in the vicinities of the source cribs, including the area south of the 216-Z-9 waste site. The use of additional extraction points will alter the subsurface airflow pathways. Carbon tetrachloride concentrations extracted using these new airflow pathways can be used to evaluate continued carbon tetrachloride remediation using SVE.
- Consider adding extraction/monitoring points near the vadose zone/groundwater interface, where data are relatively sparse, to evaluate vapor concentrations below the CCU and potential mass flux to the groundwater.
- Consider implementing an SVE operating strategy that ultimately will support demonstration of the successful completion of remediation using SVE. For example, potential operational strategies include operating for either longer durations or at different locations to compare the SVE response to the response observed in previous cyclic operations, focusing soil vapor extraction in targeted areas, and using a combination of extraction wells and injection wells (i.e., wells open to the atmosphere) to focus air flow through selected areas.

6 Soil Vapor Extraction System Cost Data

Actual project costs for the 200-PW-1 OU SVE system can be used to determine labor costs associated with each specific activity over a given period of time. Table 6-1 provides the burdened costs (by activity) for the 200-PW-1 OU SVE system for FY 2009. Specific activities are described as follows:

- **Design** – Includes environmental and operations engineering support to design activities required for SVE system upgrades, modifications, and other design documentation.
- **Operations and maintenance** – Represents facility supplies, labor, and craft supervision costs associated with operating and maintaining the equipment. It also includes costs associated with routine characterization of on-line wells and engineering support as required during the course of SVE system operations and periodic maintenance.
- **Performance monitoring** – Includes monthly soil vapor sampling, analysis, and reporting, as required by the annual SVE system operating plan. It also includes preparation of the annual performance evaluation report.
- **Project support** – Includes project management, planning, and other administrative support required during the course of SVE operations during FY 2009.
- **Waste management** – Represents the estimated cost for the management of GAC at the 200-PW-1 OU in accordance with applicable laws for suspect hazardous, toxic, and regulated wastes. Waste designation, sampling, and analysis are included.
- **Treatment system capital** – Includes activities to acquire two new SVE systems for use in FY 2009.

Table 6-1. Costs for Operation of 200-PW-1 Operable Unit Soil Vapor Extraction System

Activity	Actual Costs ($1,000)					
	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009
Design	78.9	50.9	41.7	20.7	16.2	54.0
Operations and maintenance	188.2	183.8	280.7	345.2	286.6	217.7
Performance monitoring	44.9	55.6	47.0	85.0	140.5	189.0
Project support	121.5	72.1	221.8	480.7	257.2	159.7
Waste management	27.2	7.9	10.5	3.7	6.7	14.7
Treatment system capital*	--	--	--	4.3	815.5	565.8
Totals	**460.7**	**370.4**	**601.6**	**939.6**	**1,522.6**	**1201.0**

* Capital costs are not included in the calculation or presentation of cost per cubic meter of vapor treated or cost per gram of carbon tetrachloride removed.

FY = fiscal year

The project costs for operation of the 200-PW-1 OU SVE system in FY 2009 are displayed by percent of total costs in Figure 6-1. Based on the FY 2009 costs and yearly production rates of 2.5 million m^3 of vapor treated and 177 kg (390 lb) of carbon tetrachloride removed (Table 2-2), the FY 2009 treatment costs equate to \$0.25/m^3 of vapor treated and \$3.59/g (\$3,589/kg) (\$1,628/lb) of carbon tetrachloride removed (Figure 6-2).

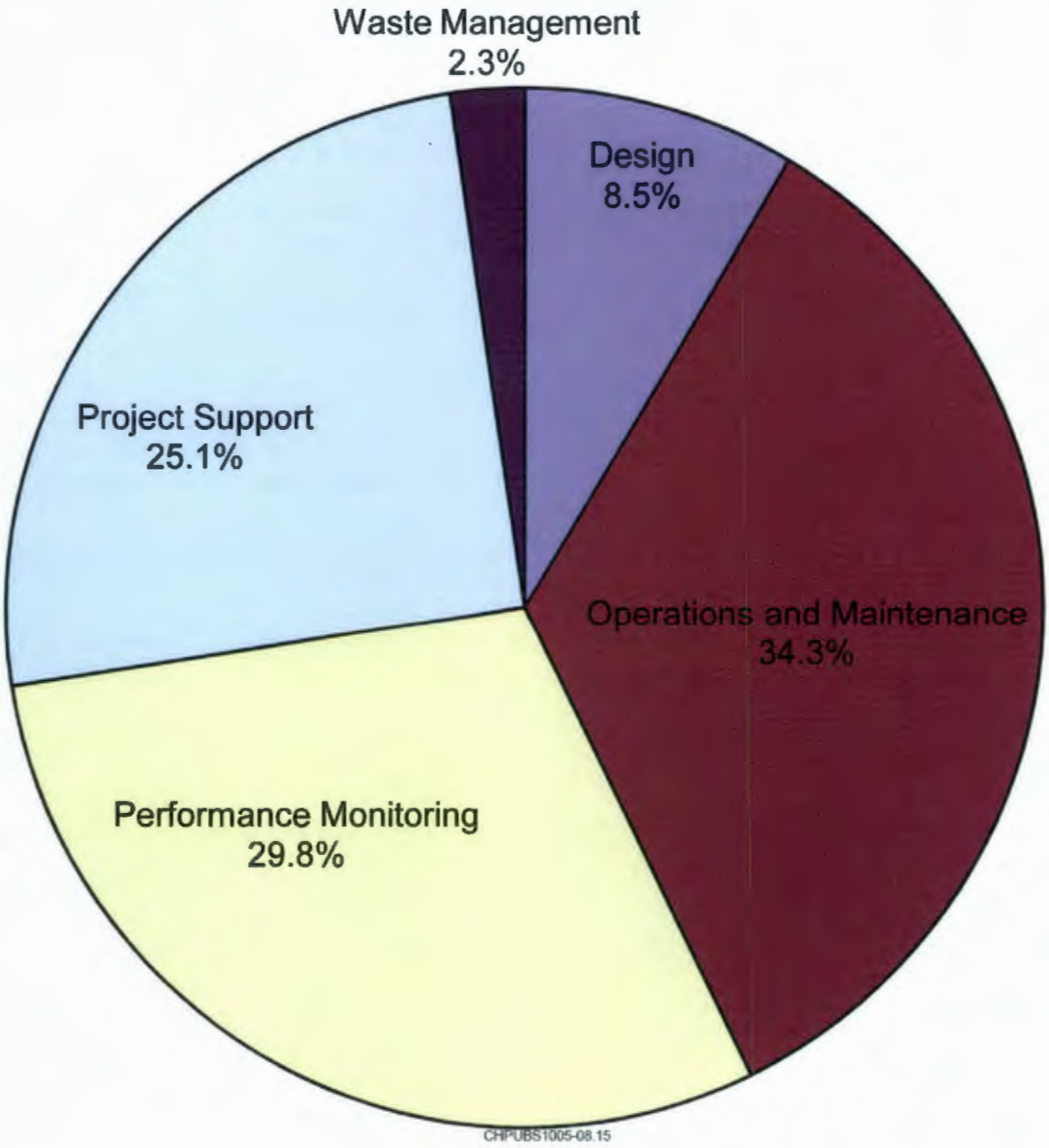

Figure 6-1. Cost Breakdown for 200-PW-1 Operable Unit Soil Vapor Extraction Operations in Fiscal Year 2009

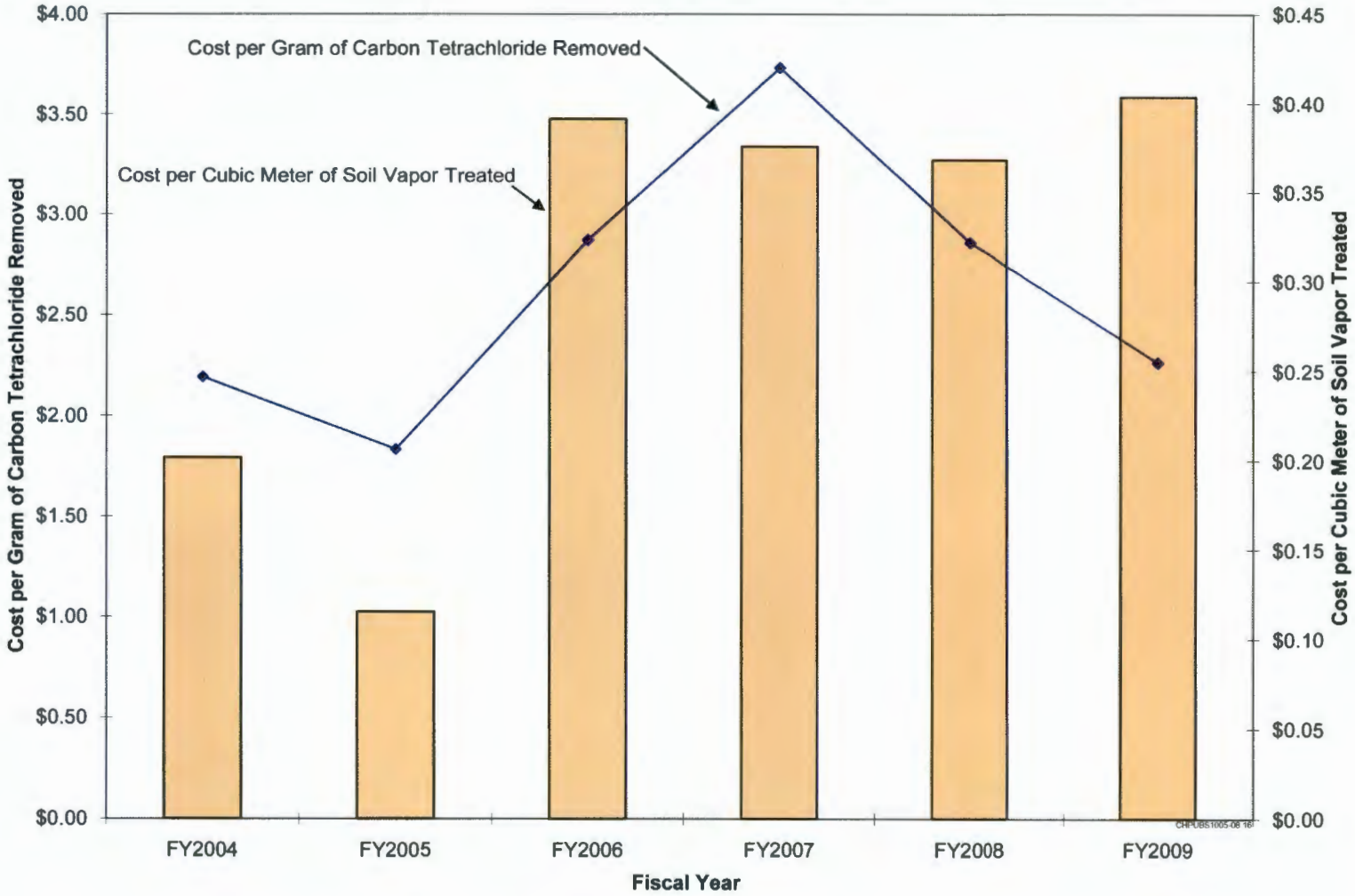

Figure 6-2. Cost for Soil Vapor Extraction Removal of Carbon Tetrachloride in Fiscal Year 2009

7 Previous Evaluations of Soil Vapor Extraction Data

Detailed information on previous SVE operating periods (FY 1992 through FY 2008) and on characterization data collected during the 200-PW-1 OU RI can be obtained from the following reports:

- **FY 1992 through FY 2001** – BHI-00720
- **FY 2002** – WMP-17869
- **FY 2003** – WMP-21327
- **FY 2004** – WMP-26178
- **FY 2005** – WMP-30426
- **FY 2006** – SGW-33746
- **FY 2007** – SGW-37111
- **FY 2008** – SGW-40456
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Appendix A

Wells and Flow Rates for Each Cycle of Soil Vapor Extraction, 1997-2009

A Wells and Flow Rates for Each Cycle of Soil Vapor Extraction, 1997-2009

This appendix provides the following data on the wells and flow rates for each cycle of soil vapor extraction from 1997 through 2009.

- Table A-1 provides a list of the wells and flow rates for soil vapor extraction at the 216-Z-9 site.
- Table A-2 provides a list of the wells and flow rates for soil vapor extraction at the 216-Z-1A/216-Z-18/216-Z-12 site.

Table A-1. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-9 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
07/14/1997	07/14/1997	2.6	W15-82
07/15/1997	07/15/1997	3.6	W15-217
07/18/1997	09/30/1997	45.5	W15-6L, W15-6U, W15-9L, W15-9U, W15-82, W15-84U, W15-85, W15-86, W15-95U, W15-216L, W15-216U, W15-217, W15-218L, W15-218U, W15-219L, W15-219U, W15-220L, W15-220U, W15-223
07/14/1997	**09/30/1997**	**44.4**	**W15-6L, W15-6U, W15-9L, W15-9U, W15-82, W15-84U, W15-85, W15-86, W15-95U, W15-216L, W15-216U, W15-217, W15-218L, W15-218U, W15-219L, W15-219U, W15-220L, W15-220U, W15-223**
07/07/1998	07/28/1998	9.7	W15-9U, W15-9L, W15-82, W15-217
07/29/1998	07/30/1998	13.0	W15-9U, W15-9L, W15-82, W15-217, W15-6L, W15-86, W15-218U
07/31/1998	08/31/1998	13.9	W15-9U, W15-9L, W15-82, W15-217, W15-6L, W15-86
09/01/1998	09/16/1998	14.0	W15-9L, W15-82, W15-6L, W15-86, W15-219L, W15-84U, W15-95U
09/17/1998	09/30/1998	14.5	W15-9L, W15-82, W15-6L, W15-219L, W15-84U, W15-85, W15-216L, W15-216U, W15-220L
07/07/1998	**09/30/1998**	**13.0**	**W15-6L, W15-9U, W15-9L, W15-82, W15-84U, W15-85, W15-86, W15-95U, W15-216U, W15-216L, W15-217, W15-218U, W15-219L, W15-220L**
03/29/1999	04/14/1999	9.8	W15-9U, W15-9L, W15-82, W15-217
04/15/1999	06/14/1999	13.8	W15-9U, W15-9L, W15-82, W15-217, W15-86, W15-6L
06/15/1999	06/15/1999	14.2	W15-9U, W15-9L, W15-82, W15-217, W15-86, W15-6L, W15-219L, W15-218U, W15-223
06/16/1999	06/20/1999	14.8	W15-9U, W15-9L, W15-82, W15-217, W15-86, W15-6L, W15-219L, W15-223
06/21/1999	06/21/1999	15.0	W15-9U, W15-9L, W15-82, W15-217, W15-86, W15-6L, W15-219L, W15-218U, W15-223
06/22/1999	06/22/1999	14.8	W15-9L, W15-82, W15-217, W15-86, W15-6L, W15-219L, W15-218U, W15-220U, W15-84U, W15-95U, W15-218L
06/23/1999	06/28/1999	14.3	W15-9L, W15-82, W15-217, W15-86, W15-6L, W15-219L, W15-218U, W15-220U, W15-218L

Table A-1. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-9 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
03/29/1999	**06/28/1999**	**13.8**	**W15-6L, W15-9U, W15-9L, W15-82, W15-84U, W15-86, W15-95U, W15-217, W15-218U, W15-218L, W15-219L, W15-220U, W15-223**
07/20/2001	07/20/2001	4.9	W15-95L
07/21/2001	07/22/2001	0.0	
07/23/2001	07/23/2001	6.8	W15-84L, W15-82, W15-9L, W15-9U, W15-217
07/24/2001	07/27/2001	6.4	W15-82, W15-9L, W15-9U, W15-217
07/28/2001	07/29/2001	0.0	W15-82, W15-9L, W15-9U, W15-217
07/30/2001	08/26/2001	4.8	W15-82, W15-9L, W15-9U, W15-217
08/27/2001	09/11/2001	8.8	W15-82, W15-9L, W15-9U, W15-217, W15-86, W15-95L
09/12/2001	10/01/2001	11.6	W15-82, W15-9L, W15-9U, W15-217, W15-86, W15-95L, W15-84L, W15-218L, W15-223
07/20/2001	**10/01/2001**	**7.2**	**W15-9U, W15-9L, W15-82, W15-84L, W15-86, W15-95L, W15-217, W15-218L, W15-223**
04/01/2002	04/15/2002	7.1	W15-9L, W15-9U, W15-82, W15-217
04/16/2002	06/04/2002	10.2	W15-9L, W15-82, W15-217, W15-86, W15-95L, W15-84L, W15-218L
06/05/2002	06/19/2002	11.4	W15-9L, W15-82, W15-217, W15-86, W15-95L, W15-84L, W15-218L, W15-218U, W15-219L, W15-219U, W15-220L, W15-220U
06/20/2002	07/22/2002	11.0	W15-6L, W15-9L, W15-82, W15-217, W15-86, W15-95L, W15-84L, W15-216L, W15-216U, W15-218L, W15-219L, W15-219U, W15-220L, W15-220U
04/01/2002	**07/22/2002**	**9.9**	**W15-6L, W15-9U, W15-9L, W15-82, W15-84L, W15-86, W15-95L, W15-216U, W15-216L, W15-217, W15-218U, W15-218L, W15-219U, W15-219L, W15-220U, W15-220L**
10/06/2004	10/12/2004	1.3	W15-9U
10/13/2004	10/13/2004	2.6	W15-9U, W15-9L, W15-82
10/14/2004	10/25/2004	6.0	W15-9U, W15-9L, W15-82, W15-217

Table A-1. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-9 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
10/26/2004	11/01/2004	7.8	W15-9U, W15-9L, W15-82, W15-217, W15-95L, W15-86, W15-218L
10/06/2004	**11/01/2004**	**4.4**	**W15-9U, W15-9L, W15-82, W15-217, W15-95L, W15-86, W15-218L**
03/31/2005	04/25/2005	9.6	W15-82, W15-95L, W15-95U, W15-217
04/26/2005	05/04/2005	10.4	W15-82, W15-95L, W15-95U, W15-217, W15-86, W15-218L
05/05/2005	06/07/2005	10.3	W15-82, W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U
06/08/2005	06/08/2005	10.3	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U
06/09/2005	06/10/2005	10.4	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
06/11/2005	06/12/2005	0.0	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
06/13/2005	06/17/2005	9.8	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
06/18/2005	06/19/2005	0.0	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
06/20/2005	06/24/2005	9.3	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
06/27/2005	07/01/2005	9.3	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
07/02/2005	07/04/2005	0.0	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
07/05/2005	07/07/2005	9.2	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
07/08/2005	07/18/2005	0.0	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
07/19/2005	07/19/2005	9.1	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
07/20/2005	07/24/2005	0.0	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
07/25/2005	07/26/2005	9.1	W15-95L, W15-95U, W15-217, W15-86, W15-218L, W15-8L, W15-8U, W15-218U, W15-220U, W15-220L
03/31/2005	**07/26/2005**	**9.7**	**W15-8U, W15-8L, W15-82, W15-95U, W15-95L, W15-86, W15-217, W15-218U, W15-218L, W15-220U, W15-220L**

Table A-1. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-9 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
07/31/2006	07/31/2006	6.5	W15-82, W15-9U, W15-9L, W15-217
08/01/2006	08/03/2006	4.3	W15-48
08/04/2006	08/06/2006	0.0	
08/07/2006	08/07/2006	1.5	W15-48
08/08/2006	09/29/2006	8.1	W15-48, W15-82, W15-9U, W15-9L, W15-217, W15-95U, W15-95L, W15-86, W15-8U, W15-8L
07/31/2006	**09/29/2006**	**5.1**	**W15-8U, W15-8L, W15-9U, W15-9L, W15-48, W15-82, W15-86, W15-95U, W15-95L, W15-217**
03/29/2007	03/29/2007	7.6	W15-9U, W15-9L, W15-82, W15-217
03/30/2007	04/01/2007	0.0	W15-9U, W15-9L, W15-82, W15-217
04/02/2007	05/08/2007	5.6	W15-9U, W15-9L, W15-82, W15-217
05/09/2007	05/20/2007	8.9	W15-9U, W15-9L, W15-217, W15-95U, W15-95L, W15-8U, W15-48, W15-86
05/21/2007	06/17/2007	8.9	W15-9U, W15-9L, W15-217, W15-95U, W15-95L, W15-8U, W15-8L, W15-48, W15-86
06/18/2007	08/07/2007	10.4	W15-9U, W15-9L, W15-217, W15-95U, W15-95L, W15-8U, W15-8L, W15-48, W15-86, W15-223, C4937, C4938, C5340
03/29/2007	**08/07/2007**	**8.3**	**W15-8U, W15-8L, W15-9U, W15-9L, W15-48, W15-82, W15-86, W15-95U, W15-95L, W15-217, W15-223, C4937, C4938, C5340**
07/01/2008	08/18/2008	5.6	W15-9U, W15-9L, W15-217
08/19/2008	09/01/2008	10.1	W15-9U, W15-9L, W15-217, W15-82, W15-48, W15-95U, W15-86, W15-8U
09/02/2008	09/23/2008	10.5	W15-9U, W15-9L, W15-217, W15-82, W15-48, W15-95U, W15-86, W15-8U, W15-32
09/24/2008	09/28/2008	8.6	W15-9U, W15-9L, W15-217, W15-82, W15-48, W15-95U, W15-86, W15-8U
09/29/2008	10/01/2008	7.3	W15-9U, W15-9L, W15-82, W15-48, W15-95U, C4937
10/02/2008	10/06/2008	7.1	W15-9U, W15-9L, W15-82, W15-48, W15-95U, C5340

Table A-1. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-9 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
07/01/2008	**10/06/2008**	**8.2**	**W15-8U, W15-9U, W15-9L, W15-32, W15-48, W15-82, W15-86, W15-95U, W15-217, C4937, C5340**
04/01/2009	05/03/2009	4.8	W15-9U, W15-9L, W15-82, W15-217
05/04/2009	05/20/2009	8.4	W15-9U, W15-9L, W15-82, W15-217, W15-48, W15-86, W15-8U, C5340
05/21/2009	09/30/2009	4.9	W15-9U, W15-9L, W15-82, W15-217, W15-48, W15-86, W15-8U, C5340, C4937, C4938
04/01/2009	**09/30/2009**	**5.3**	**W15-9U, W15-9L, W15-82, W15-217, W15-48, W15-86, W15-8U, C5340, C4937, C4938**

a. System downtimes of less than 2 days are included in the calculation of the average flow rate. System downtimes of 2 days or more are shown as intervals with an average flow rate of 0.0 m^3/min. No wells are listed for system downtimes that were planned (e.g., 07/21/01 through 07/22/01).

b. All soil vapor extraction well names prefixed by "299-." Well name suffix (L ["lower"] or U ["upper"]) are informal designations used in this report to identify multiple screens or perforated intervals in the same well.

Table A-2. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-1A/216-Z-18/216-Z-12 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
07/18/1997	08/12/1997	216-Z-1A: 28.5	W18-6U, W18-6L, W18-7, W18-89, W18-158U, W18-158L, W18-159, W18-163U, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-171U, W18-171L, W18-174, W18-248
08/13/1997	09/30/1997	216-Z-1A: 25.6	W18-6U, W18-89, W18-158U, W18-158L, W18-159, W18-163U, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-171U, W18-171L, W18-174, W18-248
07/18/1997	**09/30/1997**	**216-Z-1A: 26.6**	**W18-6U, W18-6L, W18-7, W18-89, W18-158U, W18-158L, W18-159, W18-163U, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-171U, W18-171L, W18-174, W18-248**
07/18/1997	08/12/1997	216-Z-18/Z-12: 15.0	W18-152, W18-153, W18-246U, W18-246L, W18-252U, W18-252L
08/13/1997	09/28/1997	216-Z-18/Z-12: 10.9	W18-152, W18-153
07/18/1997	**09/28/1997**	**216-Z-18/Z-12: 12.3**	**W18-152, W18-153, W18-246U, W18-246L, W18-252U, W18-252L**
03/30/1998	04/09/1998	15.2	W18-6L, W18-7, W18-12, W18-89, W18-96, W18-152, W18-165, W18-167, W18-168, W18-174, W18-246U, W18-248, W18-249, W18-252U, W18-252L
04/10/1998	05/03/1998	14.8	W18-6L, W18-7, W18-12, W18-89, W18-165, W18-167, W18-168, W18-248, W18-252L
05/04/1998	05/13/1998	15.1	W18-12, W18-89, W18-96, W18-165, W18-167, W18-246U, W18-249, W18-252U, W18-252L
05/14/1998	05/17/1998	15.5	W18-12, W18-89, W18-96, W18-246U, W18-249, W18-252U, W18-252L
05/18/1998	05/31/1998	13.2	W18-6L, W18-168, W18-174, W18-248
06/01/1998	06/11/1998	14.3	W18-7, W18-152, W18-165, W18-167
06/12/1998	06/30/1998	13.5	W18-6L, W18-89, W18-165, W18-168
03/30/1998	**06/30/1998**	**14.5**	**W18-6L, W18-7, W18-12, W18-89, W18-96, W18-152, W18-165, W18-167, W18-168, W18-174, W18-246U, W18-248, W18-249, W18-252U, W18-252L**
06/30/1999	07/26/1999	13.3	W18-165, W18-166, W18-168, W18-174

Table A-2. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-1A/216-Z-18/216-Z-12 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
07/27/1999	07/28/1999	13.3	W18-158L, W18-165, W18-167, W18-168, W18-248
07/29/1999	08/25/1999	14.4	W18-165, W18-167, W18-168, W18-248, W18-89
08/26/1999	08/30/1999	14.6	W18-165, W18-167, W18-168, W18-248, W18-89, W18-249
08/31/1999	09/16/1999	14.8	W18-165, W18-167, W18-168, W18-248, W18-89
09/17/1999	09/30/1999	14.3	W18-165, W18-166, W18-167, W18-168, W18-174, W18-248
06/30/1999	**09/30/1999**	**14.1**	**W18-89, W18-158L, W18-165, W18-166, W18-167, W18-168, W18-174, W18-248, W18-249**
04/04/2001	04/18/2001	12.8	W18-158L, W18-165, W18-166, W18-167, W18-168, W18-174
04/19/2001	05/03/2001	12.9	W18-89, W18-165, W18-166, W18-167, W18-168, W18-174, W18-248
05/04/2001	05/24/2001	12.5	W18-89, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-248, W18-249
05/25/2001	05/30/2001	12.0	W18-6U, W18-89, W18-96, W18-163U, W18-165, W18-167, W18-169, W18-171L
05/31/2001	06/06/2001	12.1	W18-6U, W18-7, W18-89, W18-159, W18-163U, W18-165, W18-167, W18-168
06/07/2001	06/08/2001	11.9	W18-7, W18-89, W18-159, W18-163U, W18-165, W18-167, W18-168
06/09/2001	06/10/2001	0.0	W18-7, W18-89, W18-159, W18-163U, W18-165, W18-167, W18-168
06/11/2001	06/24/2001	11.3	W18-7, W18-89, W18-159, W18-163U, W18-165, W18-167, W18-168
06/25/2001	07/18/2001	11.7	W18-7, W18-89, W18-159, W18-163U, W18-165, W18-167, W18-246U, W18-246L
04/04/2001	**07/18/2001**	**12.1**	**W18-6U, W18-7, W18-89, W18-96, W18-158L, W18-159, W18-163U, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-171L, W18-174, W18-246U, W18-246L, W18-248, W18-249**
07/24/2002	08/08/2002	8.7	W18-165, W18-166, W18-167, W18-168, W18-174
08/09/2002	08/28/2002	9.8	W18-165, W18-166, W18-167, W18-168, W18-174, W18-89, W18-248
08/29/2002	09/16/2002	11.3	W18-165, W18-167, W18-89, W18-6U, W18-6L, W18-7, W18-159, W18-246L, W18-252L

Table A-2. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-1A/216-Z-18/216-Z-12 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
09/17/2002	10/01/2002	11.6	W18-165, W18-167, W18-89, W18-6U, W18-6L, W18-7, W18-246L, W18-252L, W18-248, W18-249
07/24/2002	**10/01/2002**	**10.3**	**W18-6U, W18-6L, W18-7, W18-89, W18-159, W18-165, W18-166, W18-167, W18-168, W18-174, W18-246L, W18-248, W18-249, W18-252L**
04/01/2003	04/11/2003	11.1	W18-165, W18-166, W18-167, W18-168, W18-174
04/12/2003	04/13/2003	0.0	W18-165, W18-166, W18-167, W18-168, W18-174
04/14/2003	04/18/2003	11.4	W18-165, W18-166, W18-167, W18-168, W18-174
04/19/2003	04/20/2003	0.0	W18-165, W18-166, W18-167, W18-168, W18-174
04/21/2003	04/22/2003	11.1	W18-165, W18-166, W18-167, W18-168, W18-174
04/23/2003	04/23/2003	11.3	W18-165, W18-166, W18-167, W18-168, W18-174, W18-89, W18-248
04/24/2003	04/28/2003	0.0	W18-165, W18-166, W18-167, W18-168, W18-174, W18-89, W18-248
04/29/2003	05/18/2003	11.6	W18-165, W18-166, W18-167, W18-168, W18-174, W18-89, W18-248
05/19/2003	07/03/2003	11.6	W18-165, W18-167, W18-168, W18-89, W18-248, W18-163U, W18-246U, W18-249, W18-252U
07/04/2003	07/06/2003	0.0	W18-165, W18-167, W18-168, W18-89, W18-248, W18-163U, W18-246U, W18-249, W18-252U
07/07/2003	07/07/2003	11.6	W18-165, W18-167, W18-168, W18-89, W18-248, W18-163U, W18-246U, W18-249, W18-252U
07/08/2003	07/22/2003	11.8	W18-165, W18-167, W18-168, W18-89, W18-248, W18-163U, W18-246U, W18-252U, W18-96
07/23/2003	09/16/2003	11.7	W18-165, W18-167, W18-168, W18-89, W18-248, W18-163U, W18-6L, W18-7, W18-246L, W18-252L
09/17/2003	09/30/2003	7.3	W18-165, W18-248, W18-163U, W18-6L, W18-7, W18-246L, W18-6U, W18-159, W18-169
04/01/2003	**09/30/2003**	**11.1**	**W18-6U, W18-6L, W18-7, W18-89, W18-96, W18-159, W18-163U, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-246U, W18-246L, W18-248, W18-249, W18-252U, W18-252L**
04/01/2004	04/02/2004	11.6	W18-165, W18-166, W18-167, W18-168, W18-174
04/03/2004	04/05/2004	0.0	W18-165, W18-166, W18-167, W18-168, W18-174

Table A-2. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-1A/216-Z-18/216-Z-12 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
04/06/2004	04/19/2004	8.9	W18-165, W18-166, W18-167, W18-168, W18-174
04/20/2004	06/06/2004	0.0	W18-165, W18-166, W18-167, W18-168, W18-174
06/07/2004	06/08/2004	7.2	W18-165, W18-166, W18-167, W18-168, W18-174
06/09/2004	07/20/2004	7.6	W18-165, W18-166, W18-167, W18-168, W18-174, W18-89, W18-248
07/21/2004	09/23/2004	11.3	W18-165, W18-166, W18-167, W18-168, W18-89, W18-248, W18-6L, W18-7, W18-10L, W18-12, W18-163U, W18-246L, W18-252L
04/01/2004	**09/23/2004**	**9.3**	**W18-6L, W18-7, W18-10L, W18-12, W18-89, W18-163U, W18-165, W18-166, W18-167, W18-168, W18-174, W18-246L, W18-248, W18-252L**
07/29/2005	07/29/2005	8.5	W18-165, W18-166, W18-167, W18-168, W18-174
07/30/2005	08/01/2005	0.0	W18-165, W18-166, W18-167, W18-168, W18-174
08/02/2005	08/04/2005	9.6	W18-165, W18-166, W18-167, W18-168, W18-174
08/05/2005	08/07/2005	0.0	W18-165, W18-166, W18-167, W18-168, W18-174
08/08/2005	08/12/2005	8.4	W18-165, W18-166, W18-167, W18-168, W18-174
08/13/2005	08/14/2005	0.0	W18-165, W18-166, W18-167, W18-168, W18-174
08/15/2005	08/19/2005	6.1	W18-165, W18-166, W18-167, W18-168, W18-174
08/20/2005	08/21/2005	0.0	W18-165, W18-166, W18-167, W18-168, W18-174
08/22/2005	09/11/2005	6.8	W18-165, W18-166, W18-167, W18-168, W18-174
09/12/2005	10/18/2005	8.9	W18-165, W18-166, W18-167, W18-168, W18-174, W18-89, W18-248
07/29/2005	**10/18/2005**	**8.1**	**W18-89, W18-165, W18-166, W18-167, W18-168, W18-174, W18-248**
04/03/2006	04/07/2006	8.3	W18-165, W18-166, W18-174
04/08/2006	04/09/2006	0.0	W18-165, W18-166, W18-174

Table A-2. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-1A/216-Z-18/216-Z-12 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
04/10/2006	05/01/2006	8.8	W18-165, W18-166, W18-174
05/02/2006	05/07/2006	0.0	W18-165, W18-166, W18-174
05/08/2006	07/25/2006	8.4	W18-165, W18-166, W18-174
04/03/2006	**07/25/2006**	**8.5**	**W18-165, W18-166, W18-174**
08/15/2007	08/22/2007	10.5	W18-165, W18-167, W18-174
08/23/2007	09/18/2007	10.7	W18-165, W18-167, W18-174, W18-166, W18-168
09/19/2007	10/01/2007	11.4	W18-165, W18-167, W18-174, W18-166, W18-168, W18-248, W18-89
08/15/2007	**10/01/2007**	**10.8**	**W18-89, W18-165, W18-166, W18-167, W18-168, W18-174, W18-248**
04/01/2008	05/19/2008	10.2	W18-165, W18-166, W18-167, W18-168, W18-174
05/20/2008	05/23/2008	9.2	W18-165, W18-166, W18-167, W18-168, W18-174, W18-150L, W18-175, W18-89
05/24/2008	05/27/2008	0.0	W18-165, W18-166, W18-167, W18-168, W18-174, W18-150L, W18-175, W18-89
05/28/2008	06/02/2008	11.3	W18-165, W18-166, W18-167, W18-168, W18-174, W18-150L, W18-175, W18-89
06/03/2008	06/23/2008	11.6	W18-165, W18-166, W18-167, W18-168, W18-174, W18-150L, W18-175, W18-89, W18-248
04/01/2008	**06/23/2008**	**10.6**	**W18-89, W18-150L, W18-165, W18-166, W18-167, W18-168, W18-174, W18-175, W18-248**
04/01/2009	04/28/2009	7.8	W18-165, W18-166, W18-167, W18-168, W18-174
04/29/2009	05/03/2009	6.2	W18-165, W18-166, W18-167, W18-168, W18-174, W18-175, W18-253
05/04/2009	09/30/2009	6.7	W18-165, W18-166, W18-167, W18-168, W18-174, W18-175, W18-253, W18-89, W18-248
04/01/2009	**09/30/2009**	**6.8**	**W18-165, W18-166, W18-167, W18-168, W18-174, W18-175, W18-253, W18-89, W18-248**

Table A-2. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-1A/216-Z-18/216-Z-12 Site, 1997-2009

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]

a. System downtimes of less than 2 days are included in the calculation of the average flow rate. System downtimes of 2 days or more are shown as intervals with an average flow rate of 0.0 m^3/min. No wells are listed for system downtimes that were planned (e.g., 07/21/01 through 07/22/01).

b. All soil vapor extraction well names prefixed by "299-." Well name suffix (L ["lower"] or U ["upper"]) are informal designations used in this report to identify multiple screens or perforated intervals in the same well.

Appendix B

Fiscal Year 2009 Daily Soil Vapor Extraction Data

B Fiscal Year 2009 Daily Soil Vapor Extraction Data

This appendix provides daily data for soil vapor extraction operations for fiscal year 2009:

- Table B-1 provides the daily data for soil vapor extraction operations at the 216-Z-9 site for fiscal year 2009.
- Table B-2 provides the daily data for soil vapor extraction operations at the 216-Z-1A site for fiscal year 2009.

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
4/1/2009		24.0	24.0	24.0		0.000	0.000	0.9	0.9
4/2/2009		24.0	24.0	48.0		0.000	0.000	0.9	1.7
4/3/2009		24.0	24.0	72.0		0.000	0.000	0.9	2.6
4/4/2009		24.0	24.0	96.0		0.000	0.000	0.9	3.4
4/5/2009		24.0	24.0	120.0		0.000	0.000	0.9	4.3
4/6/2009		24.0	24.0	144.0		0.000	0.000	0.9	5.1
4/7/2009		24.0	24.0	168.0		0.000	0.000	0.9	6.0
4/8/2009		24.0	24.0	192.0		0.000	0.000	0.9	6.8
4/9/2009		24.0	24.0	216.0		0.000	0.000	1.0	7.8
4/10/2009		24.0	24.0	240.0		0.000	0.000	1.0	8.8
4/11/2009		24.0	24.0	264.0	5,781	8.324	8.324	1.0	9.7
4/12/2009		24.0	24.0	288.0	5,841	8.411	16.735	1.0	10.7
4/13/2009		24.0	24.0	312.0	5,678	8.177	24.912	1.0	11.7
4/14/2009		24.0	24.0	336.0	5,544	7.983	32.895	1.0	12.7
4/15/2009		24.0	24.0	360.0	5,348	7.701	40.596	1.0	13.6
4/16/2009		24.0	24.0	384.0	5,339	7.688	48.284	0.5	14.2
4/17/2009		24.0	24.0	408.0	4,800	6.912	55.196	0.5	14.7

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
4/18/2009		24.0	24.0	432.0	3,096	4.458	59.654	0.5	15.2
4/19/2009		24.0	24.0	456.0	3,074	4.427	64.081	0.5	15.8
4/20/2009		18.8	24.0	474.8	3,175	3.572	67.653	0.5	16.3
4/21/2009		24.0	24.0	498.8	5,190	7.473	75.126	0.5	16.8
4/22/2009		24.0	24.0	522.8	5,147	7.412	82.538	0.5	17.3
4/23/2009		24.0	24.0	546.8	5,147	7.412	89.950	1.1	18.5
4/24/2009		24.0	24.0	570.8	5,130	7.387	97.337	1.1	19.6
4/25/2009		24.0	24.0	594.8	5,117	7.368	104.705	1.1	20.8
4/26/2009		24.0	24.0	618.8	5,104	7.350	112.055	1.1	21.9
4/27/2009		14.6	24.0	633.3	3,000	2.625	114.680	1.1	23.0
4/28/2009		24.0	24.0	657.3	5,186	7.467	122.147	1.1	24.2
4/29/2009		24.0	24.0	681.3	5,050	7.272	129.420	1.1	25.3
4/30/2009		23.4	24.0	704.8	4,858	6.826	136.246	1.9	27.2
5/1/2009	3.32	24.0	24.0	728.8	5,012	7.217	143.463	1.9	29.1
5/2/2009	4.65	24.0	24.0	752.8	4,955	7.136	150.599	1.9	30.9
5/3/2009	4.08	24.0	24.0	776.8	4,927	7.095	157.694	1.9	32.8
5/4/2009	4.85	24.0	24.0	800.8	7,334	10.561	168.255	1.9	34.7

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
5/5/2009	4.76	24.0	24.0	824.8	8,835	12.722	180.977	1.9	36.6
5/6/2009	3.92	24.0	24.0	848.8	8,807	12.681	193.659	1.9	38.5
5/7/2009	3.02	24.0	24.0	872.8	8,807	12.681	206.340	1.6	40.1
5/8/2009	2.98	24.0	24.0	896.8	8,863	12.763	219.103	1.6	41.7
5/9/2009	3.66	24.0	24.0	920.8	8,948	12.885	231.988	1.6	43.4
5/10/2009	4.21	24.0	24.0	944.8	8,807	12.681	244.670	1.6	45.0
5/11/2009	5.94	24.0	24.0	968.8	8,608	12.396	257.066	1.6	46.6
5/12/2009	0.78	23.8	24.0	992.5	8,552	12.186	269.252	1.6	48.3
5/13/2009	0.78	24.0	24.0	1016.5	8,778	12.641	281.893	1.6	49.9
5/14/2009	3.15	24.0	24.0	1040.5	8,665	12.478	294.370	1.5	51.4
5/15/2009	2.30	24.0	24.0	1064.5	8,552	12.314	306.685	1.5	53.0
5/16/2009	2.72	24.0	24.0	1088.5	8,495	12.233	318.917	1.5	54.5
5/17/2009	3.32	24.0	24.0	1112.5	8,467	12.192	331.110	1.5	56.1
5/18/2009	3.99	15.3	24.0	1127.8	5,380	4.923	336.032	1.5	57.6
5/19/2009	3.82	23.8	24.0	1151.6	8,438	12.067	348.099	1.5	59.2
5/20/2009	3.45	24.0	24.0	1175.6	8,523	12.274	360.373	1.5	60.7
5/21/2009	0.32	14.9	24.0	1190.5	5,324	4.765	365.138	0.1	60.8

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
5/22/2009		0.0	24.0	1190.5		0.000	365.138	0.1	61.0
5/23/2009		0.0	24.0	1190.5		0.000	365.138	0.1	61.1
5/24/2009		0.0	24.0	1190.5		0.000	365.138	0.1	61.2
5/25/2009		0.0	24.0	1190.5		0.000	365.138	0.1	61.3
5/26/2009		0.0	24.0	1190.5		0.000	365.138	0.1	61.4
5/27/2009		0.0	24.0	1190.5		0.000	365.138	0.1	61.5
5/28/2009		0.0	24.0	1190.5		0.000	365.138	0.2	61.7
5/29/2009		0.0	24.0	1190.5		0.000	365.138	0.2	61.9
5/30/2009		0.0	24.0	1190.5		0.000	365.138	0.2	62.1
5/31/2009		0.0	24.0	1190.5		0.000	365.138	0.2	62.3
6/1/2009		0.0	24.0	1190.5		0.000	365.138	0.2	62.5
6/2/2009	3.11	15.8	24.0	1206.3	5,717	5.431	370.569	0.2	62.7
6/3/2009	0.28	8.5	24.0	1214.8	3,180	1.622	372.191	0.2	62.9
6/4/2009		0.0	24.0	1214.8		0.000	372.191	0.1	63.0
6/5/2009		0.0	24.0	1214.8		0.000	372.191	0.1	63.1
6/6/2009		0.0	24.0	1214.8		0.000	372.191	0.1	63.2
6/7/2009		0.0	24.0	1214.8		0.000	372.191	0.1	63.4

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
6/8/2009		0.0	24.0	1214.8		0.000	372.191	0.1	63.5
6/9/2009		0.0	24.0	1214.8		0.000	372.191	0.1	63.6
6/10/2009		0.0	24.0	1214.8		0.000	372.191	0.1	63.7
6/11/2009	8.60	17.1	24.0	1231.9	2,915	2.988	375.179	0.8	64.5
6/12/2009	14.09	24.0	24.0	1255.9	4,144	5.967	381.146	0.8	65.2
6/13/2009	14.11	24.0	24.0	1279.9	4,160	5.991	387.137	0.8	66.0
6/14/2009	13.99	24.0	24.0	1303.9	4,156	5.984	393.121	0.8	66.8
6/15/2009	5.90	14.8	24.0	1318.7	3,301	2.922	396.043	0.8	67.5
6/16/2009	12.59	24.0	24.0	1342.7	6,290	9.058	405.101	0.8	68.3
6/17/2009	7.41	24.0	24.0	1366.7	3,942	5.676	410.777	0.8	69.1
6/18/2009		24.0	24.0	1390.7		0.000	410.777	0.0	69.1
6/19/2009		24.0	24.0	1414.7		0.000	410.777	0.0	69.1
6/20/2009		24.0	24.0	1438.7		0.000	410.777	0.0	69.1
6/21/2009		24.0	24.0	1462.7		0.000	410.777	0.0	69.1
6/22/2009		22.9	24.0	1485.6		0.000	410.777	0.0	69.1
6/23/2009	6.82	13.1	24.0	1498.7	3,473	2.727	413.503	0.1	69.2
6/24/2009	5.96	10.3	24.0	1509.0	2,627	1.628	415.132	0.1	69.3

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
6/25/2009	12.66	24.0	24.0	1533.0	6,284	9.049	424.180	0.7	70.0
6/26/2009	12.24	24.0	24.0	1557.0	6,289	9.056	433.237	0.7	70.7
6/27/2009	2.69	5.4	24.0	1562.4	1,446	0.470	433.706	0.0	70.7
6/28/2009		0.0	24.0	1562.4		0.000	433.706	0.0	70.7
6/29/2009	5.56	15.8	24.0	1578.3	4,069	3.865	437.572	0.1	70.8
6/30/2009	7.48	15.4	24.0	1593.7	4,028	3.726	441.298	0.2	71.0
7/1/2009	6.92	12.9	24.0	1606.6	3,474	2.692	443.990	0.1	71.1
7/2/2009	12.20	24.0	24.0	1630.6	6,568	9.457	453.447	0.7	71.8
7/3/2009	12.05	24.0	24.0	1654.6	675	0.972	454.419	0.1	71.9
7/4/2009	11.91	24.0	24.0	1678.6	6,519	9.388	463.806	0.7	72.6
7/5/2009	11.70	24.0	24.0	1702.6	6,496	9.354	473.161	0.7	73.3
7/6/2009	11.45	24.0	24.0	1726.6	6,517	9.384	482.545	0.7	74.0
7/7/2009	7.69	11.2	24.0	1737.8	3,467	2.323	484.867	0.1	74.1
7/8/2009	3.09	11.0	24.0	1748.8	2,904	1.917	486.784	0.0	74.1
7/9/2009	6.80	24.0	24.0	1772.8	6,389	9.200	495.984	0.4	74.5
7/10/2009	6.80	24.0	24.0	1796.8	6,364	9.164	505.147	0.4	74.9
7/11/2009	6.80	24.0	24.0	1820.8	6,349	9.143	514.291	0.4	75.3

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
7/12/2009	6.80	24.0	24.0	1844.8	6,345	9.137	523.428	0.4	75.7
7/13/2009	3.61	12.8	24.0	1857.5	3,421	2.617	526.045	0.1	75.8
7/14/2009		0.0	24.0	1857.5		0.000	526.045	0.0	75.8
7/15/2009		0.0	24.0	1857.5		0.000	526.045	0.0	75.8
7/16/2009		0.0	24.0	1857.5		0.000	526.045	0.0	75.8
7/17/2009		0.0	24.0	1857.5		0.000	526.045	0.0	75.8
7/18/2009		0.0	24.0	1857.5		0.000	526.045	0.0	75.8
7/19/2009		0.0	24.0	1857.5		0.000	526.045	0.0	75.8
7/20/2009	0.38	9.8	24.0	1867.3	1,073	0.628	526.673	0.0	75.8
7/21/2009	4.81	24.0	24.0	1891.3	5,570	8.022	534.694	0.2	76.0
7/22/2009	7.65	24.0	24.0	1915.3	7,101	10.225	544.919	0.5	76.5
7/23/2009	2.97	9.5	24.0	1924.8	2,836	1.616	546.536	0.0	76.5
7/24/2009	6.63	15.4	24.0	1940.2	4,521	4.181	550.717	0.2	76.7
7/25/2009	10.37	24.0	24.0	1964.2	7,133	10.271	560.988	0.7	77.4
7/26/2009	10.37	24.0	24.0	1988.2	7,098	10.221	571.209	0.7	78.0
7/27/2009	11.19	14.2	24.0	2002.3	4,102	3.487	574.696	0.2	78.3
7/28/2009	12.93	24.0	24.0	2026.3	6,398	9.214	583.909	0.7	79.0

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
7/29/2009	8.45	23.5	24.0	2049.8	5,809	8.191	592.100	0.4	79.5
7/30/2009	8.55	24.0	24.0	2073.8	4,751	6.842	598.942	0.4	79.8
7/31/2009	2.03	5.9	24.0	2079.8	1,216	0.432	599.374	0.0	79.8
8/1/2009		0.0	24.0	2079.8		0.000	599.374	0.0	79.8
8/2/2009		0.0	24.0	2079.8		0.000	599.374	0.0	79.8
8/3/2009	5.14	14.7	24.0	2094.4	2,846	2.505	601.878	0.1	79.9
8/4/2009	7.05	8.7	24.0	2103.1	4,071	2.117	603.995	0.1	80.0
8/5/2009	1.31	4.1	24.0	2107.2	767	0.188	604.183	0.0	80.0
8/6/2009	4.94	14.4	24.0	2121.6	2,859	2.473	606.656	0.1	80.1
8/7/2009	8.01	24.0	24.0	2145.6	4,802	6.915	613.571	0.3	80.4
8/8/2009	7.71	24.0	24.0	2169.6	4,809	6.925	620.496	0.3	80.8
8/9/2009	7.69	24.0	24.0	2193.6	4,804	6.918	627.413	0.3	81.1
8/10/2009	7.62	24.0	24.0	2217.6	4,816	6.935	634.349	0.3	81.4
8/11/2009	7.74	24.0	24.0	2241.6	4,824	6.946	641.295	0.3	81.8
8/12/2009	7.66	24.0	24.0	2265.6	4,825	6.948	648.243	0.3	82.1
8/13/2009	7.54	24.0	24.0	2289.6	4,857	6.994	655.237	0.3	82.4
8/14/2009	7.28	24.0	24.0	2313.6	4,881	7.028	662.265	0.3	82.8

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
8/15/2009	7.28	24.0	24.0	2337.6	4,857	6.994	669.259	0.3	83.1
8/16/2009	7.25	24.0	24.0	2361.6	4,829	6.953	676.212	0.3	83.4
8/17/2009	7.25	24.0	24.0	2385.6	4,815	6.934	683.146	0.3	83.7
8/18/2009	7.32	24.0	24.0	2409.6	4,790	6.897	690.043	0.3	84.0
8/19/2009	7.51	24.0	24.0	2433.6	4,744	6.831	696.875	0.3	84.4
8/20/2009	7.40	23.4	24.0	2457.0	4,552	6.396	703.271	0.3	84.7
8/21/2009	7.07	24.0	24.0	2481.0	4,737	6.821	710.091	0.3	85.0
8/22/2009	7.01	24.0	24.0	2505.0	4,775	6.876	716.967	0.3	85.3
8/23/2009	7.05	24.0	24.0	2529.0	4,750	6.841	723.808	0.3	85.6
8/24/2009	6.83	24.0	24.0	2553.0	4,779	6.882	730.690	0.3	85.9
8/25/2009	6.84	24.0	24.0	2577.0	4,748	6.837	737.527	0.3	86.2
8/26/2009	6.79	24.0	24.0	2601.0	4,774	6.874	744.401	0.3	86.5
8/27/2009	6.62	24.0	24.0	2625.0	4,742	6.828	751.230	0.3	86.7
8/28/2009	6.85	24.0	24.0	2649.0	4,751	6.842	758.071	0.3	87.0
8/29/2009	6.75	24.0	24.0	2673.0	4,786	6.891	764.963	0.3	87.3
8/30/2009	6.96	24.0	24.0	2697.0	4,756	6.848	771.811	0.3	87.6
8/31/2009	6.89	24.0	24.0	2721.0	4,729	6.810	778.621	0.3	87.9

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
9/1/2009	6.81	24.0	24.0	2745.0	4,695	6.760	785.382	0.3	88.2
9/2/2009	6.72	24.0	24.0	2769.0	4,700	6.768	792.150	0.3	88.5
9/3/2009	6.65	24.0	24.0	2793.0	4,762	6.857	799.007	0.3	88.8
9/4/2009	6.44	24.0	24.0	2817.0	4,807	6.922	805.929	0.3	89.1
9/5/2009	6.50	24.0	24.0	2841.0	4,797	6.908	812.837	0.3	89.3
9/6/2009	6.31	24.0	24.0	2865.0	4,840	6.970	819.807	0.3	89.6
9/7/2009	6.21	24.0	24.0	2889.0	4,840	6.969	826.776	0.3	89.9
9/8/2009	6.20	24.0	24.0	2913.0	4,829	6.954	833.730	0.3	90.2
9/9/2009	7.10	24.0	24.0	2937.0	5,683	8.184	841.914	0.4	90.5
9/10/2009	8.51	24.0	24.0	2961.0	6,774	9.754	851.669	0.5	91.1
9/11/2009	8.72	24.0	24.0	2985.0	6,774	9.754	861.423	0.5	91.6
9/12/2009	8.94	24.0	24.0	3009.0	6,745	9.713	871.137	0.5	92.1
9/13/2009	8.99	24.0	24.0	3033.0	6,699	9.646	880.783	0.5	92.7
9/14/2009	8.87	24.0	24.0	3057.0	6,688	9.631	890.414	0.5	93.2
9/15/2009	8.50	24.0	24.0	3081.0	6,750	9.719	900.133	0.5	93.7
9/16/2009	8.56	24.0	24.0	3105.0	6,743	9.710	909.844	0.5	94.3
9/17/2009	5.16	9.2	24.0	3114.2	4,132	2.272	912.116	0.1	94.3

Table B-1. Daily Soil Vapor Extraction Data at the 216-Z-9 Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
9/18/2009		0.0	24.0	3114.2		0.000	912.116	0.0	94.3
9/19/2009		0.0	24.0	3114.2		0.000	912.116	0.0	94.3
9/20/2009		0.0	24.0	3114.2		0.000	912.116	0.0	94.3
9/21/2009	4.25	15.5	24.0	3129.7	4,030	3.748	915.864	0.1	94.4
9/22/2009	8.00	24.0	24.0	3153.7	6,299	9.071	924.935	0.5	94.9
9/23/2009	8.12	24.0	24.0	3177.7	6,248	8.998	933.933	0.5	95.4
9/24/2009	8.45	24.0	24.0	3201.7	6,221	8.959	942.892	0.5	95.8
9/25/2009	8.22	24.0	24.0	3225.7	6,216	8.952	951.843	0.5	96.3
9/26/2009	8.32	24.0	24.0	3249.7	6,218	8.953	960.796	0.5	96.8
9/27/2009	8.15	24.0	24.0	3273.7	6,252	9.003	969.799	0.5	97.2
9/28/2009	8.13	24.0	24.0	3297.7	6,260	9.014	978.813	0.5	97.7
9/29/2009	7.74	24.0	24.0	3321.7	6,274	9.034	987.847	0.4	98.1
9/30/2009	7.32	15.2	24.0	3336.8	3,956	3.600	991.447	0.2	98.3

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
4/1/2009		24.0	24.0	24.0		0.000	0.000	0.5	0.5
4/2/2009		24.0	24.0	48.0		0.000	0.000	0.5	1.0
4/3/2009		24.0	24.0	72.0		0.000	0.000	0.5	1.5
4/4/2009		24.0	24.0	96.0		0.000	0.000	0.5	2.0
4/5/2009		24.0	24.0	120.0		0.000	0.000	0.5	2.5
4/6/2009		24.0	24.0	144.0		0.000	0.000	0.5	3.0
4/7/2009		24.0	24.0	168.0		0.000	0.000	0.5	3.5
4/8/2009		24.0	24.0	192.0		0.000	0.000	0.5	3.9
4/9/2009		24.0	24.0	216.0		0.000	0.000	0.6	4.5
4/10/2009		24.0	24.0	240.0		0.000	0.000	0.6	5.1
4/11/2009		24.0	24.0	264.0	8,155	11.744	11.744	0.6	5.6
4/12/2009		24.0	24.0	288.0	8,353	12.029	23.773	0.6	6.2
4/13/2009		24.0	24.0	312.0	8,297	11.947	35.720	0.6	6.8
4/14/2009		24.0	24.0	336.0	8,438	12.151	47.871	0.6	7.3
4/15/2009		24.0	24.0	360.0	8,454	12.174	60.045	0.6	7.9
4/16/2009		24.0	24.0	384.0	8,410	12.111	72.156	0.6	8.5
4/17/2009		24.0	24.0	408.0	7,617	10.969	83.125	0.6	9.1

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
4/18/2009		24.0	24.0	432.0	5,324	7.666	90.791	0.6	9.7
4/19/2009		24.0	24.0	456.0	5,295	7.625	98.416	0.6	10.3
4/20/2009		20.1	24.0	476.1	5,607	6.756	105.172	0.6	10.8
4/21/2009		24.0	24.0	500.1	8,240	11.866	117.038	0.6	11.4
4/22/2009		24.0	24.0	524.1	8,325	11.988	129.026	0.6	12.0
4/23/2009		24.0	24.0	548.1	8,339	12.009	141.035	0.7	12.7
4/24/2009		24.0	24.0	572.1	8,297	11.947	152.982	0.7	13.3
4/25/2009		24.0	24.0	596.1	8,325	11.988	164.970	0.7	14.0
4/26/2009		24.0	24.0	620.1	8,283	11.928	176.898	0.7	14.7
4/27/2009		23.6	24.0	643.7	8,114	11.481	188.379	0.7	15.3
4/28/2009		24.0	24.0	667.7	8,283	11.928	200.307	0.7	16.0
4/29/2009		24.0	24.0	691.7	8,438	12.151	212.458	0.7	16.6
4/30/2009		24.0	24.0	715.7	8,523	12.274	224.732	0.6	17.3
5/1/2009		7.0	24.0	722.7	2,520	1.058	225.790	0.6	17.9
5/2/2009		0.0	24.0	722.7		0.000	225.790	0.6	18.6
5/3/2009		0.0	24.0	722.7		0.000	225.790	0.6	19.2
5/4/2009		14.9	24.0	737.6	5,352	4.790	230.580	0.6	19.9

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
5/5/2009		24.0	24.0	761.6	8,467	12.192	242.773	0.6	20.5
5/6/2009		24.0	24.0	785.6	8,495	12.233	255.005	0.6	21.2
5/7/2009		24.0	24.0	809.6	8,495	12.233	267.238	0.5	21.7
5/8/2009		24.0	24.0	833.6	8,467	12.192	279.430	0.5	22.1
5/9/2009		24.0	24.0	857.6	8,438	12.151	291.582	0.5	22.6
5/10/2009		12.5	24.0	870.1	283	0.212	291.794	0.5	23.1
5/11/2009		0.0	24.0	870.1		0.000	291.794	0.5	23.6
5/12/2009		15.2	24.0	885.3	5,437	4.948	296.742	0.5	24.0
5/13/2009		24.0	24.0	909.3	8,665	12.478	309.219	0.5	24.5
5/14/2009		24.0	24.0	933.3	8,580	12.355	321.574	0.6	25.1
5/15/2009		24.0	24.0	957.3	8,580	12.355	333.930	0.6	25.7
5/16/2009		24.0	24.0	981.3	8,552	12.314	346.244	0.6	26.3
5/17/2009		24.0	24.0	1005.3	8,467	12.192	358.436	0.6	26.8
5/18/2009		24.0	24.0	1029.3	8,410	12.111	370.547	0.6	27.4
5/19/2009		19.4	24.0	1048.7	6,881	8.016	378.563	0.6	28.0
5/20/2009		24.0	24.0	1072.7	8,523	12.274	390.837	0.6	28.6
5/21/2009		20.7	24.0	1093.3	7,306	9.059	399.896	0.6	29.2

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
5/22/2009		24.0	24.0	1117.3	8,467	12.192	412.088	0.6	29.8
5/23/2009		24.0	24.0	1141.3	8,410	12.111	424.198	0.6	30.4
5/24/2009		24.0	24.0	1165.3	8,410	12.111	436.309	0.6	30.9
5/25/2009		24.0	24.0	1189.3	8,382	12.070	448.379	0.6	31.5
5/26/2009		24.0	24.0	1213.3	8,353	12.029	460.408	0.6	32.1
5/27/2009		24.0	24.0	1237.3	8,353	12.029	472.437	0.6	32.7
5/28/2009		24.0	24.0	1261.3	8,297	11.947	484.384	0.6	33.3
5/29/2009		24.0	24.0	1285.3	8,269	11.907	496.291	0.6	33.9
5/30/2009		24.0	24.0	1309.3	8,240	11.866	508.157	0.6	34.4
5/31/2009		24.0	24.0	1333.3	8,240	11.866	520.023	0.6	35.0
6/1/2009		24.0	24.0	1357.3	8,261	11.896	531.919	0.6	35.6
6/2/2009		23.8	24.0	1381.1	8,143	11.603	543.522	0.6	36.2
6/3/2009		24.0	24.0	1405.1	8,293	11.942	555.464	0.6	36.7
6/4/2009		13.8	24.0	1418.9	4,788	3.974	559.438	0.1	36.8
6/5/2009		0.0	24.0	1418.9		0.000	559.438	0.1	36.9
6/6/2009		0.0	24.0	1418.9		0.000	559.438	0.1	37.0
6/7/2009		0.0	24.0	1418.9		0.000	559.438	0.1	37.0

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
6/8/2009		0.0	24.0	1418.9		0.000	559.438	0.1	37.1
6/9/2009		0.0	24.0	1418.9		0.000	559.438	0.1	37.2
6/10/2009	1.54	9.6	24.0	1428.5	2,111	1.214	560.652	0.1	37.3
6/11/2009	4.26	24.0	24.0	1452.5	5,268	7.586	568.238	0.5	37.8
6/12/2009	4.37	24.0	24.0	1476.5	5,241	7.547	575.785	0.5	38.3
6/13/2009	4.28	24.0	24.0	1500.5	5,252	7.563	583.348	0.5	38.9
6/14/2009	4.38	24.0	24.0	1524.5	5,271	7.590	590.937	0.5	39.4
6/15/2009	3.85	19.8	24.0	1544.3	5,793	6.893	597.831	0.5	40.0
6/16/2009	4.84	24.0	24.0	1568.3	8,288	11.934	609.765	0.5	40.5
6/17/2009	4.92	24.0	24.0	1592.3	8,325	11.987	621.753	0.5	41.0
6/18/2009	5.01	24.0	24.0	1616.3	8,278	11.920	633.673	0.4	41.4
6/19/2009	4.89	24.0	24.0	1640.3	8,292	11.940	645.613	0.4	41.8
6/20/2009	4.84	24.0	24.0	1664.3	8,269	11.907	657.520	0.4	42.1
6/21/2009	4.98	24.0	24.0	1688.3	8,303	11.956	669.476	0.4	42.5
6/22/2009	4.77	24.0	24.0	1712.3	7,731	11.132	680.608	0.3	42.9
6/23/2009	4.64	24.0	24.0	1736.3	7,571	10.902	691.510	0.3	43.2
6/24/2009	4.59	24.0	24.0	1760.3	7,493	10.791	702.300	0.3	43.5

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
6/25/2009	4.44	22.4	24.0	1782.8	7,036	9.463	711.763	0.3	43.7
6/26/2009	4.60	24.0	24.0	1806.8	7,637	10.997	722.761	0.3	44.1
6/27/2009	4.63	24.0	24.0	1830.8	7,624	10.978	733.739	0.3	44.4
6/28/2009	2.21	22.5	24.0	1853.3	3,678	4.965	738.704	0.1	44.5
6/29/2009	1.96	24.0	24.0	1877.3	2,645	3.809	742.513	0.0	44.5
6/30/2009	4.88	24.0	24.0	1901.3	5,890	8.481	750.995	0.3	44.8
7/1/2009	4.91	24.0	24.0	1925.3	5,905	8.504	759.499	0.3	45.0
7/2/2009	4.86	24.0	24.0	1949.3	5,898	8.494	767.992	0.3	45.3
7/3/2009	4.56	24.0	24.0	1973.3	5,876	8.462	776.454	0.2	45.5
7/4/2009	4.62	24.0	24.0	1997.3	5,871	8.455	784.909	0.2	45.8
7/5/2009	4.59	24.0	24.0	2021.3	5,861	8.439	793.348	0.2	46.0
7/6/2009	4.69	24.0	24.0	2045.3	5,933	8.543	801.891	0.3	46.3
7/7/2009	4.23	23.8	24.0	2069.1	5,897	8.433	810.324	0.2	46.5
7/8/2009	6.73	24.0	24.0	2093.1	5,929	8.538	818.862	0.4	46.9
7/9/2009	7.64	24.0	24.0	2117.1	5,900	8.495	827.357	0.4	47.3
7/10/2009	7.73	24.0	24.0	2141.1	5,884	8.472	835.830	0.4	47.7
7/11/2009	7.67	24.0	24.0	2165.1	5,842	8.413	844.242	0.4	48.1

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
7/12/2009	7.75	24.0	24.0	2189.1	5,836	8.403	852.646	0.4	48.5
7/13/2009	7.97	24.0	24.0	2213.1	5,941	8.555	861.201	0.4	48.9
7/14/2009	7.74	24.0	24.0	2237.1	5,898	8.492	869.693	0.4	49.3
7/15/2009	7.61	24.0	24.0	2261.1	5,853	8.428	878.121	0.4	49.7
7/16/2009	7.61	24.0	24.0	2285.1	5,832	8.398	886.519	0.4	50.1
7/17/2009	7.48	24.0	24.0	2309.1	5,829	8.393	894.913	0.4	50.5
7/18/2009	7.62	24.0	24.0	2333.1	5,825	8.388	903.301	0.4	50.9
7/19/2009	7.79	24.0	24.0	2357.1	5,844	8.416	911.717	0.4	51.3
7/20/2009	7.57	17.0	24.0	2374.1	5,975	6.094	917.811	0.3	51.6
7/21/2009	9.04	24.0	24.0	2398.1	7,136	10.276	928.087	0.6	52.2
7/22/2009	4.39	14.9	24.0	2413.0	4,446	3.979	932.066	0.1	52.3
7/23/2009		0.0	24.0	2413.0		0.000	932.066	0.0	52.3
7/24/2009		0.0	24.0	2413.0		0.000	932.066	0.0	52.3
7/25/2009		0.0	24.0	2413.0		0.000	932.066	0.0	52.3
7/26/2009		0.0	24.0	2413.0		0.000	932.066	0.0	52.3
7/27/2009	6.61	5.4	24.0	2418.4	1,303	0.423	932.489	0.0	52.4
7/28/2009	6.96	24.0	24.0	2442.4	5,805	8.359	940.848	0.4	52.7

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
7/29/2009	5.63	24.0	24.0	2466.4	5,833	8.400	949.248	0.3	53.0
7/30/2009	3.07	24.0	24.0	2490.4	6,258	9.012	958.260	0.2	53.2
7/31/2009		24.0	24.0	2514.4		0.000	958.260	0.0	53.2
8/1/2009		0.0	24.0	2514.4		0.000	958.260	0.0	53.2
8/2/2009		0.0	24.0	2514.4		0.000	958.260	0.0	53.2
8/3/2009	4.52	15.3	24.0	2529.7	3,651	3.341	961.600	0.1	53.3
8/4/2009	6.76	24.0	24.0	2553.7	5,838	8.407	970.008	0.4	53.6
8/5/2009	6.77	24.0	24.0	2577.7	5,847	8.420	978.428	0.4	54.0
8/6/2009	6.94	23.0	24.0	2600.7	5,681	7.839	986.267	0.3	54.3
8/7/2009	7.25	24.0	24.0	2624.7	5,923	8.530	994.797	0.4	54.7
8/8/2009	6.79	24.0	24.0	2648.7	5,909	8.509	1003.306	0.4	55.1
8/9/2009	6.66	24.0	24.0	2672.7	5,890	8.482	1011.788	0.4	55.5
8/10/2009	6.65	24.0	24.0	2696.7	5,887	8.477	1020.264	0.4	55.8
8/11/2009	6.69	24.0	24.0	2720.7	5,896	8.491	1028.755	0.4	56.2
8/12/2009	6.67	24.0	24.0	2744.7	5,909	8.509	1037.264	0.4	56.5
8/13/2009	6.54	24.0	24.0	2768.7	5,938	8.551	1045.815	0.4	56.9
8/14/2009	6.63	24.0	24.0	2792.7	5,993	8.630	1054.446	0.4	57.2

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
8/15/2009	6.50	24.0	24.0	2816.7	5,971	8.599	1063.044	0.4	57.6
8/16/2009	6.44	24.0	24.0	2840.7	5,941	8.555	1071.599	0.3	57.9
8/17/2009	6.42	24.0	24.0	2864.7	5,919	8.523	1080.123	0.3	58.3
8/18/2009	6.29	24.0	24.0	2888.7	5,885	8.475	1088.597	0.3	58.6
8/19/2009	6.39	24.0	24.0	2912.7	5,831	8.397	1096.994	0.3	58.9
8/20/2009	6.29	23.8	24.0	2936.4	5,716	8.145	1105.140	0.3	59.3
8/21/2009	6.20	24.0	24.0	2960.4	5,928	8.536	1113.676	0.3	59.6
8/22/2009	6.12	24.0	24.0	2984.4	5,985	8.619	1122.295	0.3	59.9
8/23/2009	5.95	24.0	24.0	3008.4	5,970	8.597	1130.892	0.3	60.3
8/24/2009	5.79	24.0	24.0	3032.4	5,991	8.627	1139.519	0.3	60.6
8/25/2009	5.97	24.0	24.0	3056.4	5,960	8.583	1148.102	0.3	60.9
8/26/2009	6.00	24.0	24.0	3080.4	5,986	8.621	1156.723	0.3	61.2
8/27/2009	5.89	24.0	24.0	3104.4	5,978	8.609	1165.332	0.3	61.5
8/28/2009	5.85	24.0	24.0	3128.4	5,956	8.577	1173.908	0.3	61.9
8/29/2009	5.81	24.0	24.0	3152.4	5,987	8.622	1182.530	0.3	62.2
8/30/2009	5.78	24.0	24.0	3176.4	5,955	8.575	1191.105	0.3	62.5
8/31/2009	6.02	24.0	24.0	3200.4	5,909	8.510	1199.615	0.3	62.8

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
9/1/2009	6.16	24.0	24.0	3224.4	5,862	8.441	1208.056	0.3	63.1
9/2/2009	6.00	24.0	24.0	3248.4	5,913	8.515	1216.571	0.3	63.5
9/3/2009	5.89	24.0	24.0	3272.4	5,988	8.623	1225.193	0.3	63.8
9/4/2009	5.83	24.0	24.0	3296.4	6,031	8.685	1233.879	0.3	64.1
9/5/2009	5.52	24.0	24.0	3320.4	6,031	8.685	1242.564	0.3	64.4
9/6/2009	5.82	24.0	24.0	3344.4	6,116	8.808	1251.372	0.3	64.7
9/7/2009	4.46	24.0	24.0	3368.4	6,088	8.767	1260.138	0.2	65.0
9/8/2009	4.36	24.0	24.0	3392.4	6,088	8.767	1268.905	0.2	65.2
9/9/2009	5.96	24.0	24.0	3416.4	6,796	9.786	1278.692	0.4	65.6
9/10/2009	6.53	24.0	24.0	3440.4	7,900	11.377	1290.068	0.5	66.0
9/11/2009	5.94	24.0	24.0	3464.4	7,900	11.377	1301.445	0.4	66.5
9/12/2009	5.24	24.0	24.0	3488.4	7,872	11.336	1312.781	0.4	66.8
9/13/2009	6.10	24.0	24.0	3512.4	7,787	11.213	1323.994	0.4	67.3
9/14/2009	6.29	22.8	24.0	3535.3	7,815	10.707	1334.701	0.4	67.7
9/15/2009	5.66	24.0	24.0	3559.3	7,900	11.377	1346.078	0.4	68.1
9/16/2009	5.68	24.0	24.0	3583.3	7,900	11.377	1357.454	0.4	68.5
9/17/2009	6.11	24.0	24.0	3607.3	7,617	10.969	1368.423	0.4	68.9

Table B-2. Daily Soil Vapor Extraction Data at the 216-Z-1A Site

Date	Carbon Tetrachloride (ppmv)	Daily Operating Hours (hrs)	Daily Operating Hours Available (hrs)	Year-to-Date Operating Hours (hrs)	Daily Flowrate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
9/18/2009	5.99	24.0	24.0	3631.3	8,240	11.866	1380.289	0.4	69.4
9/19/2009	6.18	24.0	24.0	3655.3	8,240	11.866	1392.155	0.5	69.8
9/20/2009	6.47	24.0	24.0	3679.3	8,240	11.866	1404.021	0.5	70.3
9/21/2009	6.24	24.0	24.0	3703.3	8,127	11.703	1415.724	0.5	70.8
9/22/2009	6.10	24.0	24.0	3727.3	8,184	11.784	1427.508	0.5	71.2
9/23/2009	5.91	24.0	24.0	3751.3	8,184	11.784	1439.292	0.4	71.7
9/24/2009	6.14	24.0	24.0	3775.3	8,042	11.580	1450.873	0.4	72.1
9/25/2009	6.33	24.0	24.0	3799.3	8,155	11.744	1462.616	0.5	72.6
9/26/2009	6.12	24.0	24.0	3823.3	8,184	11.784	1474.401	0.5	73.0
9/27/2009	5.98	24.0	24.0	3847.3	8,240	11.866	1486.267	0.4	73.5
9/28/2009	1.82	24.0	24.0	3871.3	8,155	11.744	1498.010	0.1	73.6
9/29/2009		14.9	24.0	3886.2	4,729	4.232	1502.243	0.0	73.6
9/30/2009		0.0	24.0	3886.2		0.000	1502.243	0.0	73.6

Appendix C

Fiscal Year 2009 Soil Vapor Extraction Well Characterization Data

C Fiscal Year 2009 Soil Vapor Extraction Well Characterization Data

This appendix provides soil vapor extraction well characterization data for fiscal year 2009:

- Table C-1 provides the 216-Z-1A soil vapor extraction well characterization data for fiscal year 2009.
- Table C-2 provides the 216-Z-9 soil vapor extraction well characterization data for fiscal year 2009.

Table C-1. 216-Z-1A Soil Vapor Extraction Well Characterization Data, Fiscal Year 2009

Well/Interval	Date	Well Vacuum (kPa)	Flow (m^3/min)	CCl_4 (ppmv)	CCl_4 Flux (kg/day)	$CHCl_3$ (ppmv)	CH_2Cl_2 (ppmv)	MEK (ppmv)
299-W18-89	05/04/2009	0.5	1.4	17.1	0.224	0	1.88	0.660
299-W18-89	05/21/2009	0.9	1.7	13.8	0.209	0.011	1.54	0.278
299-W18-89	06/04/2009	1.0	1.7	11.3	0.171	1.07	1.69	0.376
299-W18-89	06/18/2009	0.9	1.9	12.9	0.222	1.07	1.99	0.360
299-W18-89	08/19/2009	0.8	1.4	12.0	0.157	0.462	1.81	0.298
299-W18-165	04/08/2009	2.2	1.0	16.0	0.144	0.16	1.69	0
299-W18-165	04/17/2009	1.2	0.4	14.5	0.056	0.119	1.30	0
299-W18-165	04/22/2009	2.0	1.1	15.5	0.155	0.289	0.357	0
299-W18-165	04/29/2009	1.0	0.3	13.5	0.038	0.219	1.31	0.164
299-W18-165	05/04/2009	0.7	0.4	10.1	0.039	0.335	0.970	0.115
299-W18-165	05/21/2009	1.3	0.7	12.0	0.071	0.03	2.08	0.221
299-W18-165	06/04/2009	1.2	0.8	7.5	0.052	0.836	1.34	0.247
299-W18-165	06/18/2009	1.1	0.7	10.1	0.060	1.08	1.89	0.270
299-W18-165	08/19/2009	0.9	0.3	8.8	0.025	0.600	1.57	0.137
299-W18-166	04/08/2009	2.4	0.5	9.8	0.045	0.07	1.87	0
299-W18-166	04/17/2009	1.2	0.2	7.2	0.015	0	1.74	0
299-W18-166	04/22/2009	2.2	0.5	7.4	0.036	0.654	0	0
299-W18-166	04/29/2009	0.7	0.2	6.4	0.013	0.321	1.23	0.228
299-W18-166	05/04/2009	0.7	0.2	7.0	0.014	0	1.54	0.245
299-W18-166	05/21/2009	1.1	0.2	5.5	0.011	0	1.62	0.204
299-W18-166	06/04/2009	1.1	0.3	4.4	0.010	0.719	0.998	0.281
299-W18-166	06/18/2009	1.2	0.3	4.7	0.011	0.816	1.67	0.292
299-W18-166	08/19/2009	0.9	0.3	3.8	0.009	0.310	1.35	0.182
299-W18-167	04/08/2009	0.8	2.4	14.1	0.300	0.866	0.879	0
299-W18-167	04/17/2009	0.7	1.9	15.5	0.267	0.867	0.900	0
299-W18-167	04/22/2009	0.9	2.5	15.5	0.358	1.15	0	0
299-W18-167	04/29/2009	0.8	2.4	16.5	0.356	0.445	1.67	0.122
299-W18-167	05/04/2009	0.3	1.9	11.5	0.195	0.358	1.05	0.195
299-W18-167	05/21/2009	0.8	1.8	10.6	0.171	0.072	2.00	0.240
299-W18-167	06/04/2009	0.7	2.2	7.7	0.156	1.15	1.42	0.272

Table C-1. 216-Z-1A Soil Vapor Extraction Well Characterization Data, Fiscal Year 2009

Well/Interval	Date	Well Vacuum (kPa)	Flow (m^3/min)	CCl_4 (ppmv)	CCl_4 Flux (kg/day)	$CHCl_3$ (ppmv)	CH_2Cl_2 (ppmv)	MEK (ppmv)
299-W18-167	06/18/2009	0.6	2.3	8.9	0.186	1.49	2.07	0.431
299-W18-167	08/19/2009	0.6	1.7	10.9	0.165	0.226	1.79	0.325
299-W18-168	04/08/2009	1.1	0.2	19.4	0.040	0	1.60	0
299-W18-168	04/17/2009	0.7	0.2	18.5	0.038	0	2.24	0
299-W18-168	04/22/2009	1.2	0.2	19.7	0.040	0.574	0.576	0
299-W18-168	04/29/2009	1.2	0.2	12.9	0.026	0.382	1.34	0.172
299-W18-168	05/04/2009	0.5	0.2	13.0	0.027	0.186	0.864	0.169
299-W18-168	05/21/2009	0.9	0.2	0.7	0.001	0.14	0.314	0.106
299-W18-168	06/04/2009	0.9	0.2	7.3	0.015	0.854	1.29	0.210
299-W18-168	06/18/2009	0.8	0.3	8.4	0.019	1.07	1.84	0.306
299-W18-168	08/19/2009	0.7	0.2	7.3	0.015	0.348	1.42	0.162
299-W18-174	04/08/2009	2.5	0.3	10.8	0.030	0.134	0.713	0
299-W18-174	04/17/2009	1.5	0.2	6.6	0.014	0	0.661	0
299-W18-174	04/22/2009	2.5	0.2	8.5	0.017	0.833	0	0
299-W18-174	04/29/2009	2.7	0.3	7.9	0.024	0.135	1.24	0.249
299-W18-174	05/04/2009	1.3	0.2	8.7	0.018	0.134	1.23	0.226
299-W18-174	05/21/2009	1.5	0.2	5.2	0.011	0	1.62	0.194
299-W18-174	06/04/2009	1.5	0.3	3.5	0.008	0.757	1.04	0.235
299-W18-174	06/18/2009	1.4	0.3	4.1	0.009	0.829	1.54	0.253
299-W18-174	08/19/2009	1.1	0.3	3.4	0.008	0.132	1.47	0.190
299-W18-175	04/29/2009	2.7	0.4	44.8	0.173	0	20.0	1.37
299-W18-175	05/04/2009	1.2	0.2	60.7	0.125	0	15.9	1.15
299-W18-175	05/21/2009	1.5	0.2	49.2	0.101	0	16.8	1.10
299-W18-175	06/04/2009	1.5	0.2	44.5	0.091	3.93	14.5	1.15
299-W18-175	06/18/2009	1.4	0.2	49.7	0.102	4.48	16.4	1.19
299-W18-175	08/19/2009	1.1	0.2	41.8	0.086	0.000	13.7	0.934
299-W18-248	05/04/2009	1.5	0.2	2.3	0.005	0.193	0.326	0.118
299-W18-248	05/21/2009	1.6	0.2	0.2	0.001	0.056	0.326	0.109
299-W18-248	06/04/2009	1.5	0.2	2.3	0.005	0.678	0.550	0.191
299-W18-248	06/18/2009	1.5	0.2	6.0	0.012	1.13	1.48	0.342

Table C-1. 216-Z-1A Soil Vapor Extraction Well Characterization Data, Fiscal Year 2009

Well/Interval	Date	Well Vacuum (kPa)	Flow (m^3/min)	CCl_4 (ppmv)	CCl_4 Flux (kg/day)	$CHCl_3$ (ppmv)	CH_2Cl_2 (ppmv)	MEK (ppmv)
299-W18-248	08/19/2009	1.1	0.2	0.2	0.000	0.304	0.681	0.149
299-W18-253	04/29/2009	0.7	0.2	6.1	0.013	0.261	0.562	0.203
299-W18-253	05/04/2009	0.7	0.4	16.8	0.065	0.071	1.32	0.338
299-W18-253	05/21/2009	1.2	0.3	8.1	0.023	0.124	0.935	0.165
299-W18-253	06/04/2009	1.2	0.5	8.8	0.043	0.903	1.37	0.315
299-W18-253	06/18/2009	1.1	0.4	8.7	0.034	0.867	1.25	0.295
299-W18-253	08/19/2009	0.9	0.3	10.5	0.027	0.179	1.82	0.362

CCl_4 = carbon tetrachloride
$CHCl_3$ = chloroform
CH_2Cl_2 = methylene chloride
MEK = methyl ethyl ketone
ppmv = parts per million by volume

Table C-2. 216-Z-9 Soil Vapor Extraction Well Characterization Data, Fiscal Year 2009

Well/Interval	Date	Well Vacuum (kPa)	Flow (m^3/min)	CCl_4 (ppmv)	CCl_4 Flux (kg/day)	$CHCl_3$ (ppmv)	CH_2Cl_2 (ppmv)	MEK (ppmv)
299-W15-8U	05/04/2009	9.2	0.8	28.7	0.2	0.393	2.83	0.388
299-W15-8U	05/13/2009	9.7	0.9	16.8	0.1	0.460	0.651	0.235
299-W15-8U	05/21/2009	9.0	0.7	16.8	0.1	0.405	0.706	0.238
299-W15-8U	06/04/2009	7.2	0.8	18.1	0.1	1.55	3.60	0.512
299-W15-8U	07/30/2009	7.5	0.3	12.1	0.0	1.20	2.52	0.435
299-W15-8U	08/19/2009	4.0	0.4	7.8	0.0	0.539	1.21	0.213
299-W15-9L	04/02/2009	17.4	2.0	5.8	0.1	0.903	0.577	0
299-W15-9L	04/08/2009	21.9	1.9	7.8	0.1	1.06	1.30	0
299-W15-9L	04/17/2009	13.7	1.6	6.1	0.1	0.436	1.65	0
299-W15-9L	04/22/2009	12.7	1.3	6.8	0.1	1.64	0	0
299-W15-9L	04/29/2009	18.9	1.9	6.4	0.1	0.118	2.30	0.320
299-W15-9L	05/04/2009	10.5	1.4	6.4	0.1	0.22	1.65	0.308
299-W15-9L	05/13/2009	11.2	1.3	5.3	0.1	0.521	0.315	0.157
299-W15-9L	05/21/2009	9.0	1.2	4.6	0.1	0.455	0.214	0.175
299-W15-9L	06/04/2009	8.5	1.2	5.7	0.1	1.26	3.06	0.466
299-W15-9L	07/30/2009	5.0	0.9	4.5	0.0	1.04	2.07	0.334
299-W15-9L	08/19/2009	5.0	0.9	5.0	0.0	0.494	1.31	0.243
299-W15-9U	04/02/2009	15.2	2.7	6.0	0.1	1.07	0.937	0
299-W15-9U	04/08/2009	19.4	2.5	7.0	0.2	1.27	1.06	0
299-W15-9U	04/17/2009	12.2	1.9	5.9	0.1	1.30	0.495	0
299-W15-9U	04/22/2009	12.2	1.6	6.5	0.1	1.79	0	0
299-W15-9U	04/29/2009	17.4	2.1	6.7	0.1	0.256	2.17	0.316
299-W15-9U	05/04/2009	9.7	1.7	6.4	0.1	0.023	1.85	0.332
299-W15-9U	05/13/2009	10.5	1.7	5.1	0.1	0.425	0.233	0.090
299-W15-9U	05/21/2009	8.7	1.6	4.6	0.1	0.310	0.590	0.187
299-W15-9U	06/04/2009	8.0	1.6	5.1	0.1	1.33	2.75	0.519
299-W15-9U	07/30/2009	4.7	1.1	5.2	0.1	1.22	2.35	0.423
299-W15-9U	08/19/2009	4.5	1.1	4.8	0.0	0.587	1.30	0.224
299-W15-48	05/04/2009	13.9	2.4	15.4	0.3	0.206	2.85	0.264
299-W15-48	05/13/2009	11.2	4.1	8.3	0.3	0.722	1.46	0.187

Table C-2. 216-Z-9 Soil Vapor Extraction Well Characterization Data, Fiscal Year 2009

Well/Interval	Date	Well Vacuum (kPa)	Flow (m^3/min)	CCl_4 (ppmv)	CCl_4 Flux (kg/day)	$CHCl_3$ (ppmv)	CH_2Cl_2 (ppmv)	MEK (ppmv)
299-W15-48	05/21/2009	12.5	2.0	10.7	0.2	0.543	2.26	0.269
299-W15-48	06/04/2009	11.5	2.4	9.2	0.2	1.59	3.75	0.498
299-W15-48	07/30/2009	7.5	1.6	10.6	0.1	1.79	4.09	0.547
299-W15-48	08/19/2009	6.5	1.7	9.5	0.1	0.756	2.48	0.343
299-W15-82	04/02/2009	24.9	0.2	1.9	0.0	1.53	0	0
299-W15-82	04/08/2009	19.9	0.2	5.1	0.0	0.983	0.886	0
299-W15-82	04/17/2009	13.2	0.2	2.0	0.0	0.981	0.102	0
299-W15-82	04/22/2009	12.5	0.2	2.1	0.0	1.30	0	0
299-W15-82	04/29/2009	17.7	0.2	1.6	0.0	0.120	1.06	0.309
299-W15-82	05/04/2009	18.7	0.2	2.6	0.0	0.055	1.03	0.247
299-W15-82	05/13/2009	14.4	2.4	4.8	0.1	0.496	0.211	0.122
299-W15-82	05/21/2009	18.7	0.2	1.6	0.0	0.532	0	0.147
299-W15-82	06/04/2009	14.9	0.2	1.4	0.0	0.694	1.33	0.308
299-W15-82	07/30/2009	9.0	0.2	1.0	0.0	0.888	0.973	0.320
299-W15-82	08/19/2009	8.0	0.3	0.3	0.0	0.665	0.171	0.150
299-W15-86	05/04/2009	11.2	2.2	34.8	0.7	0.271	3.62	0.362
299-W15-86	05/13/2009	11.5	2.4	27.2	0.6	0.350	1.84	0.184
299-W15-86	05/21/2009	10.0	1.9	22.2	0.4	0.432	1.34	0.194
299-W15-86	06/04/2009	9.7	2.1	24.5	0.5	2.01	4.71	0.604
299-W15-86	07/30/2009	5.0	1.2	22.9	0.2	1.81	4.34	0.445
299-W15-86	08/19/2009	5.0	1.3	18.7	0.2	0.573	2.46	0.285
299-W15-217	04/02/2009	14.7	2.0	29.0	0.5	1.03	4.24	0
299-W15-217	04/08/2009	17.4	2.8	26.5	0.7	0.42	5.20	0.117
299-W15-217	04/17/2009	11.5	1.9	20.6	0.3	0.607	2.57	0
299-W15-217	04/22/2009	12.0	1.5	19.0	0.3	1.69	0.472	0
299-W15-217	04/29/2009	15.2	2.4	16.0	0.4	0.156	2.40	0.399
299-W15-217	05/04/2009	11.5	2.3	16.3	0.3	0.240	2.48	0.321
299-W15-217	05/13/2009	12.0	2.3	10.9	0.2	0.473	0.186	0.0643
299-W15-217	05/21/2009	10.0	2.0	7.3	0.1	0.520	0	0.100
299-W15-217	06/04/2009	8.0	2.4	9.1	0.2	1.19	2.66	0.436

Table C-2. 216-Z-9 Soil Vapor Extraction Well Characterization Data, Fiscal Year 2009

Well/Interval	Date	Well Vacuum (kPa)	Flow (m^3/min)	CCl_4 (ppmv)	CCl_4 Flux (kg/day)	$CHCl_3$ (ppmv)	CH_2Cl_2 (ppmv)	MEK (ppmv)
299-W15-217	07/30/2009	5.2	1.0	7.5	0.1	1.13	1.92	0.318
299-W15-217	08/19/2009	5.0	1.1	6.6	0.1	0.618	1.03	0.148
C5340	05/04/2009	10.0	0.2	53.0	0.1	0.266	4.46	0.626
C5340	05/13/2009	11.0	0.2	63.4	0.1	0.683	1.94	0.440
C4937	05/21/2009	9.7	0.3	251.0	0.6	2.48	6.41	1.40
C4938	05/21/2009	9.7	0.3	4.7	0.0	0.470	0.535	0.257
C5340	05/21/2009	9.7	0.3	6.4	0.0	0.378	0	0.215
C4937	06/04/2009	8.0	0.3	68.9	0.2	5.16	9.84	1.35
C4938	06/04/2009	8.0	0.3	4.4	0.0	1.50	2.82	0.547
C5340	06/04/2009	8.5	0.3	4.2	0.0	1.31	2.51	0.483
C4937	07/30/2009	5.0	0.3	71.9	0.2	5.25	8.62	1.42
C4938	07/30/2009	5.0	0.3	5.5	0.0	1.09	1.90	0.466
C5340	07/30/2009	5.0	0.3	2.1	0.0	0.631	1.24	0.264
C4937	08/19/2009	4.7	0.3	34.3	0.1	0.738	2.46	0.541
C4938	08/19/2009	4.7	0.3	1.7	0.0	0.385	0.826	0.198
C5340	08/19/2009	4.7	0.3	1.1	0.0	0.311	0.759	0.202

CCl_4 = carbon tetrachloride
$CHCl_3$ = chloroform
CH_2Cl_2 = methylene chloride
MEK = methyl ethyl ketone
ppmv = parts per million by volume

Appendix D

Fiscal Year 2009 Passive Soil Vapor Extraction Data

D Fiscal Year 2009 Passive Soil Vapor Extraction Data

This appendix contains the following four tables of data from fiscal year 2009 for passive soil vapor extraction:

- Table D-1 provides passive soil vapor extraction well monitoring data for the 216-Z-1A/216-Z-18/216-Z-12 site.
- Table D-2 provides data on carbon tetrachloride concentration standard analyses.
- Table D-3 provides data on blank analyses.
- Table D-4 provides data on field blank analyses.

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data, 216-Z-1A/216-Z-18/Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W18-6L	63	6	10/23/08 08:20	1.00 U	1.00 U	1.00 U	1.00 U	7,560	
299-W18-6L	63	6	11/19/08 12:32	1.00 U	1.00 U	1.00 U	1.00 U	8,230	
299-W18-6L	63	6	01/07/09 14:03	5.64	1.00 U	1.00 U	2.73	11,000	
299-W18-6L	63	6	01/07/09 14:16	5.57	1.00 U	1.00 U	2.69	11,000	DUPLICATE
299-W18-6L	63	6	01/28/09 08:51	1.00 U	1.00 U	1.00 U	1.00 U	4,800	
299-W18-6L	63	6	02/25/09 08:12	8.00	1.00 U	1.00 U	1.82	9,130	
299-W18-6L	63	6	03/24/09 12:20	1.00 U	1.00 U	1.00 U	1.00 U	7,430	
299-W18-6L	63	6	04/22/09 08:28	8.23	1.00 U	1.00 U	1.87	12,600	
299-W18-6L	63	6	05/12/09 09:06	7.78	1.00 U	1.00 U	1.83	8,800	
299-W18-6L	63	6	06/26/09 08:16	2.20	1.00 U	1.00 U	1.59	8,810	
299-W18-6L	63	6	07/24/09 09:31	1.62	1.00 U	1.47	2.38	13,400	
299-W18-6L	63	6	08/27/09 08:56	1.84	1.00 U	1.00 U	1.02	7,820	
299-W18-6L	63	6	08/27/09 08:56	1.91	1.00 U	1.00 U	1.02	7,760	DUPLICATE
299-W18-6L	63	6	09/23/09 08:42	10.3	1.00 U	1.00 U	1.29	13,100	
299-W18-7	60	6	10/23/08 08:10	4.44	1.00 U	1.00 U	1.00 U	6,880	
299-W18-7	60	6	11/19/08 12:20	1.00 U	1.00 U	1.00 U	1.00 U	5,780	
299-W18-7	60	6	01/07/09 13:45	16.2	1.00 U	1.00 U	2.44	10,600	
299-W18-7	60	6	01/28/09 08:33	10.4	1.00 U	1.00 U	1.57	4,690	
299-W18-7	60	6	01/28/09 09:19	10.9	1.00 U	1.00 U	1.62	4,620	DUPLICATE

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data, 216-Z-1A/216-Z-18/Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W18-7	60	6	02/25/09 08:03	16.6	1.00 U	1.00 U	1.44	8,860	
299-W18-7	60	6	03/24/09 12:05	11.2	1.00 U	1.00 U	1.00 U	7,980	
299-W18-7	60	6	04/22/09 08:19	16.8	1.00 U	1.00 U	1.56	12,600	
299-W18-7	60	6	05/12/09 08:54	12.2	1.00 U	1.00 U	1.39	7,970	
299-W18-7	60	6	06/26/09 07:59	9.75	1.00 U	1.00 U	1.44	9,080	
299-W18-7	60	6	07/24/09 09:12	3.87	1.00 U	1.37	2.36	14,400	
299-W18-7	60	6	08/27/09 08:41	5.41	1.00 U	1.00 U	1.00 U	8,410	
299-W18-7	60	6	09/23/09 08:32	6.86	1.00 U	1.00 U	1.28	9,190	
299-W18-7	60	6	09/23/09 08:33	7.07	1.00 U	1.00 U	1.69	9,440	DUPLICATE
299-W18-10	56	6	10/23/08 09:20	8.56	1.00 U	1.00 U	1.00 U	8,050	
299-W18-10	56	6	11/19/08 13:25	3.28	1.00 U	1.00 U	1.01	7,170	
299-W18-10	56	6	01/07/09 15:32	11.6	1.00 U	1.00 U	1.00 U	12,000	
299-W18-10	56	6	01/28/09 09:49	5.13	1.00 U	1.00 U	1.00 U	4,850	
299-W18-10	56	6	02/25/09 09:06	11.7	1.00 U	1.00 U	1.02	9,670	
299-W18-10	56	6	02/25/09 09:06	11.8	1.00 U	1.00 U	1.00 U	9,700	DUPLICATE
299-W18-10	56	6	03/24/09 13:25	1.00 U	1.00 U	1.00 U	1.00 U	6,810	
299-W18-10	56	6	04/22/09 09:19	8.48	1.00 U	1.00 U	1.72	10,900	
299-W18-10	56	6	05/12/09 10:07	11.9	1.00 U	1.00 U	1.23	10,800	
299-W18-10	56	6	06/26/09 10:49	8.10	1.00 U	1.00 U	1.62	10,300	

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data, 216-Z-1A/216-Z-18/Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W18-10	56	6	07/24/09 11:45	6.46	1.00 U	1.00 U	2.06	12,900	
299-W18-10	56	6	08/27/09 09:51	4.66	1.00 U	1.00 U	1.00 U	9,640	
299-W18-10	56	6	09/23/09 09:34	4.43	1.00 U	1.00 U	1.30	16,600	
299-W18-11L	61	6	10/23/08 09:12	2.13	1.00 U	1.00 U	1.00 U	7,740	
299-W18-11L	61	6	11/19/08 13:16	1.00 U	1.00 U	1.00 U	1.00 U	5,630	
299-W18-11L	61	6	01/07/09 15:20	6.45	1.00 U	1.00 U	1.21	10,800	
299-W18-11L	61	6	01/28/09 09:43	1.00 U	1.00 U	1.00 U	1.00 U	4,820	
299-W18-11L	61	6	02/25/09 08:59	8.07	1.00 U	1.00 U	1.00 U	9,530	
299-W18-11L	61	6	03/24/09 13:14	1.97	1.00 U	1.00 U	1.00 U	6,890	
299-W18-11L	61	6	03/24/09 13:16	2.16	1.00 U	1.00 U	1.00 U	6,790	DUPLICATE
299-W18-11L	61	6	04/22/09 09:13	6.46	1.00 U	1.00 U	1.15	8,910	
299-W18-11L	61	6	05/12/09 10:00	6.31	1.00 U	1.00 U	1.00 U	9,330	
299-W18-11L	61	6	06/26/09 10:43	1.61	1.00 U	1.00 U	1.02	9,880	
299-W18-11L	61	6	07/24/09 11:38	2.26	1.00 U	1.00 U	1.74	12,800	
299-W18-11L	61	6	08/27/09 09:44	1.00 U	1.00 U	1.00 U	1.00 U	8,650	
299-W18-11L	61	6	09/23/09 09:28	1.00 U	1.00 U	1.00 U	1.00 U	10,200	
299-W18-12L	60	6	10/23/08 09:05	1.17	1.00 U	1.00 U	1.00 U	9,350	
299-W18-12L	60	6	11/19/08 13:09	1.00 U	1.00 U	1.00 U	1.00 U	5,920	
299-W18-12L	60	6	01/07/09 15:08	2.36	1.00 U	1.00 U	1.20	11,700	

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data, 216-Z-1A/216-Z-18/Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W18-12L	60	6	01/28/09 09:36	1.00 U	1.00 U	1.00 U	1.00 U	5,430	
299-W18-12L	60	6	02/25/09 08:52	4.54	1.00 U	1.00 U	1.00 U	9,920	
299-W18-12L	60	6	03/24/09 13:05	1.00 U	1.00 U	1.00 U	1.00 U	6,660	
299-W18-12L	60	6	04/22/09 08:59	2.45	1.00 U	1.00 U	1.17	11,900	
299-W18-12L	60	6	04/22/09 09:06	2.41	1.00 U	1.00 U	1.17	11,600	DUPLICATE
299-W18-12L	60	6	05/12/09 09:55	2.99	1.00 U	1.00 U	1.00 U	10,900	
299-W18-12L	60	6	06/26/09 10:36	1.00 U	1.00 U	1.00 U	1.10	8,510	
299-W18-12L	60	6	07/24/09 11:32	1.00 U	1.00 U	1.00 U	1.47	11,500	
299-W18-12L	60	6	08/27/09 09:37	1.00 U	1.00 U	1.00 U	1.00 U	6,830	
299-W18-12L	60	6	09/23/09 09:21	1.00 U	1.00 U	1.00 U	1.31	10,600	
299-W18-246L	52	6	10/23/08 08:30	2.91	1.00 U	1.00 U	1.00 U	6,960	
299-W18-246L	52	6	11/19/08 12:37	2.14	1.00 U	1.00 U	1.00 U	7,660	
299-W18-246L	52	6	01/07/09 14:24	12.8	1.00 U	1.00 U	1.19	9,650	
299-W18-246L	52	6	01/28/09 08:59	1.00 U	1.00 U	1.00 U	1.00 U	4,770	
299-W18-246L	52	6	02/25/09 08:20	14.2	1.00 U	1.00 U	1.00 U	8,230	
299-W18-246L	52	6	03/24/09 12:29	1.00 U	1.00 U	1.00 U	1.00 U	6,970	
299-W18-246L	52	6	04/22/09 08:34	10.5	1.00 U	1.00 U	1.13	11,300	
299-W18-246L	52	6	05/12/09 09:14	15.7	1.00 U	1.00 U	1.00 U	7,850	
299-W18-246L	52	6	05/12/09 09:14	16.2	1.00 U	1.00 U	1.01	8,190	DUPLICATE

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data, 216-Z-1A/216-Z-18/Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W18-246L	52	6	06/26/09 08:25	1.00 U	1.00 U	1.00 U	1.00 U	8,590	
299-W18-246L	52	6	07/24/09 09:37	1.00 U	1.00 U	1.12	2.00	13,300	
299-W18-246L	52	6	08/27/09 09:06	1.00 U	1.00 U	1.00 U	1.00 U	7,290	
299-W18-246L	52	6	09/23/09 08:47	15.4	1.00 U	1.00 U	1.00 U	13,100	
299-W18-247L	51	6	10/23/08 09:28	5.82	1.00 U	1.00 U	1.00 U	7,830	
299-W18-247L	51	6	10/23/08 09:30	6.07	1.00 U	1.00 U	1.00 U	7,710	DUPLICATE
299-W18-247L	51	6	11/19/08 13:33	1.00 U	1.00 U	1.00 U	1.00 U	5,510	
299-W18-247L	51	6	01/07/09 15:45	7.23	1.00 U	1.00 U	1.00 U	9,390	
299-W18-247L	51	6	01/28/09 09:57	1.00 U	1.00 U	1.00 U	1.00 U	5,430	
299-W18-247L	51	6	02/25/09 09:15	8.31	1.00 U	1.00 U	1.00 U	8,820	
299-W18-247L	51	6	03/24/09 13:33	1.00 U	1.00 U	1.00 U	1.00 U	6,880	
299-W18-247L	51	6	04/22/09 09:26	1.90	1.00 U	1.00 U	1.00 U	13,100	
299-W18-247L	51	6	05/12/09 10:15	2.59	1.00 U	1.00 U	1.00 U	11,000	
299-W18-247L	51	6	06/26/09 10:57	1.00 U	1.00 U	1.00 U	1.42	8,730	
299-W18-247L	51	6	06/26/09 10:57	1.00 U	1.00 U	1.00 U	1.72	8,650	DUPLICATE
299-W18-247L	51	6	07/24/09 11:55	1.28	1.00 U	1.00 U	1.67	12,000	
299-W18-247L	51	6	08/27/09 10:00	1.00 U	1.00 U	1.00 U	1.00 U	7,750	
299-W18-247L	51	6	09/23/09 09:40	1.00 U	1.00 U	1.00 U	1.14	17,100	
299-W18-252L	53	6	10/23/08 08:40	12.1	1.00 U	1.00 U	1.00 U	7,340	

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data, 216-Z-1A/216-Z-18/Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W18-252L	53	6	11/19/08 12:48	1.00 U	1.00 U	1.00 U	1.00 U	5,270	
299-W18-252L	53	6	11/19/08 12:53	1.00 U	1.00 U	1.00 U	1.00 U	5,160	DUPLICATE
299-W18-252L	53	6	01/07/09 14:41	9.56	1.00 U	1.00 U	1.37	9,810	
299-W18-252L	53	6	01/28/09 09:08	1.00 U	1.00 U	1.00 U	1.00 U	5,110	
299-W18-252L	53	6	02/25/09 08:29	11.2	1.00 U	1.00 U	1.00 U	8,630	
299-W18-252L	53	6	03/24/09 12:39	1.00 U	1.00 U	1.00 U	1.00 U	6,730	
299-W18-252L	53	6	04/22/09 08:41	8.38	1.00 U	1.00 U	1.17	11,400	
299-W18-252L	53	6	05/12/09 09:26	8.02	1.00 U	1.00 U	1.00 U	8,290	
299-W18-252L	53	6	06/26/09 08:39	3.46	1.00 U	1.00 U	1.56	8,880	
299-W18-252L	53	6	07/24/09 09:49	3.37	1.00 U	1.00 U	1.77	13,200	
299-W18-252L	53	6	07/24/09 09:49	3.41	1.00 U	1.00 U	1.65	13,100	DUPLICATE
299-W18-252L	53	6	08/27/09 09:16	2.47	1.00 U	1.00 U	1.00 U	7,940	
299-W18-252L	53	6	09/23/09 08:55	7.06	1.00 U	1.00 U	1.33	13,600	

bgs = below ground surface
CCl_4 = carbon tetrachloride
$CHCl_3$ = chloroform
CH_2Cl_2 = methylene chloride
MEK = methyl ethyl ketone
ppmv = parts per million by volume
U = analyzed for but not detected; value reported in the reporting limit

Table D-2. Carbon Tetrachloride Concentration Standard Analyses

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed	B&K™ Serial Number
24.984	21.4	10/23/08	09:53	1715232
24.984	21.7	10/23/08	10:49	1715232
24.984	21.6	11/19/08	14:11	1715232
24.984	21.5	11/19/08	15:07	1715232
24.984	21.4	01/07/09	16:19	1715232
24.984	21.4	01/07/09	17:15	1715232
24.984	21.5	01/28/09	10:24	1715232
24.984	21.5	01/28/09	11:20	1715232
24.984	21.1	02/25/09	09:35	1715232
24.984	21.2	02/25/09	10:31	1715232
24.984	21.7	03/24/09	15:12	1715232
24.984	21.8	03/24/09	16:08	1715232
24.984	21.0	04/22/09	09:48	1715232
24.984	21.2	04/22/09	10:44	1715232
24.984	21.0	05/12/09	10:41	1715232
24.984	21.0	05/12/09	11:37	1715232
24.984	21.0	06/26/09	11:20	1715232
24.984	21.7	06/26/09	13:14	1715232
24.984	21.1	07/24/09	12:15	1715232
24.984	21.0	07/24/09	14:07	1715232
24.984	21.4	08/27/09	10:26	1715232
24.984	21.3	08/27/09	11:22	1715232
24.984	21.2	09/23/09	10:03	1715232
24.984	21.2	09/23/09	10:59	1715232

B&K™ = Brüel & Kjær (trademark of Brüel & Kjær North America, Inc., Norcross, Georgia)
ppmv = parts per million by volume

Table D-3. Blank Analyses

Sample Location	Sample Date	Sample Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
Blank	10/23/08	09:55	1.00 U	1.00 U	1.00 U	1.00 U	4,820
Blank	10/23/08	10:47	1.00 U	1.00 U	1.00 U	1.00 U	5,060
Blank	11/19/08	14:13	1.00 U	1.00 U	1.00 U	1.00 U	1,850
Blank	11/19/08	15:05	1.00 U	1.00 U	1.00 U	1.00 U	3,540
Blank	01/07/09	16:21	1.00 U	1.00 U	1.00 U	1.00 U	3,060
Blank	01/07/09	17:13	1.00 U	1.00 U	1.00 U	1.00 U	4,880
Blank	01/28/09	10:26	1.00 U	1.00 U	1.00 U	1.00 U	3,640
Blank	01/28/09	11:18	1.00 U	1.00 U	1.00 U	1.00 U	3,960
Blank	02/25/09	09:37	1.00 U	1.00 U	1.00 U	1.00 U	7,010
Blank	02/25/09	10:29	1.00 U	1.00 U	1.00 U	1.00 U	7,260
Blank	03/24/09	15:14	1.00 U	1.00 U	1.00 U	1.00 U	7,330
Blank	03/24/09	16:06	1.00 U	1.00 U	1.00 U	1.00 U	7,200
Blank	04/22/09	09:50	1.00 U	1.00 U	1.00 U	1.00 U	6,920
Blank	04/22/09	10:46	1.00 U	1.00 U	1.00 U	1.00 U	7,430
Blank	05/12/09	10:43	1.00 U	1.00 U	1.00 U	1.00 U	5,560
Blank	05/12/09	11:39	1.00 U	1.00 U	1.00 U	1.00 U	5,850
Blank	06/26/09	11:22	1.00 U	1.00 U	1.00 U	1.00 U	8,890
Blank	06/26/09	13:12	1.00 U	1.00 U	1.00 U	1.00 U	8,290
Blank	07/24/09	12:17	1.00 U	1.00 U	1.00 U	1.00 U	9,960
Blank	07/24/09	14:09	1.00 U	1.00 U	1.00 U	1.00 U	10,600
Blank	08/27/09	10:28	1.00 U	1.00 U	1.00 U	1.00 U	7,090
Blank	08/27/09	11:24	1.00 U	1.00 U	1.00 U	1.00 U	7,430
Blank	09/23/09	10:05	1.00 U	1.00 U	1.00 U	1.00 U	6,990
Blank	09/23/09	11:01	1.00 U	1.00 U	1.00 U	1.00 U	7,530

CCl_4 = carbon tetrachloride
$CHCl_3$ = chloroform
CH_2Cl_2 = methylene chloride
MEK = methyl ethyl ketone
ppmv = parts per million by volume
U = analyzed for but not detected; value reported in the reporting limit

Table D-4. Field Blank Analyses

Sample Location	Sample Date	Sample Time	Analysis Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
Field Blank	04/22/09	09:32	10:26	1.00 U	1.00 U	1.00 U	1.00 U	8,190	Previously used Tedlar® bag was from Well C5340.
Field Blank	05/12/09	10:20	11:19	1.00 U	1.00 U	1.00 U	1.00 U	7,810	Previously used Tedlar® bag was from Well C4937.
Field Blank	06/26/09	11:03	12:54	1.00 U	1.00 U	1.00 U	1.44	8,670	Previously used Tedlar® bag was from Well 299-W18-248.
Field Blank	07/24/09	11:58	13:49	1.00 U	1.00 U	1.00 U	1.41 J	11,600	Previously used Tedlar® bag was from Well 299-W18-152. J was also detected in trailer.
Field Blank	08/27/09	10:04	11:04	1.00 U	1.00 U	1.00 U	1.00 U	7,310	Previously used Tedlar® bag was from Well 299-W15-84.
Field Blank	09/23/09	09:44	10:41	1.00 U	1.00 U	1.00 U	1.00 U	8,570	Previously used Tedlar® bag was from Well 299-W15-46.

CCl_4 = carbon tetrachloride
$CHCl_3$ = chloroform
CH_2Cl_2 = methylene chloride
MEK = methyl ethyl ketone
ppmv = parts per million by volume
U = analyzed for but not detected; value reported in the reporting limit
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Appendix E

Fiscal Year 2009 Soil Vapor Monitoring Data

E Fiscal Year 2009 Soil Vapor Monitoring Data

This appendix presents the following five tables containing data for fiscal year 2009 soil vapor monitoring:

- Table E-1 provides monitoring data for non-operational wells and probes at the 216-Z-1A/216-Z-18/216-Z-12 site.
- Table E-2 provides monitoring data for non-operational wells and probes at the 216-Z-9 site.
- Table E-3 provides data for carbon tetrachloride concentration standard analyses.
- Table E-4 provides data on blank analyses.
- Table E-5 provides data on field blank analyses.

Table E-1. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-1A/216-Z-18/216-Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-4E/ 25 ft	8	2	04/21/09 09:15	[1]	2.45	1.00 U	1.00 U	1.98	11,400	
CPT-4E/ 25 ft	8	2	05/14/10 08:16	[1]	2.58	1.00 U	1.00 U	1.00 U	12,000	
CPT-4E/ 25 ft	8	2	06/26/09 09:00	[1]	1.44	1.00 U	1.00 U	1.34	10,300	
CPT-4E/ 25 ft	8	2	07/24/09 10:05	[1]	1.00 U	1.00 U	1.00 U	1.24	13,400	
CPT-4E/ 25 ft	8	2	08/28/09 09:25	[1]	1.00 U	1.00 U	1.00 U	1.07	10,800	
CPT-4E/ 25 ft	8	2	09/24/09 08:58	[1]	1.00 U	1.00 U	1.00 U	1.00 U	13,600	
CPT-32/ 25 ft	8	2	10/22/08 10:31	0.007	3.24	1.00 U	1.00 U	1.00 U	7,410	
CPT-32/ 25 ft	8	2	10/22/08 10:33	0.007	1.93	1.00 U	1.00 U	1.00 U	7,260	DUPLICATE
CPT-32/ 25 ft	8	2	11/20/08 09:20	0.012	2.33	1.00 U	1.00 U	1.00 U	7,180	
CPT-32/ 25 ft	8	2	01/08/09 10:56	-0.005	3.90	1.00 U	1.00 U	1.31	8,820	
CPT-32/ 25 ft	8	2	01/27/09 11:24	0.005	3.83	1.00 U	1.00 U	1.00 U	4,610	
CPT-32/ 25 ft	8	2	02/24/09 09:03	[1]	5.26	1.00 U	1.00 U	1.60	8,530	
CPT-32/ 25 ft	8	2	03/25/09 08:33	[1]	6.52	1.00 U	1.00 U	1.52	7,330	
CPT-32/ 25 ft	8	2	04/21/09 08:58	[1]	3.61	1.00 U	1.00 U	2.12	11,600	
CPT-32/ 25 ft	8	2	05/14/09 08:01	[1]	2.59	1.00 U	1.00 U	1.29	12,500	
CPT-32/ 25 ft	8	2	06/26/09 08:08	[1]	1.23	1.00 U	1.00 U	1.13	9,900	
CPT-32/ 25 ft	8	2	07/24/09 09:20	[1]	1.00 U	1.00 U	1.00 U	1.72	15,400	
CPT-32/ 25 ft	8	2	08/28/09 09:08	[1]	1.00 U	1.00 U	1.00 U	1.00 U	12,200	
CPT-32/ 25 ft	8	2	09/24/09 08:41	[1]	1.00 U	1.00 U	1.00 U	1.00 U	13,800	

Table E-1. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-1A/216-Z-18/216-Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-13A/ 30 ft	9	2	10/22/08 12:48	0.030	3.04	1.00 U	1.00 U	1.00 U	9,890	
CPT-13A/ 30 ft	9	2	11/20/08 11:32	0.015	3.84	1.00 U	1.00 U	1.00 U	7,490	
CPT-13A/ 30 ft	9	2	01/08/09 13:12	0.007	3.65	1.00 U	1.00 U	1.00 U	8,800	
CPT-13A/ 30 ft	9	2	01/27/09 13:20	0.062	5.56	1.00 U	1.00 U	1.00 U	4,850	
CPT-13A/ 30 ft	9	2	02/24/09 11:04	[1]	5.23	1.00 U	1.00 U	1.00 U	8,790	
CPT-13A/ 30 ft	9	2	02/24/09 11:04	[1]	2.72	1.00 U	1.00 U	1.00 U	8,790	DUPLICATE
CPT-13A/ 30 ft	9	2	03/25/09 10:20	[1]	2.14	1.00 U	1.00 U	1.00 U	8,440	
CPT-13A/ 30 ft	9	2	04/21/09 10:23	[1]	1.96	1.00 U	1.00 U	1.03	14,300	
CPT-13A/ 30 ft	9	2	05/14/09 09:15	[1]	2.00	1.00 U	1.00 U	1.00 U	11,800	
CPT-13A/ 30 ft	9	2	06/26/09 10:27	[1]	1.56	1.00 U	1.00 U	1.00 U	12,400	
CPT-13A/ 30 ft	9	2	07/24/09 11:19	[1]	1.68	1.00 U	1.00 U	1.27	14,100	
CPT-13A/ 30 ft	9	2	08/28/09 10:40	[1]	1.45	1.00 U	1.00 U	1.25	15,200	
CPT-13A/ 30 ft	9	2	09/24/09 09:57	[1]	1.26	1.00 U	1.00 U	1.04	15,900	
CPT-7A/ 32 ft	10	2	10/22/08 09:57	0.000	1.53	1.00 U	1.00 U	1.00 U	6,560	
CPT-7A/ 32 ft	10	2	11/20/08 08:41	0.040	1.98	1.00 U	1.00 U	1.00 U	7,070	
CPT-7A/ 32 ft	10	2	01/08/09 10:02	-0.022	2.61	1.00 U	1.00 U	1.00 U	8,440	
CPT-7A/ 32 ft	10	2	01/08/09 10:05	-0.022	2.56	1.00 U	1.00 U	1.00 U	8,270	DUPLICATE
CPT-7A/ 32 ft	10	2	01/27/09 10:47	0.045	2.35	1.00 U	1.00 U	1.00 U	4,130	
CPT-7A/ 32 ft	10	2	02/24/09 08:26	[1]	3.63	1.00 U	1.00 U	1.00 U	8,320	

Table E-1. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-1A/216-Z-18/216-Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-7A/ 32 ft	10	2	03/25/09 08:01	[1]	3.31	1.00 U	1.00 U	1.00 U	6,900	
CPT-7A/ 32 ft	10	2	04/21/09 08:48	[1]	2.30	1.00 U	1.00 U	1.68	11,000	
CPT-7A/ 32 ft	10	2	05/14/09 07:52	[1]	2.12	1.00 U	1.00 U	1.00 U	11,500	
CPT-7A/ 32 ft	10	2	06/26/09 07:47	[1]	1.47	1.00 U	1.00 U	1.00 U	9,870	
CPT-7A/ 32 ft	10	2	07/24/09 09:02	[1]	1.64	1.00 U	1.00 U	1.48	15,400	
CPT-7A/ 32 ft	10	2	08/28/09 08:53	[1]	1.47	1.00 U	1.00 U	1.00 U	12,200	
CPT-7A/ 32 ft	10	2	09/24/09 08:28	[1]	1.33	1.00 U	1.00 U	1.00 U	13,200	
CPT-1A/ 35 ft	11	2	10/22/08 10:44	0.020	8.39	1.00 U	1.00 U	1.29	7,550	
CPT-1A/ 35 ft	11	2	11/20/08 09:34	0.012	9.58	1.00 U	1.00 U	1.69	7,720	
CPT-1A/ 35 ft	11	2	11/20/08 09:36	0.012	9.51	1.03	1.00 U	1.47	7,480	DUPLICATE
CPT-1A/ 35 ft	11	2	01/08/09 11:11	-0.022	3.95	1.00 U	1.00 U	1.37	8,260	
CPT-1A/ 35 ft	11	2	01/27/09 11:29	0.047	3.89	1.00 U	1.00 U	1.16	4,590	
CPT-1A/ 35 ft	11	2	02/24/09 09:19	[1]	3.43	1.00 U	1.00 U	1.21	7,950	
CPT-1A/ 35 ft	11	2	03/25/09 08:45	[1]	4.33	1.00 U	1.00 U	1.20	6,970	
CPT-1A/ 35 ft	11	2	04/21/09 09:20	[1]	2.34	1.00 U	1.00 U	1.41	11,500	
CPT-1A/ 35 ft	11	2	05/14/09 08:19	[1]	4.02	1.00 U	1.00 U	1.53	11,100	
CPT-1A/ 35 ft	11	2	06/26/09 09:07	[1]	5.05	1.00 U	1.00 U	1.97	9,870	
CPT-1A/ 35 ft	11	2	07/24/09 10:10	[1]	11.7	1.22	1.00 U	2.96	14,000	
CPT-1A/ 35 ft	11	2	08/28/09 09:31	[1]	7.31	1.00 U	1.00 U	1.56	9,690	

Table E-1. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-1A/216-Z-18/216-Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-1A/ 35 ft	11	2	09/24/09 09:03	[1]	8.51	1.03	1.00 U	1.79	12,700	
CPT-34/ 40 ft	12	2	04/21/09 10:28	[1]	1.35	1.00 U	1.00 U	2.51	13,500	
CPT-34/ 40 ft	12	2	05/14/09 09:20	[1]	1.33	1.00 U	1.00 U	1.84	11,100	
CPT-34/ 40 ft	12	2	06/26/09 10:32	[1]	1.21	1.00 U	1.00 U	2.53	11,000	
CPT-34/ 40 ft	12	2	07/24/09 11:26	[1]	1.00	1.00 U	1.00 U	1.63	12,200	
CPT-34/ 40 ft	12	2	08/28/09 10:46	[1]	1.00 U	1.00 U	1.00 U	1.29	14,100	
CPT-34/ 40 ft	12	2	09/24/09 10:03	[1]	1.20	1.00 U	1.00 U	1.58	15,100	
CPT-30/48 ft	15	2	10/22/08 10:38	0.015	2.01	1.00 U	1.00 U	2.03	7,370	
CPT-30/ 48 ft	15	2	11/20/08 09:27	-0.134	2.09	1.00 U	1.00 U	1.56	7,370	
CPT-30/ 48 ft	15	2	01/08/09 11:02	-0.017	6.35	1.00 U	1.00 U	1.99	8,390	
CPT-30/ 48 ft	15	2	01/27/09 11:28	0.050	9.96	1.00 U	1.00 U	1.96	4,630	
CPT-30/ 48 ft	15	2	02/24/09 09:09	[1]	5.68	1.00 U	1.00 U	2.15	8,240	
CPT-30/ 48 ft	15	2	03/25/09 08:38	[1]	7.22	1.00 U	1.00 U	2.05	7,310	
CPT-30/ 48 ft	15	2	04/21/09 09:05	[1]	1.80	1.00 U	1.00 U	3.85	10,800	
CPT-30/ 48 ft	15	2	05/14/09 08:07	[1]	1.23	1.00 U	1.00 U	3.20	12,700	
CPT-30/ 48 ft	15	2	06/26/09 08:34	[1]	1.00 U	1.00 U	1.00 U	3.48	10,500	
CPT-30/ 48 ft	15	2	07/24/09 09:44	[1]	1.00 U	1.00 U	1.00 U	3.61	14,800	
CPT-30/ 48 ft	15	2	08/28/09 09:15	[1]	1.00 U	1.00 U	1.00 U	3.02	12,000	
CPT-30/ 48 ft	15	2	09/24/09 08:47	[1]	1.00 U	1.00 U	1.00 U	2.72	14,500	

Table E-1. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-1A/216-Z-18/216-Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
C3872/ 62.5 ft	19	2	10/22/08 10:03	-0.020	3.81	1.00 U	1.00 U	1.29	6,750	
C3872/ 62.5 ft	19	2	11/20/08 08:47	0.179	5.23	1.00 U	1.00 U	1.36	7,250	
C3872/ 62.5 ft	19	2	01/08/09 10:12	-0.147	9.56	1.00 U	1.00 U	2.26	8,340	
C3872/ 62.5 ft	19	2	01/27/09 10:55	0.072	9.04	1.00 U	1.00 U	1.65	4,160	
C3872/ 62.5 ft	19	2	02/24/09 08:32	[1]	12.4	1.00 U	1.00 U	2.15	8,090	
C3872/ 62.5 ft	19	2	03/25/09 08:09	[1]	14.1	1.00 U	1.00 U	2.27	6,900	
C3872/ 62.5 ft	19	2	04/21/09 08:53	[1]	8.39	1.00 U	1.13	2.22	11,700	
C3872/ 62.5 ft	19	2	05/14/09 07:57	[1]	6.79	1.00 U	1.00 U	1.73	12,400	
C3872/ 62.5 ft	19	2	06/26/09 07:53	[1]	4.04	1.00 U	1.14	2.14	10,300	
C3872/ 62.5 ft	19	2	07/24/09 09:07	[1]	2.72	1.10	1.61	2.21	15,500	
C3872/ 62.5 ft	19	2	08/28/09 09:01	[1]	1.86	1.00 U	1.70	1.63	10,800	
C3872/ 62.5 ft	19	2	09/24/09 08:35	[1]	1.32	1.00 U	1.01	1.49	13,800	
CPT-1A/ 68 ft	21	2	04/21/09 09:22	[1]	1.63	1.00 U	1.00 U	1.58	11,100	
CPT-1A/ 68 ft	21	2	05/14/09 08:21	[1]	2.16	1.00 U	1.00 U	1.53	10,100	
CPT-1A/ 68 ft	21	2	06/26/09 09:09	[1]	1.07	1.00 U	1.00 U	1.49	9,370	
CPT-1A/ 68 ft	21	2	07/24/09 10:12	[1]	9.31	1.21	1.00	2.84	14,300	
CPT-1A/ 68 ft	21	2	08/28/09 09:33	[1]	8.95	1.13	1.00 U	1.82	11,600	
CPT-1A/ 68 ft	21	2	09/24/09 09:05	[1]	10.1	1.00 U	1.00 U	2.57	15,100	
CPT-32/ 70 ft	21	2	04/21/09 09:01	[1]	7.07	1.00 U	1.00 U	3.05	10,400	

Table E-1. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-1A/216-Z-18/216-Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-32/ 70 ft	21	2	05/14/09 08:03	[1]	8.08	1.00 U	1.00 U	2.70	11,700	
CPT-32/ 70 ft	21	2	06/26/09 08:11	[1]	8.81	1.00 U	1.29	2.96	11,000	
CPT-32/ 70 ft	21	2	07/24/09 09:24	[1]	8.07	1.00 U	1.87	3.85	14,400	
CPT-32/ 70 ft	21	2	08/28/09 09:10	[1]	6.10	1.00 U	1.71	2.82	11,200	
CPT-32/ 70 ft	21	2	09/24/09 08:43	[1]	4.29	1.00 U	1.06	2.46	14,200	
299-W18-152/ 101 ft	31	2	10/22/08 10:50	0.042	11.4	1.00 U	1.00 U	1.67	7,520	
299-W18-152/ 101 ft	31	2	11/20/08 09:41	0.281	12.7	1.00 U	1.00 U	1.89	7,370	
299-W18-152/ 101 ft	31	2	01/08/09 11:17	-0.254	14.5	1.00 U	1.00 U	2.27	8,750	
299-W18-152/ 101 ft	31	2	01/27/09 11:33	0.199	14.3	1.00 U	1.00 U	2.21	4,400	
299-W18-152/ 101 ft	31	2	02/24/09 09:23	[1]	16.5	1.00 U	1.00 U	2.15	8,220	
299-W18-152/ 101 ft	31	2	03/25/09 08:51	[1]	14.6	1.00 U	1.00 U	1.89	7,570	
299-W18-167/ 106 ft	32	3	10/22/08 10:25	0.002	186	1.00 U	1.24	5.48	7,160	
299-W18-167/ 106 ft	32	3	11/20/08 09:14	0.276	62.0	1.00 U	1.00 U	3.28	7,180	
299-W18-167/ 106 ft	32	3	01/08/09 10:50	-0.254	61.3	1.00 U	1.00 U	4.10	8,470	
299-W18-167/ 106 ft	32	3	01/27/09 11:19	0.154	51.7	1.00 U	1.00 U	3.12	4,030	
299-W18-167/ 106 ft	32	3	02/24/09 08:57	[1]	51.9	1.00 U	1.00 U	3.09	8,450	
299-W18-167/ 106 ft	32	3	03/25/09 08:28	[1]	65.1	1.00 U	1.00 U	3.78	7,330	
CPT-4F/ 109 ft	33	3	04/21/09 09:11	[1]	4.54	1.00 U	1.00 U	1.95	10,200	
CPT-4F/ 109 ft	33	3	05/14/09 08:12	[1]	5.02	1.00 U	1.00 U	1.68	12,900	

Table E-1. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-1A/216-Z-18/216-Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-4F/ 109 ft	33	3	06/26/09 08:50	[1]	3.97	1.00 U	1.00 U	2.26	10,100	Water in tubing (condensation).
CPT-4F/ 109 ft	33	3	07/24/09 09:59	[1]	3.53	1.00 U	1.00 U	2.63	13,100	As in previous month, pump was beginning to bring water up through the tubing.
CPT-4F/ 109 ft	33	3	08/28/09 09:21	[1]	2.58	1.00 U	1.00 U	1.65	9,800	
CPT-4F/ 109 ft	33	3	09/24/09 08:54	[1]	2.46	1.00 U	1.00 U	1.98	13,000	
299-W18-165/ 109 ft	33	3	10/22/08 10:19	-0.020	63.1	1.00 U	1.07	6.61	7,040	
299-W18-165/ 109 ft	33	3	11/20/08 09:08	0.284	40.9	3.10	1.00 U	6.85	7,190	
299-W18-165/ 109 ft	33	3	01/08/09 10:42	-0.279	44.3	2.02	1.05	7.84	8,440	
299-W18-165/ 109 ft	33	3	01/27/09 11:15	0.184	51.7	1.77	1.00 U	7.14	4,240	
299-W18-165/ 109 ft	33	3	02/24/09 08:52	[1]	47.6	3.75	1.07	8.64	8,200	
299-W18-165/ 109 ft	33	3	03/25/09 08:26	[1]	58.4	2.69	1.03	8.76	7,080	
299-W18-253/ 125 ft	38	3	11/20/08 09:04	0.384	9.73	1.00 U	1.00 U	1.29	7,120	[2]
299-W18-253/ 125 ft	38	3	01/08/09 10:32	-0.247	14.6	1.00 U	1.00 U	1.92	8,380	[2]
299-W18-253/ 125 ft	38	3	01/27/09 11:10	0.204	10.8	1.00 U	1.00 U	1.33	4,202	[2]
299-W18-253/ 125 ft	38	3	02/24/09 08:46	[1]	13.9	1.00 U	1.00 U	2.29	8,210	[2]
299-W18-253/ 125 ft	38	3	03/25/09 08:21	[1]	10.7	1.00 U	1.00 U	1.62	7,230	[2]
299-W18-249/ 130 ft	40	3	10/22/08 12:57	0.157	7.29	1.00 U	1.00 U	1.81	9,930	
299-W18-249/ 130 ft	40	3	11/20/08 11:39	0.149	29.8	1.00 U	1.00 U	2.07	8,170	

Table E-1. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-1A/216-Z-18/216-Z-12 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W18-249/ 130 ft	40	3	01/08/09 13:20	-0.174	15.6	1.00 U	1.00 U	1.93	8,600	
299-W18-249/ 130 ft	40	3	01/27/09 13:26	0.329	19.9	1.00 U	1.00 U	1.81	5,110	
299-W18-249/ 130 ft	40	3	02/24/09 11:14	[1]	24.5	1.00 U	1.00 U	2.30	8,670	
299-W18-249/ 130 ft	40	3	03/25/09 11:49	[1]	18.7	1.00 U	1.00 U	2.23	8,920	
299-W18-248/ 131 ft	40	3	10/22/08 10:09	-0.102	3.85	1.00 U	1.00 U	1.00 U	6,300	
299-W18-248/ 131 ft	40	3	11/20/08 08:57	0.433	41.7	1.00 U	1.00 U	1.32	7,240	
299-W18-248/ 131 ft	40	3	01/08/09 10:20	-0.296	64.4	1.00 U	1.00 U	1.93	8,320	
299-W18-248/ 131 ft	40	3	01/27/09 10:58	0.134	47.7	1.00 U	1.00 U	1.42	4,160	
299-W18-248/ 131 ft	40	3	02/24/09 08:38	[1]	35.9	1.00 U	1.00 U	1.55	8,400	
299-W18-248/ 131 ft	40	3	03/25/09 08:14	[1]	27.5	1.00 U	1.00 U	1.20	7,140	

[1] Differential pressure measurements were no longer collected in the field after January 2009.

[2] This is a new well and was not originally scheduled to be sampled.

bgs = below ground surface

CCl_4 = carbon tetrachloride

$CHCl_3$ = chloroform

CH_2Cl_2 = methylene chloride

MEK = methyl ethyl ketone

ppmv = parts per million by volume

U = analyzed for but not detected; value reported in the reporting limit

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-17/ 10 ft	3	2	10/22/08 12:21	0.012	1.60	1.00 U	1.00 U	1.00 U	9,200	
CPT-17/ 10 ft	3	2	11/20/08 11:21	0.005	1.72	1.00 U	1.00 U	1.00 U	7,380	
CPT-17/ 10 ft	3	2	01/08/09 13:02	0.002	1.00 U	1.00 U	1.00 U	1.00 U	8,780	
CPT-17/ 10 ft	3	2	01/27/09 13:09	-0.002	2.66	1.00 U	1.00 U	1.00 U	4,650	
CPT-17/ 10 ft	3	2	02/24/09 10:49	[1]	2.75	1.00 U	1.00 U	1.32	8,440	
CPT-17/ 10 ft	3	2	03/25/09 10:11	[1]	1.61	1.00 U	1.00 U	1.04	8,260	
CPT-17/ 10 ft	3	2	04/21/09 09:54	[1]	2.67	1.00 U	1.00 U	2.07	13,800	
CPT-17/ 10 ft	3	2	04/21/09 09:56	[1]	1.65	1.00 U	1.00 U	1.94	13,100	DUPLICATE
CPT-17/ 10 ft	3	2	05/14/09 08:52	[1]	2.92	1.00 U	1.00 U	1.04	12,200	
CPT-17/ 10 ft	3	2	06/26/09 09:54	[1]	3.66	1.00 U	1.00 U	1.00 U	12,500	
CPT-17/ 10 ft	3	2	07/24/09 10:48	[1]	3.25	1.00 U	1.00 U	2.02	16,100	
CPT-17/ 10 ft	3	2	08/28/09 10:10	[1]	1.86	1.00 U	1.00 U	1.00 U	15,700	
CPT-17/ 10 ft	3	2	09/24/09 09:34	[1]	2.74	1.00 U	1.00 U	1.11	16,100	
CPT-27/ 15 ft	5	2	10/22/08 11:37	0.015	1.00 U	1.00 U	1.00 U	1.00 U	8,070	
CPT-27/ 15 ft	5	2	11/20/08 10:18	-0.017	1.00 U	1.00 U	1.00 U	1.00 U	7,400	
CPT-27/ 15 ft	5	2	01/08/09 11:54	-0.020	1.00 U	1.00 U	1.00 U	1.00 U	8,480	
CPT-27/ 15 ft	5	2	01/27/09 12:21	0.032	1.00 U	1.00 U	1.00 U	1.00 U	4,540	
CPT-27/ 15 ft	5	2	02/24/09 09:57	[1]	1.00 U	1.00 U	1.00 U	1.25	8,670	
CPT-27/ 15 ft	5	2	03/25/09 09:24	[1]	1.00 U	1.00 U	1.00 U	1.51	7,730	
CPT-16/ 25 ft	8	2	10/22/08 11:03	0.012	1.00 U	1.00 U	1.00 U	1.00 U	7,800	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-16/ 25 ft	8	2	11/20/08 09:58	-0.007	1.00 U	1.00 U	1.00 U	1.00 U	7,940	
CPT-16/ 25 ft	8	2	01/08/09 11:30	-0.005	1.03	1.00 U	1.00 U	1.00 U	8,440	
CPT-16/ 25 ft	8	2	01/27/09 11:59	-0.005	1.00 U	1.00 U	1.00 U	1.00 U	4,370	
CPT-16/ 25 ft	8	2	02/24/09 09:39	[1]	1.04	1.00 U	1.00 U	1.00 U	8,590	
CPT-16/ 25 ft	8	2	03/25/09 09:03	[1]	1.00 U	1.00 U	1.00 U	1.00 U	7,480	
CPT-16/ 25 ft	8	2	03/25/09 09:15	[1]	1.00 U	1.00 U	1.00 U	1.00 U	7,940	DUPLICATE
CPT-16/ 25 ft	8	2	04/21/09 09:35	[1]	1.00 U	1.00 U	1.00 U	1.18	12,800	
CPT-16/ 25 ft	8	2	05/14/09 08:35	[1]	1.00 U	1.00 U	1.00 U	1.00 U	12,400	
CPT-16/ 25 ft	8	2	06/26/09 09:36	[1]	1.00 U	1.00 U	1.00 U	1.69	11,700	
CPT-16/ 25 ft	8	2	07/24/09 10:29	[1]	1.00 U	1.00 U	1.09	3.56	14,700	
CPT-16/ 25 ft	8	2	08/28/09 09:51	[1]	1.00 U	1.00 U	1.01	1.95	13,300	
CPT-16/ 25 ft	8	2	09/24/09 09:18	[1]	1.00 U	1.00 U	1.00 U	1.66	15,600	
CPT-27/ 33 ft	10	2	04/21/09 09:42	[1]	1.00 U	1.00 U	1.00 U	1.14	12,500	
CPT-27/ 33 ft	10	2	05/14/09 08:41	[1]	1.15	1.00 U	1.00 U	1.00 U	11,700	
CPT-27/ 33 ft	10	2	06/26/09 09:42	[1]	1.00 U	1.00 U	1.00 U	1.00 U	11,000	
CPT-27/ 33 ft	10	2	07/24/09 10:36	[1]	1.00 U	1.00 U	1.04	2.20	14,000	
CPT-27/ 33 ft	10	2	08/28/09 09:57	[1]	1.00 U	1.00 U	1.00 U	2.27	12,500	
CPT-27/ 33 ft	10	2	08/28/09 09:57	[1]	1.00 U	1.00 U	1.00 U	2.19	12,500	DUPLICATE
CPT-27/ 33 ft	10	2	09/24/09 09:24	[1]	1.00 U	1.00 U	1.00 U	1.86	15,200	
CPT-18/ 35 ft	10	2	10/22/08 12:37	0.022	1.24	1.00 U	1.00 U	1.00 U	9,490	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-18/ 35 ft	10	2	11/20/08 11:08	0.015	3.92	1.00 U	1.00 U	1.14	7,380	
CPT-18/ 35 ft	10	2	01/08/09 12:47	-0.010	1.00 U	1.00 U	1.00 U	1.77	8,820	
CPT-18/ 35 ft	10	2	01/27/09 13:01	0.030	5.80	1.00 U	1.00 U	1.29	4,810	
CPT-18/ 35 ft	10	2	02/24/09 10:38	[1]	2.54	1.00 U	1.00 U	1.39	9,100	
CPT-18/ 35 ft	10	2	03/25/09 10:03	[1]	3.79	1.00 U	1.00 U	1.42	9,080	
CPT-18/ 35 ft	10	2	04/21/09 10:04	[1]	1.00 U	1.00 U	1.00 U	1.83	14,100	
CPT-18/ 35 ft	10	2	05/14/09 08:58	[1]	1.00 U	1.00 U	1.00 U	1.00 U	12,400	
CPT-18/ 35 ft	10	2	05/14/09 08:58	[1]	1.00 U	1.00 U	1.00 U	1.00 U	12,200	DUPLICATE
CPT-18/ 35 ft	10	2	06/26/09 10:07	[1]	1.00 U	1.00 U	1.00 U	1.01	11,900	
CPT-18/ 35 ft	10	2	07/24/09 10:55	[1]	1.00 U	1.00 U	1.00 U	2.36	13,100	
CPT-18/ 35 ft	10	2	08/28/09 10:18	[1]	1.00 U	1.00 U	1.00 U	2.23	14,900	
CPT-18/ 35 ft	10	2	09/24/09 09:40	[1]	1.00 U	1.00 U	1.00 U	2.30	15,300	
CPT-28/ 40 ft	12	2	04/21/09 10:18	[1]	7.73	1.00 U	1.00 U	1.39	14,000	
CPT-28/ 40 ft	12	2	05/14/09 09:10	[1]	7.10	1.00 U	1.00 U	1.00 U	11,800	
CPT-28/ 40 ft	12	2	06/26/09 10:20	[1]	6.30	1.00 U	1.00 U	1.00 U	11,100	
CPT-28/ 40 ft	12	2	07/24/09 11:08	[1]	5.83	1.00 U	1.00 U	1.26	13,000	
CPT-28/ 40 ft	12	2	08/28/09 10:35	[1]	4.77	1.00 U	1.00 U	1.00 U	12,800	
CPT-28/ 40 ft	12	2	09/24/09 09:52	[1]	4.86	1.00 U	1.00 U	1.53	14,000	
CPT-9A/ 50 ft	15	2	10/22/08 09:45	-0.055	39.7	1.00 U	1.00 U	3.79	6,460	
CPT-9A/ 50 ft	15	2	11/20/08 08:25	0.269	39.7	1.00 U	1.00 U	3.55	7,080	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-9A/ 50 ft	15	2	01/08/09 09:29	-0.264	39.2	1.00 U	1.00 U	3.83	8,270	
CPT-9A/ 50 ft	15	2	01/27/09 10:19	0.125	39.3	1.00 U	1.00 U	3.55	3,930	
CPT-9A/ 50 ft	15	2	02/24/09 08:16	[1]	39.7	1.00 U	1.00 U	4.19	8,130	
CPT-9A/ 50 ft	15	2	03/25/09 07:51	[1]	38.9	1.00 U	1.00 U	3.84	6,770	
CPT-9A/ 50 ft	15	2	04/21/09 11:09	[1]	36.3	1.00 U	1.08	4.70	9,660	
CPT-9A/ 50 ft	15	2	05/14/09 07:44	[1]	35.0	1.00 U	1.00 U	3.62	11,400	
CPT-9A/ 50 ft	15	2	06/26/09 07:31	[1]	40.5	1.00 U	1.00 U	4.72	9,790	
CPT-9A/ 50 ft	15	2	07/24/09 08:52	[1]	40.0	1.00 U	1.37	5.29	14,800	
CPT-9A/ 50 ft	15	2	08/28/09 08:41	[1]	38.7	1.00 U	1.23	4.41	11,700	
CPT-9A/ 50 ft	15	2	09/24/09 08:18	[1]	34.2	1.00 U	1.00 U	3.62	12,200	
CPT-9A/ 60 ft	18	2	10/22/08 09:42	-0.007	7.50	1.00 U	1.00 U	1.00 U	5,870	
CPT-9A/ 60 ft	18	2	11/20/08 08:23	0.047	15.5	1.00 U	1.00 U	1.53	7,050	
CPT-9A/ 60 ft	18	2	01/08/09 09:17	-0.060	3.88	1.00 U	1.00 U	1.01	8,070	
CPT-9A/ 60 ft	18	2	01/27/09 11:40	0.010	7.14	1.00 U	1.00 U	1.00 U	4,640	
CPT-9A/ 60 ft	18	2	02/24/09 08:12	[1]	4.17	1.00 U	1.00 U	1.19	7,490	
CPT-9A/ 60 ft	18	2	03/25/09 07:48	[1]	17.3	1.00 U	1.00 U	1.87	6,580	
CPT-9A/ 60 ft	18	2	04/21/09 08:37	[1]	5.95	1.00 U	1.00 U	1.81	8,170	
CPT-9A/ 60 ft	18	2	05/14/09 07:42	[1]	12.5	1.00 U	1.00 U	1.67	10,800	
CPT-9A/ 60 ft	18	2	06/26/09 07:28	[1]	4.22	1.00 U	1.00 U	1.39	8,680	
CPT-9A/ 60 ft	18	2	07/24/09 08:50	[1]	8.31	1.00 U	1.00 U	2.47	14,500	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-9A/ 60 ft	18	2	08/28/09 08:39	[1]	14.9	1.00 U	1.00 U	2.13	9,830	
CPT-9A/ 60 ft	18	2	09/24/09 08:16	[1]	6.60	1.00 U	1.00 U	1.87	10,800	
C4938/ 64 ft	20	2	10/22/08 11:45	0.005	9.77	1.00 U	1.00 U	4.49	8,830	
C4938/ 64 ft	20	2	11/20/08 10:54	0.010	63.8	1.35	1.17	5.11	7,440	
C4938/ 64 ft	20	2	01/08/09 12:33	-0.005	6.32	1.00 U	1.00 U	1.18	8,590	
C4938/ 64 ft	20	2	01/27/09 12:53	0.027	241	1.89	1.30	9.93	4,670	
C4938/ 64 ft	20	2	02/24/09 10:31	[1]	276	1.30	1.17	9.85	9,030	
C4938/ 64 ft	20	2	03/25/09 09:41	[1]	327	2.20	1.68	15.8	8,440	
C4937/ 64 ft	20	2	10/22/08 11:52	0.020	18.5	1.00 U	1.07	10.8	8,830	
C4937/ 64 ft	20	2	11/20/08 11:00	0.020	397	3.30	2.07	13.4	7,560	
C4937/ 64 ft	20	2	01/08/09 12:38	-0.010	1.00 U	1.00 U	1.00 U	1.00 U	8,160	
C4937/ 64 ft	20	2	01/27/09 12:49	0.055	359	2.46	1.74	16.6	4,620	
C4937/ 64 ft	20	2	02/24/09 10:26	[1]	1.26	1.00 U	1.00 U	1.00	8,310	
C4937/ 64 ft	20	2	03/25/09 09:37	[1]	360	1.82	2.09	22.0	8,410	
C5340/ 64 ft	20	2	10/22/08 11:59	0.012	1.41	1.00 U	1.00 U	3.84	9,130	
C5340/ 64 ft	20	2	11/20/08 10:26	0.000	15.5	1.00 U	1.00 U	4.80	7,490	
C5340/ 64 ft	20	2	01/08/09 12:03	-0.010	1.00 U	1.00 U	1.00 U	1.00 U	8,410	
C5340/ 64 ft	20	2	01/27/09 12:27	0.035	33.1	1.00 U	1.07	10.8	4,840	
C5340/ 64 ft	20	2	02/24/09 10:05	[1]	1.00 U	1.00 U	1.00 U	1.10	8,950	
C5340/ 64 ft	20	2	03/25/09 09:31	[1]	31.4	1.00 U	1.01	12.0	8,210	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-9A/ 64 ft	20	2	10/22/08 09:47	-0.027	23.8	1.00 U	1.00 U	2.27	6,540	
CPT-9A/ 64 ft	20	2	11/20/08 08:29	0.152	29.8	1.00 U	1.00 U	2.87	7,180	
CPT-9A/ 64 ft	20	2	01/08/09 09:34	-0.197	30.3	1.00 U	1.00 U	3.24	8,350	
CPT-9A/ 64 ft	20	2	01/27/09 10:22	0.072	28.2	1.00 U	1.00 U	2.63	3,890	
CPT-9A/ 64 ft	20	2	01/27/09 10:25	0.072	26.8	1.00 U	1.00 U	2.99	3,920	DUPLICATE
CPT-9A/ 64 ft	20	2	02/24/09 08:19	[1]	29.0	1.00 U	1.00 U	3.47	8,270	
CPT-9A/ 64 ft	20	2	03/25/09 07:54	[1]	25.9	1.00 U	1.00 U	2.49	7,030	
CPT-9A/ 64 ft	20	2	04/21/09 08:41	[1]	29.2	1.00 U	1.00 U	4.08	10,600	
CPT-9A/ 64 ft	20	2	05/14/09 07:46	[1]	17.1	1.00 U	1.00 U	2.21	11,200	
CPT-9A/ 64 ft	20	2	06/26/09 07:40	[1]	1.90	1.00 U	1.00 U	1.73	8,540	
CPT-9A/ 64 ft	20	2	07/24/09 08:55	[1]	29.7	1.00 U	1.16	4.16	14,900	
CPT-9A/ 64 ft	20	2	08/28/09 08:45	[1]	27.8	1.00 U	1.12	3.43	11,900	
CPT-9A/ 64 ft	20	2	09/24/09 08:21	[1]	26.8	1.00 U	1.00 U	3.23	13,000	
CPT-16/ 65 ft	20	2	04/21/09 09:38	[1]	3.77	1.00 U	1.00 U	1.58	12,700	
CPT-16/ 65 ft	20	2	05/14/09 08:37	[1]	4.44	1.00 U	1.00 U	1.00 U	11,700	
CPT-16/ 65 ft	20	2	06/26/09 09:38	[1]	4.48	1.00 U	1.00 U	1.00 U	10,700	
CPT-16/ 65 ft	20	2	06/26/09 09:46	[1]	69.0	1.00 U	1.07	3.27	11,200	
CPT-16/ 65 ft	20	2	07/24/09 10:40	[1]	67.0	1.00 U	1.26	4.20	13,500	
CPT-16/ 65 ft	20	2	08/28/09 09:53	[1]	3.94	1.00 U	1.00 U	1.00 U	11,900	
CPT-16/ 65 ft	20	2	09/24/09 09:21	[1]	3.12	1.00 U	1.00 U	1.52	13,600	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-21A/ 65 ft	20	2	10/22/08 12:08	0.080	68.9	1.00 U	1.00 U	3.04	8,780	
CPT-21A/ 65 ft	20	2	11/20/08 10:34	0.052	73.5	1.00 U	1.00 U	2.59	7,480	
CPT-21A/ 65 ft	20	2	01/08/09 12:11	-0.090	126	1.00 U	1.00 U	2.90	8,880	
CPT-21A/ 65 ft	20	2	01/27/09 12:33	0.194	74.3	1.00 U	1.00 U	2.78	4,570	
CPT-21A/ 65 ft	20	2	02/24/09 10:11	[1]	137	1.00 U	1.00 U	3.20	8,970	
CPT-21A/ 65 ft	20	2	03/25/09 09:56	[1]	136	1.00 U	1.00 U	3.30	8700	
CPT-21A/ 65 ft	20	2	04/21/09 09:47	[1]	130	1.00 U	1.07	3.99	12,900	
CPT-21A/ 65 ft	20	2	05/14/09 08:45	[1]	70.1	1.00 U	1.00 U	3.12	12,900	
CPT-21A/ 65 ft	20	2	06/26/09 09:46	[1]	68.2	1.00 U	1.02	3.15	11,200	
CPT-21A/ 65 ft	20	2	07/24/09 10:31	[1]	4.92	1.00 U	1.00 U	1.18	13,700	
CPT-21A/ 65 ft	20	2	08/28/09 10:03	[1]	62.6	1.00 U	1.12	2.91	12,600	
CPT-21A/ 65 ft	20	2	09/24/09 09:28	[1]	57.4	1.00 U	1.00 U	2.94	15,300	
CPT-18/ 75 ft	23	2	04/21/09 10:01	[1]	1.57	1.00 U	1.00 U	1.62	13,700	
CPT-18/ 75 ft	23	2	05/14/09 08:56	[1]	1.92	1.00 U	1.00 U	1.00 U	12,800	
CPT-18/ 75 ft	23	2	06/26/09 10:02	[1]	1.87	1.00 U	1.00 U	1.02	11,500	
CPT-18/ 75 ft	23	2	07/24/09 10:53	[1]	2.05	1.00 U	1.00 U	1.89	13,900	
CPT-18/ 75 ft	23	2	08/28/09 10:15	[1]	1.00 U	1.00 U	1.00 U	1.04	13,400	
CPT-18/ 75 ft	23	2	09/24/09 09:37	[1]	1.36	1.00 U	1.00 U	1.08	16,200	
299-W15-82/ 83 ft	25	2	10/22/08 00:00							[2]
299-W15-82/ 83 ft	25	2	11/20/08 10:13	0.154	2.59	1.00 U	1.00 U	1.00 U	8,310	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W15-82/ 83 ft	25	2	01/08/09 11:47	-0.067	3.60	1.00 U	1.00 U	1.29	8,710	
299-W15-82/ 83 ft	25	2	01/27/09 12:16	0.249	2.99	1.00 U	1.00 U	1.50	5,040	
299-W15-82/ 83 ft	25	2	02/24/09 09:50	[1]	3.82	1.00 U	1.00 U	2.05	8,540	
299-W15-82/ 83 ft	25	2	03/25/09 09:20	[1]	2.79	1.00 U	1.00 U	1.57	8,140	
CPT-21A/ 86 ft	26	2	10/22/08 12:10	0.115	179	1.00 U	1.11	3.88	8,810	
CPT-21A/ 86 ft	26	2	11/20/08 10:37	0.157	169	1.00 U	1.19	3.72	7,450	
CPT-21A/ 86 ft	26	2	01/08/09 12:14	-0.177	178	1.00 U	1.00 U	3.72	8,840	
CPT-21A/ 86 ft	26	2	01/27/09 12:36	0.299	176	1.00 U	1.00 U	3.18	4,600	
CPT-21A/ 86 ft	26	2	02/24/09 10:13	[1]	176	1.00 U	1.22	4.13	8,920	
CPT-21A/ 86 ft	26	2	03/25/09 09:54	[1]	175	1.00 U	1.00 U	3.30	8,510	
CPT-21A/ 86 ft	26	2	04/21/09 09:49	[1]	162	1.00 U	1.24	4.27	13,200	
CPT-21A/ 86 ft	26	2	05/14/09 08:47	[1]	164	1.00 U	1.13	3.65	13,100	
CPT-21A/ 86 ft	26	2	06/26/09 09:49	[1]	167	1.00 U	1.21	3.91	11,400	
CPT-21A/ 86 ft	26	2	07/24/09 10:42	[1]	165	1.00 U	1.32	4.60	13,600	
CPT-21A/ 86 ft	26	2	08/28/09 10:06	[1]	168	1.00 U	1.33	3.63	12,600	
CPT-21A/ 86 ft	26	2	09/24/09 09:30	[1]	158	1.00 U	1.10	3.50	15,400	
CPT-28/ 87 ft	27	2	10/22/08 12:42	0.159	218	1.00 U	1.24	3.03	9,820	
CPT-28/ 87 ft	27	2	11/20/08 11:27	0.177	228	1.00 U	1.27	4.17	7,910	
CPT-28/ 87 ft	27	2	01/08/09 13:07	-0.147	220	1.00 U	1.29	3.74	8,820	
CPT-28/ 87 ft	27	2	01/27/09 13:13	0.289	201	1.00 U	1.11	3.65	4,740	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
CPT-28/ 87 ft	27	2	02/24/09 10:55	[1]	223	1.00 U	1.15	3.70	8,900	
CPT-28/ 87 ft	27	2	03/25/09 10:15	[1]	221	1.00 U	1.00 U	3.47	8,780	
CPT-28/ 87 ft	27	2	04/21/09 10:14	[1]	207	1.00 U	1.21	3.94	14,900	
CPT-28/ 87 ft	27	2	05/14/09 09:07	[1]	204	1.00 U	1.20	3.97	11,700	
CPT-28/ 87 ft	27	2	06/26/09 10:17	[1]	209	1.00 U	1.23	4.12	10,900	
CPT-28/ 87 ft	27	2	07/24/09 11:06	[1]	209	1.00 U	1.44	4.56	12,700	
CPT-28/ 87 ft	27	2	08/28/09 10:32	[1]	192	1.00 U	1.37	4.01	12,200	
CPT-28/ 87 ft	27	2	09/24/09 09:48	[1]	172	1.00 U	1.32	4.21	13,600	
CPT-28/ 87 ft	27	2	09/24/09 09:48	[1]	187	1.00 U	1.21	3.91	14,300	DUPLICATE
CPT-1A/ 91 ft	28	2	04/21/09 09:25	[1]	1.00 U	1.00 U	1.00 U	1.68	11,600	
CPT-1A/ 91 ft	28	2	05/14/09 08:24	[1]	1.00 U	1.00 U	1.00 U	1.00 U	9,510	
CPT-1A/ 91 ft	28	2	06/26/09 09:11	[1]	1.00 U	1.00 U	1.00 U	1.19	8,700	
CPT-1A/ 91 ft	28	2	07/24/09 10:15	[1]	1.00 U	1.00 U	1.00 U	1.56	12,700	
CPT-1A/ 91 ft	28	2	08/28/09 09:37	[1]	1.00 U	1.00 U	1.00 U	1.26	8,260	
CPT-1A/ 91 ft	28	2	09/24/09 09:08	[1]	1.00 U	1.00 U	1.00 U	1.39	11,300	
299-W15-8U/ 103 ft	31	2	10/22/08 12:15	-0.491	3.23	1.00 U	1.00 U	1.00 U	8,810	
299-W15-8U/ 103 ft	31	2	11/20/08 10:44	0.072	11.7	1.00 U	1.00 U	2.48	7,330	
299-W15-8U/ 103 ft	31	2	01/08/09 12:24	-0.045	7.69	1.00 U	1.00 U	2.76	8,810	
299-W15-8U/ 103 ft	31	2	01/27/09 12:42	0.137	11.1	1.00 U	1.00 U	2.94	4,440	
299-W15-8U/ 103 ft	31	2	02/24/09 10:18	[1]	24.1	1.00 U	1.00 U	5.60	8,660	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W15-8U/ 103 ft	31	2	03/25/09 09:50	[1]	14.1	1.00 U	1.00 U	5.36	8,170	
299-W15-217/ 114 ft	35	3	10/22/08 12:32	0.020	49.8	1.00 U	1.00 U	2.93	9,120	
299-W15-217/ 114 ft	35	3	11/20/08 11:16	0.179	1.19	1.00 U	1.00 U	1.00 U	6,460	
299-W15-217/ 114 ft	35	3	01/08/09 12:55	-0.057	1.00 U	1.00 U	1.00 U	1.25	9,260	
299-W15-217/ 114 ft	35	3	01/27/09 13:06	0.172	3.92	1.00 U	1.00 U	1.00 U	4,610	
299-W15-217/ 114 ft	35	3	02/24/09 10:43	[1]	9.55	1.00 U	1.00 U	1.62	8,790	
299-W15-217/ 114 ft	35	3	03/25/09 10:07	[1]	3.04	1.00 U	1.00 U	1.00 U	8,560	
CPT-24/ 118 ft	36	3	04/21/09 10:10	[1]	16.9	1.00 U	1.07	5.00	13,900	
CPT-24/ 118 ft	36	3	05/14/09 09:04	[1]	16.7	1.00 U	1.00 U	4.56	12,000	
CPT-24/ 118 ft	36	3	06/26/09 10:12	[1]	16.8	1.00 U	1.03	4.73	11,300	
CPT-24/ 118 ft	36	3	07/24/09 11:00	[1]	17.1	1.00 U	1.28	5.48	13,400	
CPT-24/ 118 ft	36	3	07/24/09 11:00	[1]	17.2	1.00 U	1.55	5.71	13,000	DUPLICATE
CPT-24/ 118 ft	36	3	08/28/09 10:24	[1]	16.8	1.00 U	1.24	5.04	12,700	
CPT-24/ 118 ft	36	3	09/24/09 09:44	[1]	15.1	1.00 U	1.05	4.72	13,800	
299-W15-95L/ 144 ft	44	4	10/22/08 11:26	-0.580	11.9	1.00 U	1.00 U	5.39	7,770	
299-W15-95L/ 144 ft	44	4	11/20/08 10:07	0.795	11.8	1.00 U	1.00 U	4.48	7,370	
299-W15-95L/ 144 ft	44	4	01/08/09 11:41	-0.115	13.7	1.00 U	1.00 U	6.07	8,500	
299-W15-95L/ 144 ft	44	4	01/27/09 12:07	0.408	12.6	1.00 U	1.00 U	4.56	4,370	
299-W15-95L/ 144 ft	44	4	02/24/09 09:45	[1]	15.2	1.00 U	1.00 U	6.71	8,420	
299-W15-95L/ 144 ft	44	4	03/25/09 09:10	[1]	13.4	1.00 U	1.00 U	4.49	7,450	

Table E-2. Monitoring Data for Non-Operational Wells and Probes at the 216-Z-9 Site, Fiscal Year 2009

Sample Location	Depth (m bgs)	Zone	Sample Date Time	Differential Pressure (kPa)	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
299-W15-9L/ 176 ft	54	6	10/22/08 00:00							[3]
299-W15-9L/ 176 ft	54	6	11/20/08 00:00							[3]
299-W15-9L/ 176 ft	54	6	01/08/09 00:00							[3]
299-W15-9L/ 176 ft	54	6	01/27/09 00:00							[3]
299-W15-9L/ 176 ft	54	6	02/24/09 00:00							[3]
299-W15-9L/ 176 ft	54	6	03/25/09 00:00							[3]
299-W15-8L/ 180 ft	55	6	10/22/08 00:00							[2]
299-W15-8L/ 180 ft	55	6	11/20/08 10:48	0.700	12.5	1.00 U	1.00 U	2.82	7,420	
299-W15-8L/ 180 ft	55	6	01/08/09 12:27	-0.095	13.8	1.00 U	1.00 U	3.59	9,310	
299-W15-8L/ 180 ft	55	6	01/27/09 12:46	0.473	10.7	1.00 U	1.00 U	3.40	4,540	
299-W15-8L/ 180 ft	55	6	02/24/09 10:22	[1]	13.4	1.00 U	1.00 U	3.08	8,910	
299-W15-8L/ 180 ft	55	6	03/25/09 09:48	[1]	13.0	1.00 U	1.00 U	3.44	8,280	

[1] Differential pressure measurements were no longer collected in the field after January 2009.

[2] Sample not collected. Tubing was missing from the well.

[3] Sample not collected. During the attempt to reinstall tubing for 299-W15-9L, the tubing became lodged in the well. The tubing will be removed as soon as possible.

bgs = below ground surface

CCl_4 = carbon tetrachloride

$CHCl_3$ = chloroform

CH_2Cl_2 = methylene chloride

MEK = methyl ethyl ketone

ppmv = parts per million by volume

U = analyzed for but not detected; value reported in the reporting limit

Table E-3. Carbon Tetrachloride Concentration Standard Analyses

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed	B&K™ Serial Number
24.984	22.1	10/22/08	14:03	1715232
24.984	22.2	10/22/08	15:05	1715232
200	207	10/22/08	15:11	1715232
24.984	21.2	11/20/08	12:12	1715232
24.984	21.3	11/20/08	13:20	1715232
200	223	11/20/08	13:23	1715232
24.984	21.3	01/08/09	14:10	1715232
24.984	21.4	01/08/09	14:18	1715232
200	219	01/08/09	15:27	1715232
24.984	21.5	01/27/09	14:10	1715232
24.984	21.6	01/27/09	15:18	1715232
200	210	01/27/09	15:27	1715232
24.984	21.5	02/24/09	12:02	1715232
24.984	21.6	02/24/09	13:08	1715232
200	201	02/24/09	13:18	1715232
24.984	21.6	03/25/09	10:45	1715232
24.984	21.7	03/25/09	11:53	1715232
200	214	03/25/09	12:00	1715232
24.984	21.4	04/21/09	11:03	1715232
24.984	21.3	04/21/09	12:01	1715232
200	197	04/21/09	12:18	1715232
24.984	21.0	05/14/09	09:40	1715232
24.984	21.2	05/14/09	10:40	1715232
200	203	05/14/09	10:45	1715232
24.984	21.0	06/26/09	11:20	1715232
24.984	21.7	06/26/09	13:14	1715232
200	203	06/26/09	13:16	1715232
24.984	21.1	07/24/09	12:15	1715232

Table E-3. Carbon Tetrachloride Concentration Standard Analyses

Carbon Tetrachloride Concentration Standard (ppmv)	Carbon Tetrachloride Concentration Analyzed (ppmv)	Date Analyzed	Time Analyzed	B&K™ Serial Number
24.984	21.0	07/24/09	14:07	1715232
200	217	07/24/09	14:14	1715232
24.984	21.1	08/28/09	11:12	1715232
24.984	21.2	08/28/09	12:14	1715232
200	213	08/28/09	12:21	1715232
24.984	21.0	09/24/09	10:22	1715232
24.984	21.1	09/24/09	11:24	1715232
200	218	09/24/09	11:29	1715232

B&K™ = Brüel & Kjær (trademark of Brüel & Kjær North America, Inc., Norcross, Georgia)
ppmv = parts per million by volume

Table E-4. Blank Analyses

Sample Location	Analyzed Date	Analyzed Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
Blank	10/22/08	14:05	1.00 U	1.00 U	1.00 U	1.00 U	1,970
Blank	10/22/08	15:03	1.00 U	1.00 U	1.00 U	1.00 U	4,390
Blank	11/20/08	12:14	1.00 U	1.00 U	1.00 U	1.00 U	5,870
Blank	11/20/08	13:18	1.00 U	1.00 U	1.00 U	1.00 U	6,140
Blank	01/08/09	14:12	1.00 U	1.00 U	1.00 U	1.00 U	7,570
Blank	01/08/09	15:16	1.00 U	1.00 U	1.00 U	1.00 U	7,820
Blank	01/27/09	14:12	1.00 U	1.00 U	1.00 U	1.00 U	3,940
Blank	01/27/09	15:16	1.00 U	1.00 U	1.00 U	1.00 U	4,070
Blank	02/24/09	12:04	1.00 U	1.00 U	1.00 U	1.00 U	6,990
Blank	02/24/09	13:10	1.00 U	1.00 U	1.00 U	1.00 U	7,800
Blank	03/25/09	10:47	1.00 U	1.00 U	1.00 U	1.00 U	5,940
Blank	03/25/09	11:51	1.00 U	1.00 U	1.00 U	1.00 U	6,430
Blank	04/21/09	11:05	1.00 U	1.00 U	1.00 U	1.00 U	4,430
Blank	04/21/09	12:03	1.00 U	1.00 U	1.00 U	1.00 U	6,960
Blank	05/14/09	09:42	1.00 U	1.00 U	1.00 U	1.00 U	7,220
Blank	05/14/09	10:42	1.00 U	1.00 U	1.00 U	1.00 U	7,680
Blank	06/29/09	11:22	1.00 U	1.00 U	1.00 U	1.00 U	8,890
Blank	06/29/06	13:12	1.00 U	1.00 U	1.00 U	1.00 U	8,290
Blank	07/24/09	12:17	1.00 U	1.00 U	1.00 U	1.00 U	9,960
Blank	07/24/09	14:09	1.00 U	1.00 U	1.00 U	1.00 U	10,600
Blank	08/28/09	11:14	1.00 U	1.00 U	1.00 U	1.00 U	7,230
Blank	08/28/09	12:16	1.00 U	1.00 U	1.00 U	1.00 U	7,740
Blank	09/24/09	10:24	1.00 U	1.00 U	1.00 U	1.00 U	8,730
Blank	09/24/09	11:26	1.00 U	1.00 U	1.00 U	1.00 U	9,450

CCl_4 = carbon tetrachloride
$CHCl_3$ = chloroform
CH_2Cl_2 = methylene chloride
MEK = methyl ethyl ketone
ppmv = parts per million by volume
U = analyzed for but not detected; value reported in the reporting limit

Table E-5. Field Blank Analyses

Sample Location	Sample Date	Sample Time	Analysis Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)	Comment
Field Blank	4/21/2009	10:30	11:51	1.00 U	1.00 U	1.00 U	1.50 J	11,700	The previously used Tedlar® bag was from Well 299-W15-8U. J false positive value is due to excessive atmospheric moisture.
Field Blank	5/14/2009	09:21	10:38	1.00 U	1.00 U	1.00 U	1.00 U	8,540	The previously used Tedlar® bag was from Well 299-W15-95L.
Field Blank	6/26/2009	09:14	12:06	1.00 U	1.00 U	1.00 U	1.12	8,650	The previously used Tedlar® bag was from Well 299-W15-217.
Field Blank	7/24/2009	10:17	13:03	1.00 U	1.00 U	1.00 U	1.50 J	12,400	The previously used Tedlar® bag was from Well 299-W18-253.
Field Blank	8/28/2009	10:48	12:10	1.00 U	1.00 U	1.00 U	1.09	7,990	The previously used Tedlar® bag was from Well 299-W15-220.
Field Blank	9/24/2009	10:55	11:22	1.00 U	1.00 U	1.00 U	1.33	10,500	The previously used Tedlar® bag was from Well 299-W15-219.

CCl_4 = carbon tetrachloride
$CHCl_3$ = chloroform
CH_2Cl_2 = methylene chloride
MEK = methyl ethyl ketone
ppmv = parts per million by volume
U = analyzed for but not detected; value reported in the reporting limit
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