SGW-54566
Revision 0

Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Calendar Year 2012

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

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Plateau Remediation Company
P.O. Box 1600
Richland, Washington 99352

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Program/Project: S&GRP

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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. 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 calendar year (CY) 2012 (January 1, 2012 through December 31, 2012) and provides a general overview of the entire operating period from February 25, 1992 through December 31, 2012.

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 focus on the vadose zone in the vicinity of these three waste sites.

Two 14.2 m^3/min (500 ft^3/min) SVE systems operated from April 2 through October 4, 2012. 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 162 kg (357 lb) of carbon tetrachloride from the vadose zone. Between April 1991 (when the pilot test was conducted) and December 2012, approximately 80,107 kg (176,604 lb) of carbon tetrachloride were removed from the vadose zone.

Approximately 5 kg (11 lb) of carbon tetrachloride were removed from the vadose zone in CY 2012 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.”

When the SVE systems were not operating in 2012, carbon tetrachloride concentrations did not increase significantly at monitoring locations near the ground surface or the water table. Temporarily suspending operation of the SVE systems appears to have caused minimal detectable vertical transport of carbon tetrachloride through the soil surface to the atmosphere and to have had no negative impact on groundwater quality.

Recommendations for SVE operations include not operating the active extraction systems in 2013 to allow more time for contaminant rebound. Passive SVE operations were discontinued in March 2013.

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Terms

B&K	Brüel & Kjaer
bgs	below ground surface
CCU	Cold Creek unit
CY	calendar year
DNAPL	dense nonaqueous phase liquid
EPA	Environmental Protection Agency
FY	fiscal year
GAC	granular activated carbon
OU	operable unit
ppmv	part(s) per million by volume
RD/RAWP	remedial design/remedial action work plan
ROD	record of decision
SVE	soil vapor extraction
VOC	volatile organic compound

1 Summary of Calendar Year 2012 Activities

Soil vapor extraction (SVE) is being used to remove carbon tetrachloride contamination from the vadose zone at the carbon tetrachloride site in the 200-PW-1 Operable Unit (OU). The carbon tetrachloride site includes the three waste sites used from 1955 through 1973 for disposal of waste liquids containing carbon tetrachloride. The purpose of remediation using SVE is to mitigate the threat to the environment caused by migration of carbon tetrachloride vapors through the soil column and into the groundwater.

Between February 1992 and October 2011, SVE was operated as an interim action in accordance with "Action Memorandum: Expedited Response Action Proposal for 200 West Area Carbon Tetrachloride Plume" (Smith and Stanley, 1992). In 2012, SVE was operated in accordance with *Record of Decision Hanford 200 Area Superfund Site 200-CW-5 and 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units* (EPA, 2011), hereinafter called the 200-PW-1 ROD. The 200-PW-1 ROD (EPA, 2011) selected SVE as the final remedial action for vadose zone carbon tetrachloride contamination at these waste sites and the associated vadose zone that received carbon tetrachloride waste liquids. The 200-PW-1 ROD (EPA, 2011) specifies that SVE will continue to be implemented in accordance with the expedited response action until the remedial design/remedial action work plan (RD/RAWP) is approved. The RD/RAWP is to be submitted to the U.S. Environmental Protection Agency (EPA) for review by September 30, 2015 (Section 12.4 of the 200-PW-1 ROD [EPA, 2011]).

The purpose of this report is to evaluate the SVE system operating data and the effectiveness of SVE in remediating carbon tetrachloride contamination based on the existing remedial design. This report provides a detailed summary of operations for calendar year 2012 (January 1, 2012, through December 31, 2012) and a general overview of operations from February 25, 1992, through December 31, 2012.

Highlights of SVE activities during 2012 include the following:

- Two SVE systems, each with a maximum capacity of 14.2 m^3/min (500 ft^3/min), operated at the carbon tetrachloride site from April 2 to October 4, 2012. One system operated at the combined 216-Z-1A/216-Z-18 well field, and the other system operated at the 216-Z-9 well field.
- The two SVE systems extracted a combined total of 162 kg (357 lb) of carbon tetrachloride from the vadose zone in 2012.
- Passive SVE removed approximately 5 kg (11 lb) of carbon tetrachloride from the vadose zone in 2012.
- Soil vapor monitoring continued monthly from March through December 2012 at wells and probes that were not connected to the SVE system.

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2 200-PW-1 Operable Unit Soil Vapor Extraction

During 2012, 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-1A Tile Field
- 216-Z-18 Crib

One of the active SVE systems may also be used for future extraction of vapor through wells at the 216-Z-12 Crib. Extraction from this site was last performed in 1998. 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, a process 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 aboveground using granular activated carbon (GAC) canisters. GAC adsorbs the carbon tetrachloride from the vapor. The treated, clean soil vapor is then vented to the atmosphere. Descriptions of the active and passive SVE systems are provided in SGW-49388, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Calendar Year 2010*.

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. SVE 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—was discharged primarily to the following three subsurface infiltration facilities (Figure 2-1):

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

Additional details on the sources of carbon tetrachloride waste are provided in DOE/RL-91-32, *Expedited Response Action Proposal (EE/CA & EA) for 200 West Area Carbon Tetrachloride Plume*, and DOE/RL-2006-51, *Remedial Investigation Report for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*.

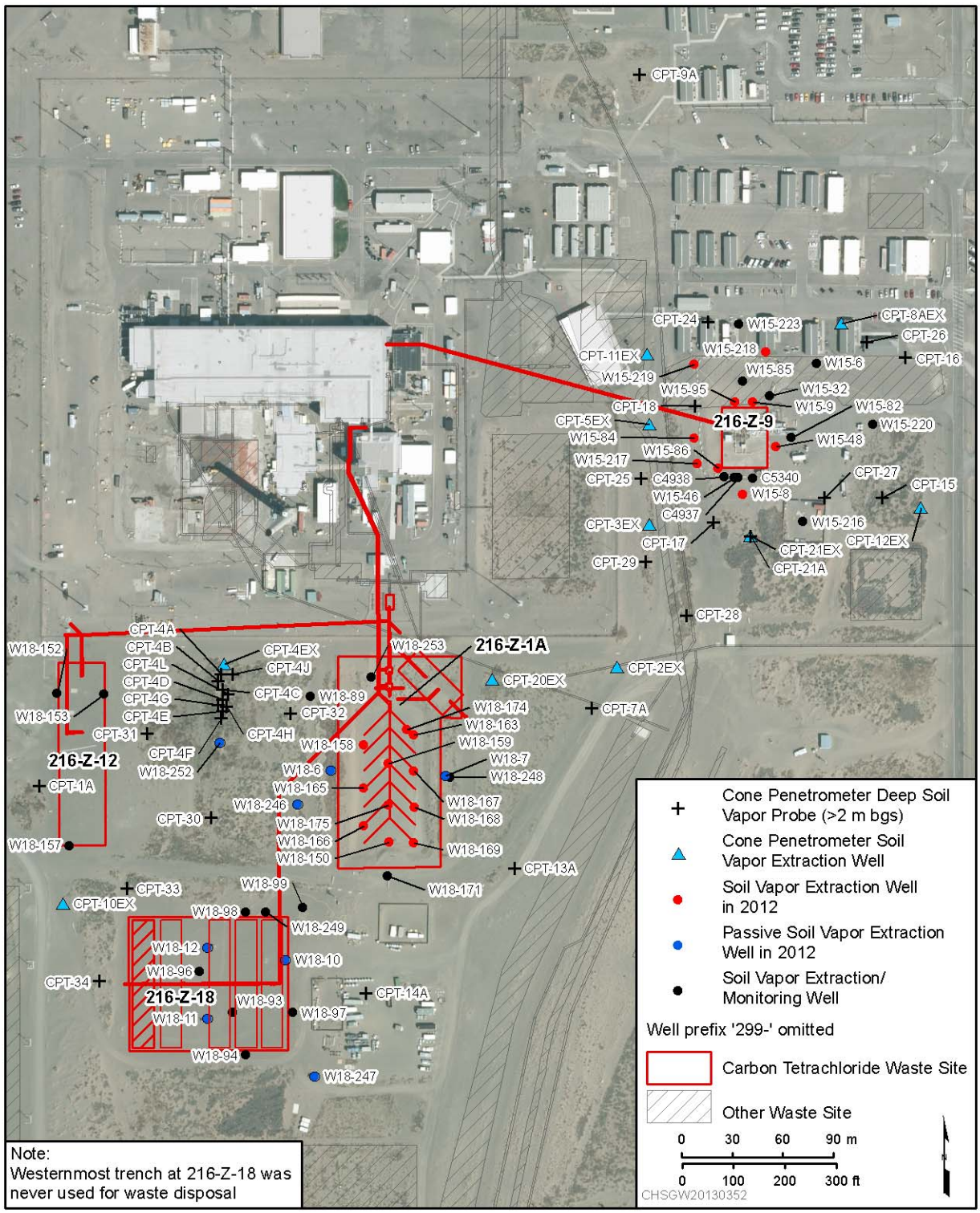

Figure 2-1. Extraction and Monitoring Wells and Deep (>2 m [>6.6 ft]) Soil Vapor Probes at the Carbon Tetrachloride Soil Vapor Extraction Sites

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. 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 (greater than 70 m [230 ft] below ground surface [bgs])

During 2012, 52 wells were available for SVE (Figure 2-1). Of the 52 wells, 13 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. SGW-49388 shows cross sections through the 216-Z-18/216-Z-12, 216-Z-1A, and 216-Z-9 well fields.

2.2.3 Carbon Tetrachloride Soil Vapor Extraction, 1992 through 2012

Between 1992 and 1997, the strategy for SVE was to operate throughout the year using up to three SVE systems with design capacities of 14.2, 28.3, and 42.5 m^3/min (500; 1,000; and 1,500 ft^3/min). In 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, *Rebound Study Report for the Carbon Tetrachloride Soil Vapor Extraction Site, Fiscal Year 1997*).

The operating strategy was modified based on the results of the rebound study and the declining rate of carbon tetrachloride removal during continuous extraction operations. Rather than 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 all year, 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.

Two new SVE systems, each with a design capacity of 14.2 m^3/min (500 ft^3/min), were operated from 2009 through 2012. One new SVE system was operated at the 216-Z-1A site, and one system was operated at the 216-Z-9 site. Each system operated for six months in 2009 (April 1 through September 30), eight months in 2010 and 2011 (March 1 through October 31), and six months in 2012 (April 2 through October 4).

The history of cyclic SVE operations (e.g., operational periods, average flows, and SVE wells) is summarized for 1997 through 2009 in Table 2-1 of SGW-49388 and Appendix A of SGW-44694; Appendix A of SGW-49388 provides the history for 2010; and Appendix A of SGW-51807 provides the history for 2011. Appendix A of this report provides the history for 2012. Table 2-1 summarizes the mass of carbon tetrachloride removed by year and by waste site.

2.2.4 Carbon Tetrachloride Soil Vapor Extraction in 2012

During 2012, each of the two 14.2 m^3/min (500 ft^3/min) SVE systems operated from April 2 through October 4. 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 2012 was based on the results of the treatability test conducted at the 216-Z-9 site in 2011 (PNNL-21326, *Treatability Test Report: Characterization of Vadose Zone Carbon Tetrachloride Source Strength Using Tomographic Methods at the 216-Z-6 Site*). A select set of wells within the higher concentration areas was used for extraction during the first two months. Wells located along the periphery of the higher concentrations areas then were added on-line. This strategy increased the rebound period in the peripheral areas.

At the 216-Z-9 site, the initial extraction wells were 299-W15-8U, 299-W15-48, 299-W15-84L, 2880W15-84U, and 299-W15-86 (Figure 2-1). Eight additional wells were added online on May 31 (Table A-1). At the 216-Z-1A site, the initial extraction wells were 299-W18-150L, 299-W18-163L, 299-W18-166, 299-W18-168, and 299-W18-174 (Figure 2-1). Six additional wells were added between May 31 and June 7 (Table A-2). During 2012, 20 wells (24 well intervals) were used for extraction.

At the 216-Z-1A/216-Z-18 site, passive SVE systems continued operating during 2012 at 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 and represent the combined contribution of all extraction wells currently online. In addition, samples are periodically collected at individual wells to obtain well-specific data (Appendix C). Flow meters, vacuum/pressure transmitters, and volatile organic compound (VOC) 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 since SVE operations began. Carbon tetrachloride concentrations in soil vapor extracted from the 216-Z-9 well field using the active SVE systems declined from approximately 30,000 ppmv at startup in 1993 to a maximum of 14 ppmv in 2012 (Figure 2-2). Carbon tetrachloride concentrations in soil vapor extracted from the 216-Z-1A/216-Z-18/216-Z-12 well field using the SVE systems declined from approximately 1,500 ppmv at startup in 1992 to a maximum of 11 ppmv in 2012 (Figure 2-3). The 200-PW-1 ROD (EPA, 2011) specified the final cleanup level for carbon tetrachloride in soil vapor as 100 ppmv.

A decrease in concentration with continued extraction is typical of SVE operations and represents removal of the volatile contaminant originally available in the readily swept pore spaces. Once that mass has been effectively removed, peak contaminant vapor concentrations at the beginning of each pumping cycle reflect the amount of carbon tetrachloride released from low-permeability sediments during the preceding nonoperational period. Once pumping has commenced, contaminant concentration rapidly decreases, approaching a concentration level that may reflect the rate of continued contaminant release from low-permeability sediments.

Table 2-1. Carbon Tetrachloride Mass Removed Using Active Soil Vapor Extraction

Site	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Carbon Tetrachloride Removed Each Calendar Year (kg)																							
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	101	75	79	54,966
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	74	92	120	83	25,141
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**	**193**	**195**	**162**	**80,107**
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**	**79,750**	**79,945**	**80,107**	
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	2602	1,491	1,468	**52,499**
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	2754	2,227	1,576	**65,793**
Yearly Total	47	153	1,427	9,351	31,054	27,921	8,909	3,492	3,555	0	2,521	2,662	2,637	1,868	1,797	1,862	2,227	2,198	2,493	5,356	3,718	**3,044**	
Cumulative Total	47	200	1,627	10,978	42,032	69,953	78,862	82,354	85,909	85,909	88,430	91,092	93,729	95,597	97,394	99,256	10,1483	10,3681	10,6174	111,530	115,248	**118,292**	**118,292**
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	0.04	0.05	0.05	
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	0.03	0.05	0.05	
Number of Weeks SVE System Operated Each Year																							
216-Z-9	--	--	--	--	--	--	11	13	13	0	11	16	0	4	17	9	19	14	26	36	35	27	**251**
216-Z-1A/216-Z-18/216-Z-12	--	--	--	--	--	--	11	13	13	0	15	10	26	18	12	16	7	12	26	36	35	27	**277**

Notes:

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. The two systems operated in 2009 were also operated in 2010 and 2011.

To convert kilograms to pounds, multiply by 2.2046.

To convert cubic meters to cubic feet, multiply by 35.315.

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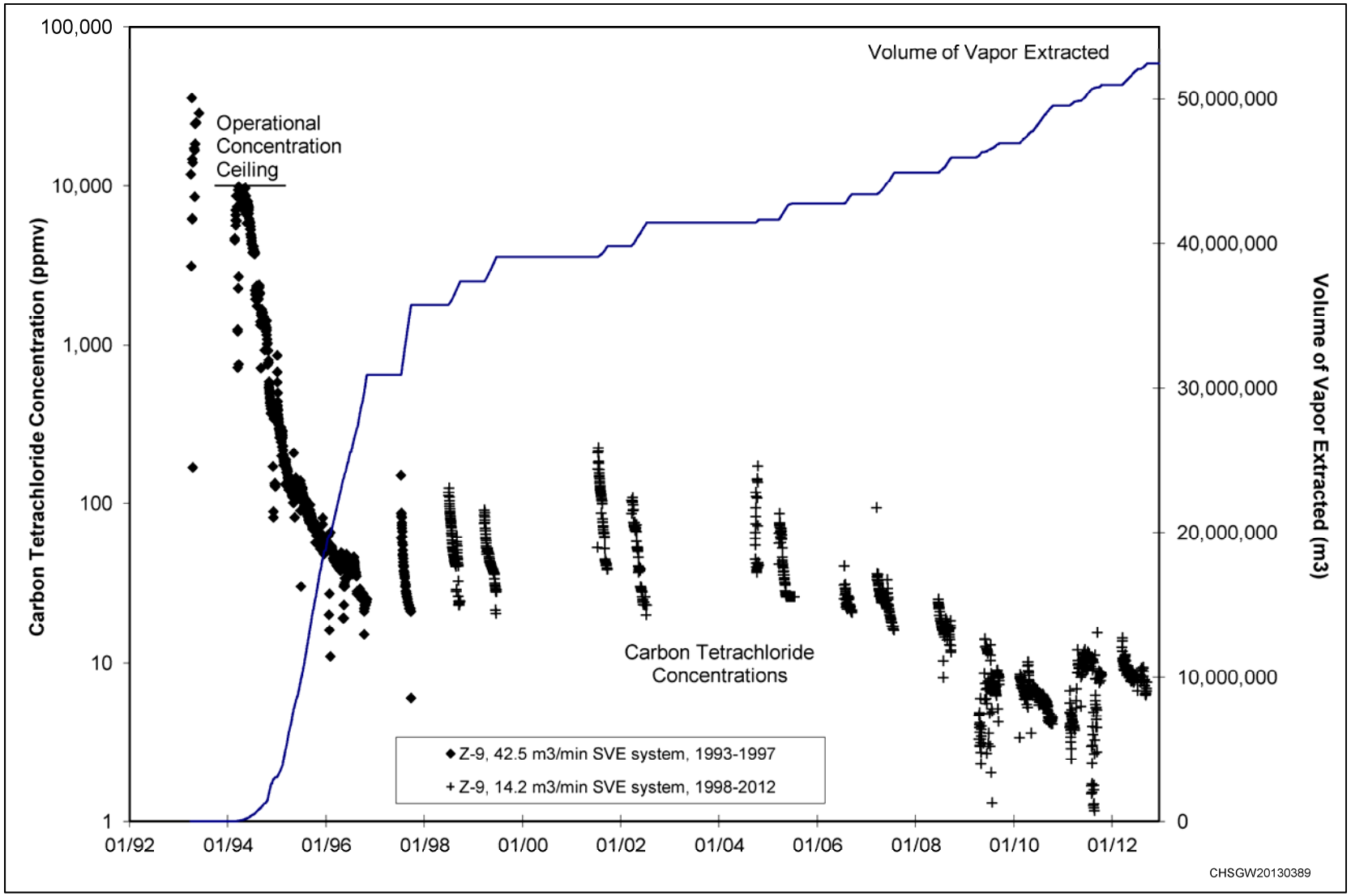


Figure 2-2. Daily Carbon Tetrachloride Concentrations at the 216-Z-9 Site, 1993 through 2012

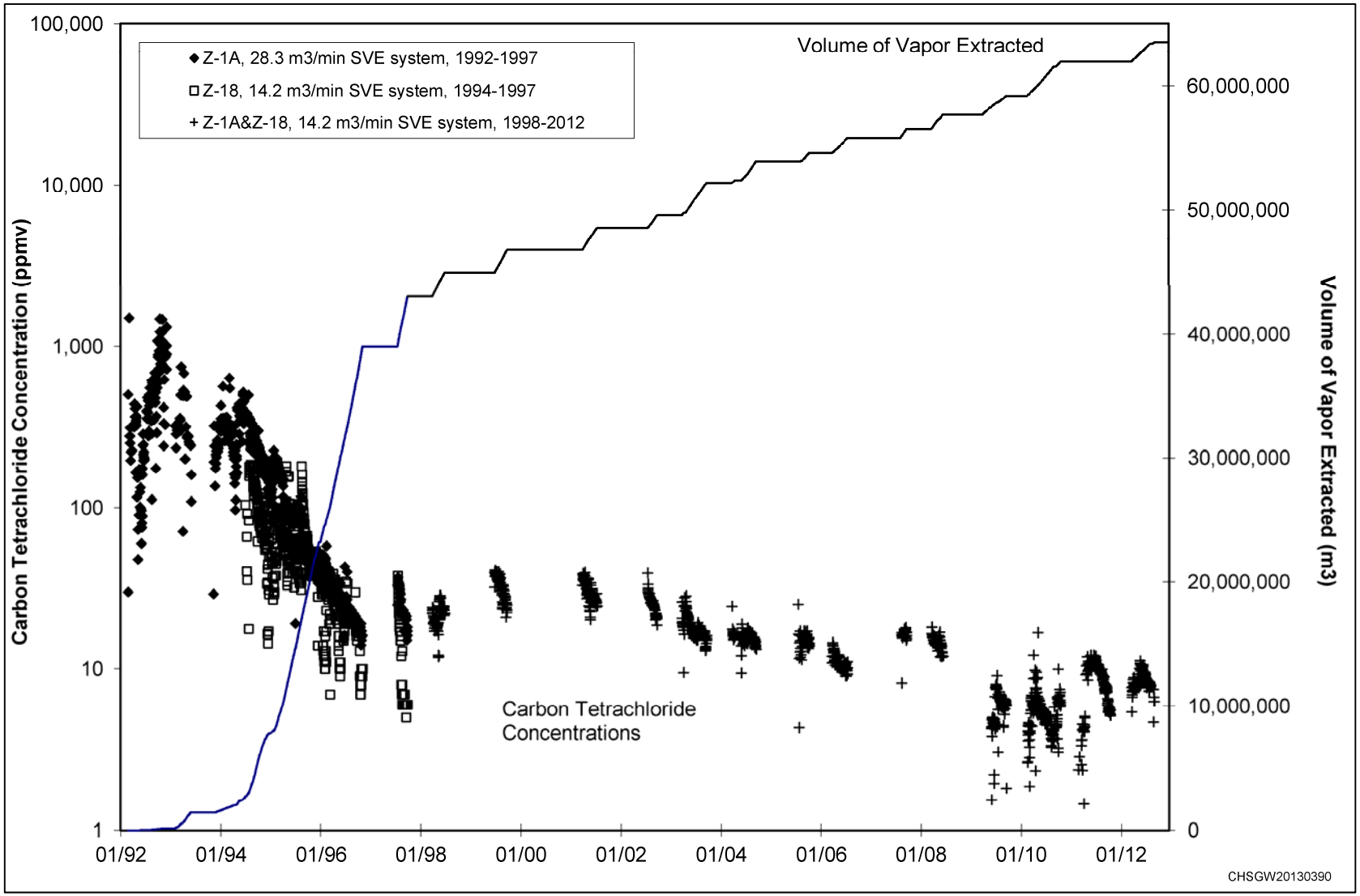


Figure 2-3. Daily Carbon Tetrachloride Concentrations at the 216-Z-1A/216-Z-18/216-Z-12 Site, 1992 through 2012

At the 216-Z-1A site, an increase in carbon tetrachloride concentrations occurred when the second set of extraction wells was added on-line; concentrations then declined to approximately 6 ppmv by the end of 2012 extraction operations (Figure 2-4). At the 216-Z-9 site, the concentration declined to approximately 7 ppmv by the end of 2012 extraction operations (Figure 2-5).

Figure 2-6 (216-Z-9 site) and Figure 2-7 (216-Z-1A site) illustrate carbon tetrachloride concentrations measured during each SVE operating period since cyclic operations began in 1997. These figures show that initial concentrations following the inactive (rebound) period declined over the years. Although initial concentrations at the 216-Z-9 site have been much higher than at the 216-Z-1A site, tailing asymptotic concentrations at the end of the extraction operating periods are similar in magnitude.

A recent study (PNNL-21326) demonstrated that the accumulation of carbon tetrachloride during rebound periods at the 216-Z-9 site has gradually decreased during recent years (Figure 2-8); a conclusion supported by a previous evaluation (SGW-44694, *Performance Evaluation Report for Soil Vapor Extraction Operations at 200-PW-1 Operable Unit for Carbon Tetrachloride Site, Fiscal Year 2009*). Figure 2-8 (216-Z-9) and Figure 2-9 (216-Z-1A) show the maximum rebound carbon tetrachloride vapor concentration and the asymptotic concentration (concentration at the end of the operations cycle) for the same period of cyclic operations. As discussed for the 216-Z-9 site in PNNL-21326, the maximum concentrations were significantly higher than the asymptotic concentrations during the earlier cycles. Since then, the maximum and asymptotic concentrations at both sites have declined, and there are now only small differences between maximum and asymptotic concentrations. These small differences between the initial and final concentrations in an operational cycle indicate that the rebound in carbon tetrachloride concentrations during the shutdown period has significantly declined (PNNL-21326).

The carbon tetrachloride concentrations in Figures 2-2 through 2-9 are the combined concentrations in the vapor extracted from all on-line wells. During SVE operations, carbon tetrachloride concentrations are periodically measured in individual on-line extraction wells. For each well, the initial carbon tetrachloride concentration is compared to the most recent concentration in Figure 2-10. These data show that the carbon tetrachloride concentrations have decreased below the cleanup level (100 ppmv) specified in the 200-PW-1 ROD (EPA, 2011). [Note: For wells with more than one extraction interval, the highest concentration from any extraction interval in the well is used in Figure 2-10.]

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 online wells and changes as the selection of online 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 2012 operations, 3.0 million m^3 of extracted vapor were treated (Table 2-1). Of that total, 1.6 million m^3 were extracted from 216-Z-1A at an average flow rate of 7.5 m^3/min (264.9 ft^3/min), and 1.5 million m^3 were extracted from 216-Z-9 at an average flow rate of 7.0 m^3/min (247.2 ft^3/min). Between April 1991 (pilot test) and December 2012, 118.3 million m^3 of soil vapor were extracted and treated. Of this total volume, 52.5 million m^3 were extracted from the 216-Z-9 well field and 65.8 million m^3 were 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 online wells (Appendix A of BHI-00720, *Performance Evaluation Report for Soil Vapor Extraction Operations at the Carbon Tetrachloride Site, February 1992 – September 2001*). To estimate the flow rate at each well on each day of operation, the system flow rate

was multiplied by the ratio of the open area of the well 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 33.9 million m^3 of soil vapor was extracted from wells open above the CCU (Table 2-2), and 17.1 million m^3 of soil vapor were extracted from wells open below the CCU (Table 2-3). For the 216-Z-1A/216-Z-18/216-Z-12 well field, an estimated 43.7 million m^3 of soil vapor was extracted from wells open above the CCU (Table 2-2), and 20.5 million m^3 was extracted from wells open below the CCU (Table 2-3).

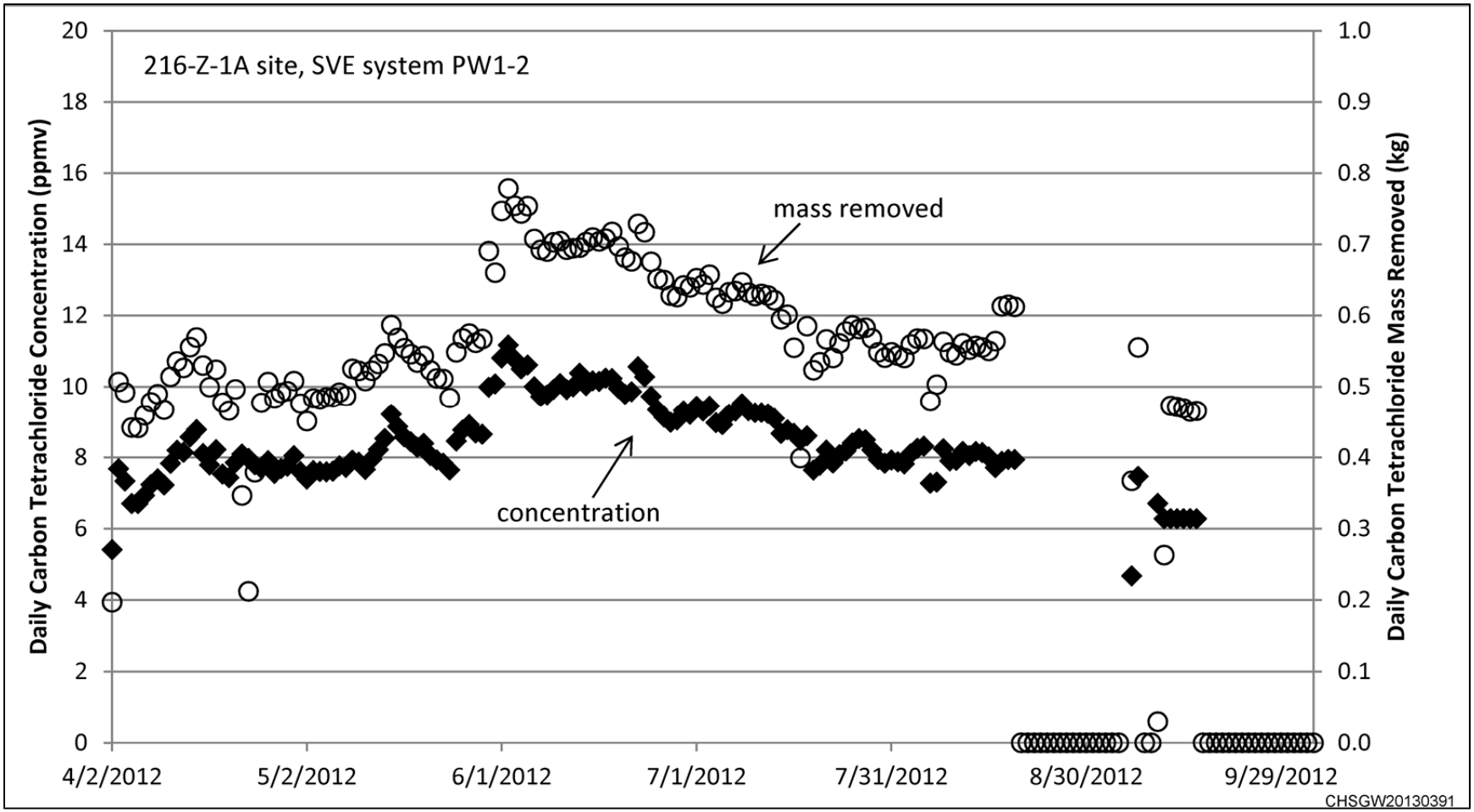


Figure 2-4. Daily Carbon Tetrachloride Concentration and Mass Removed, 216-Z-1A/216-Z-18 Site, 2012

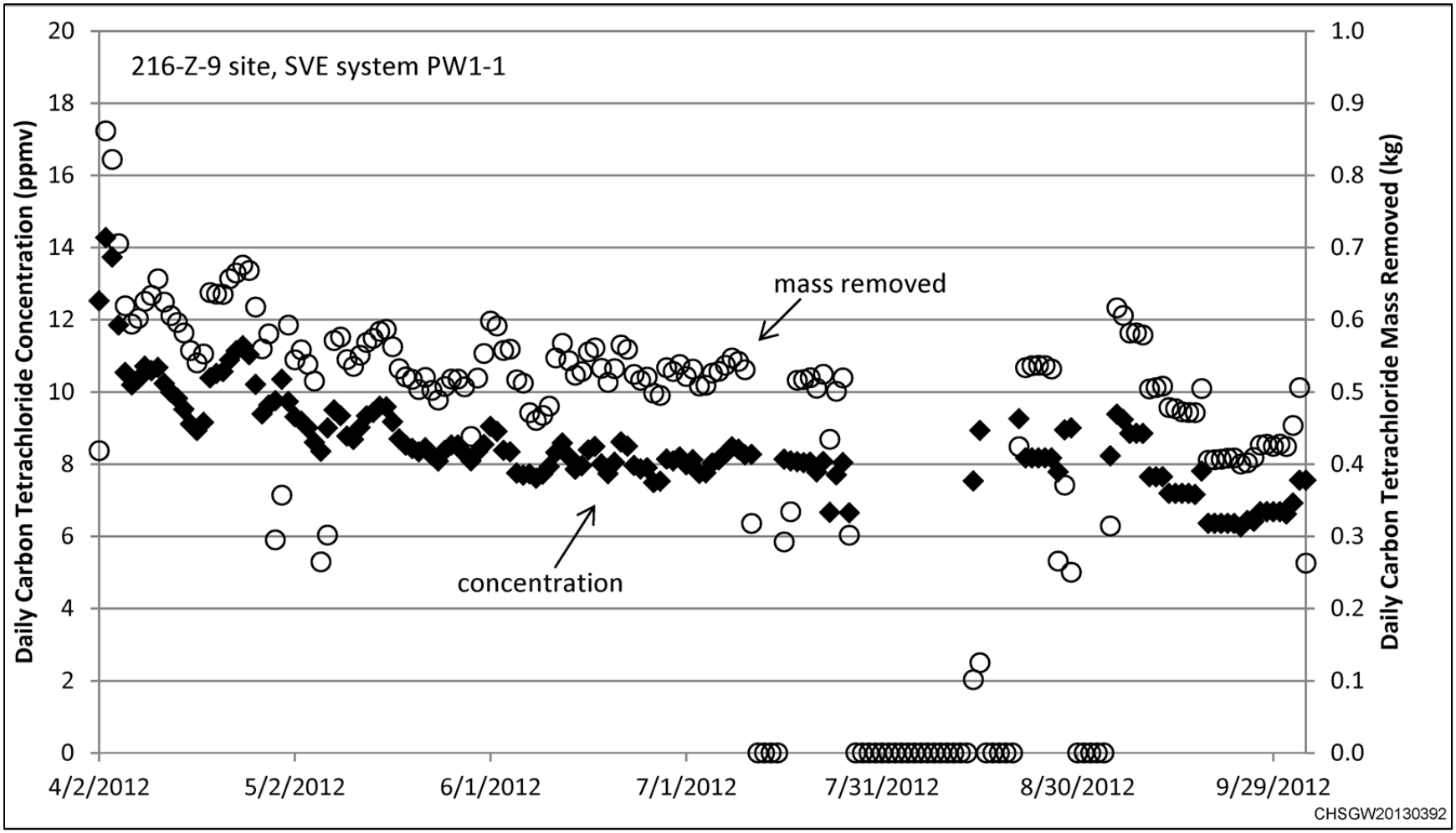


Figure 2-5. Daily Carbon Tetrachloride Concentration and Mass Removed, 216-Z-9 Site, 2012

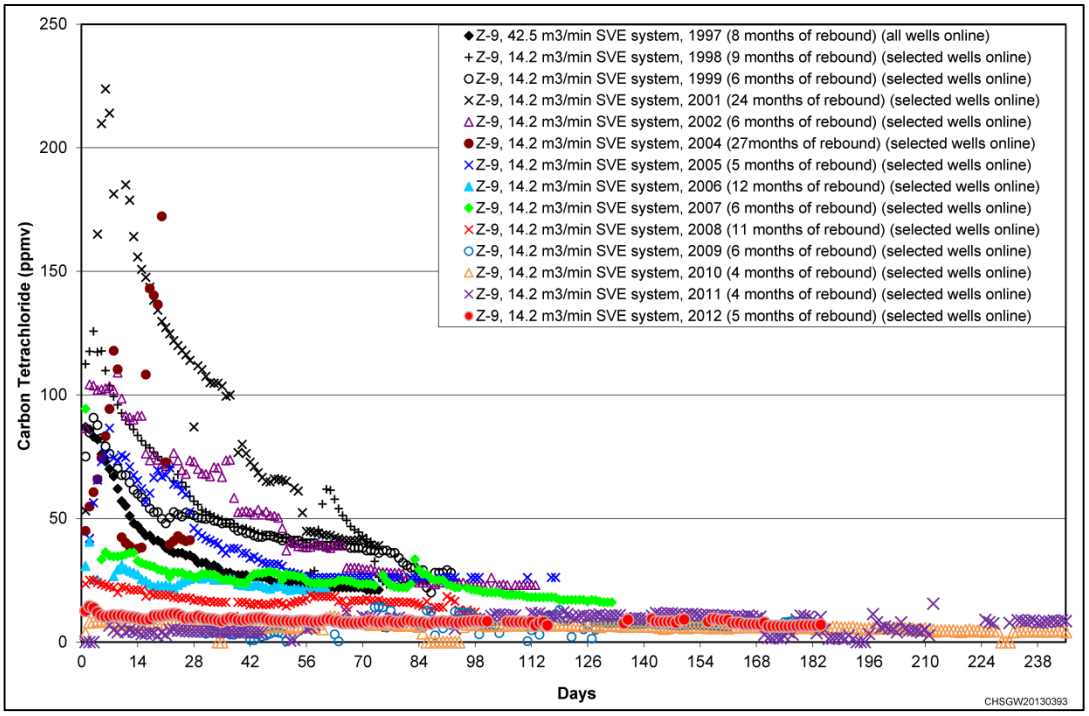


Figure 2-6. Carbon Tetrachloride Concentrations in Vapor Extracted from the 216-Z-9 Site, 1997 through 2012

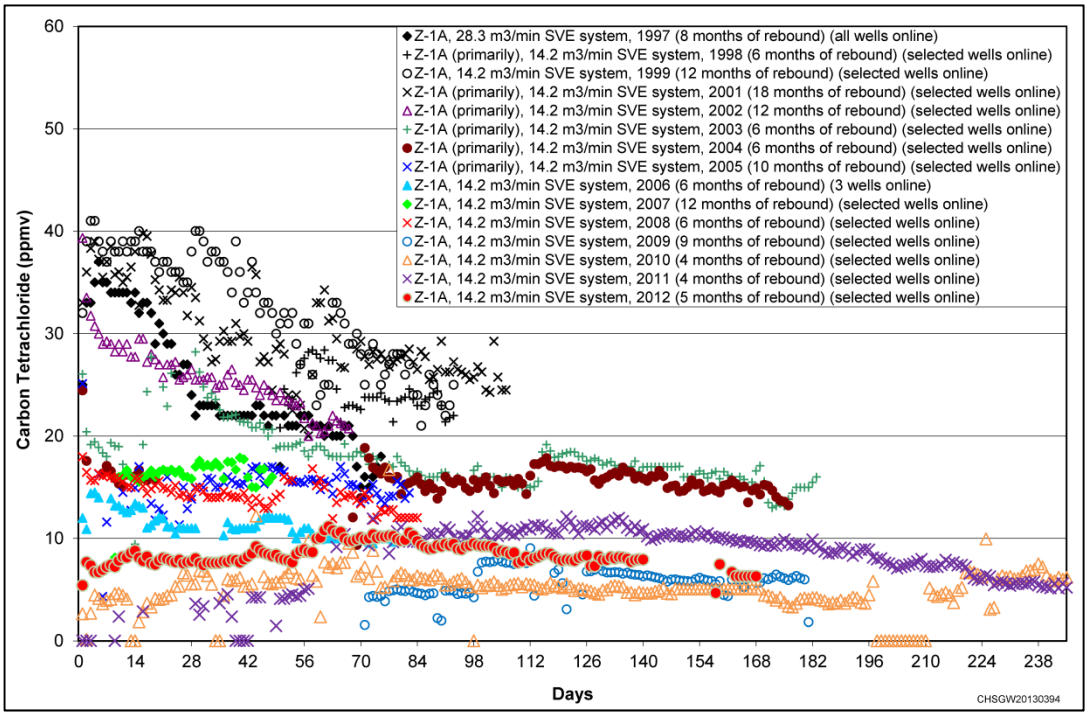
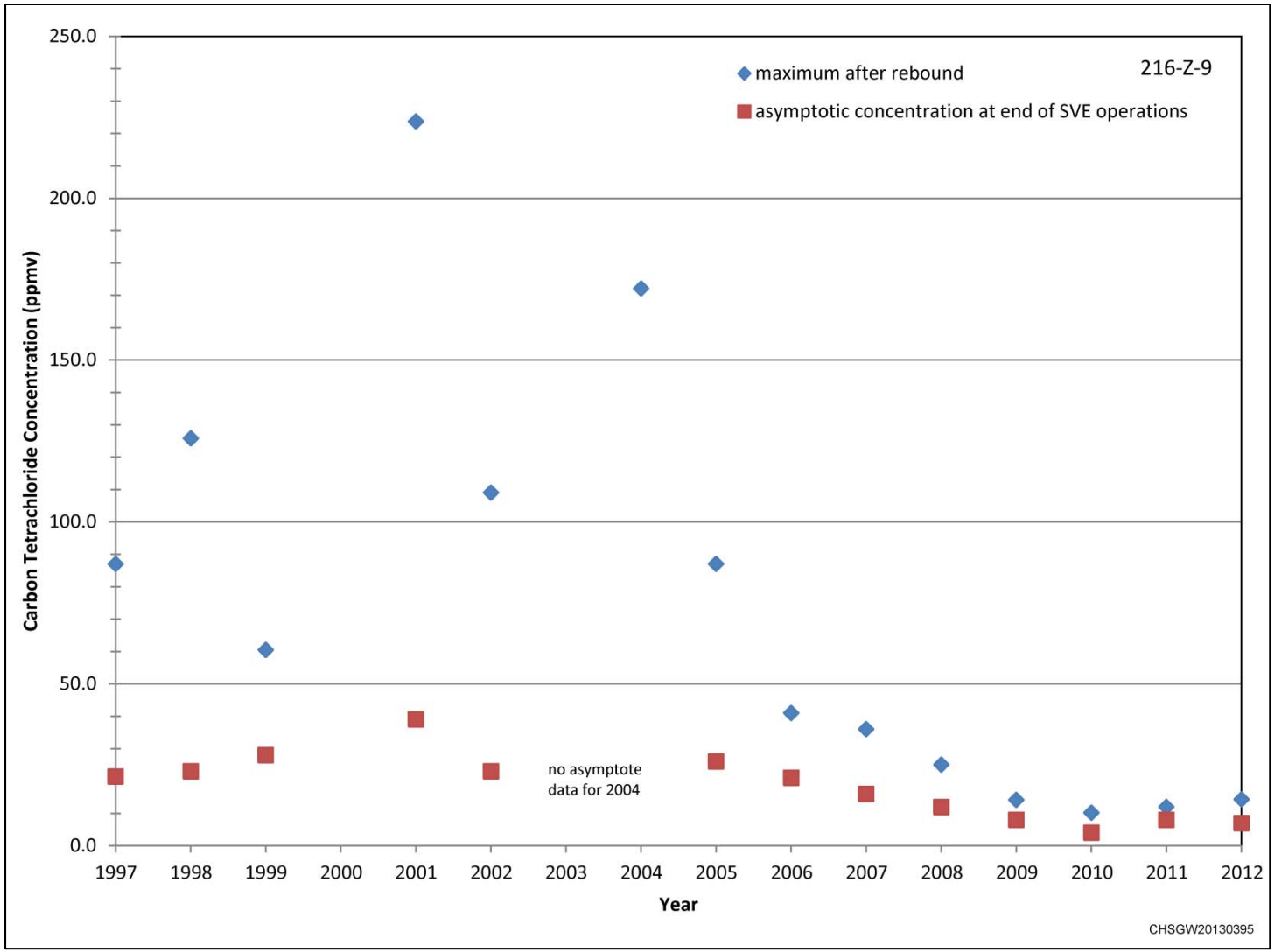


Figure 2-7. Carbon Tetrachloride Concentrations in Vapor Extracted from the 216-Z-1A Site, 1997 through 2012



Modified from Figure 4.1 in PNNL-21326, *Treatability Test Report: Characterization of Vadose Zone Carbon Tetrachloride Source Strength Using Tomographic Methods at the 216-Z-6 Site*.

Figure 2-8. Maximum and Asymptotic Carbon Tetrachloride Concentrations in Vapor Extracted from the 216-Z-9 Site, 1997 through 2012

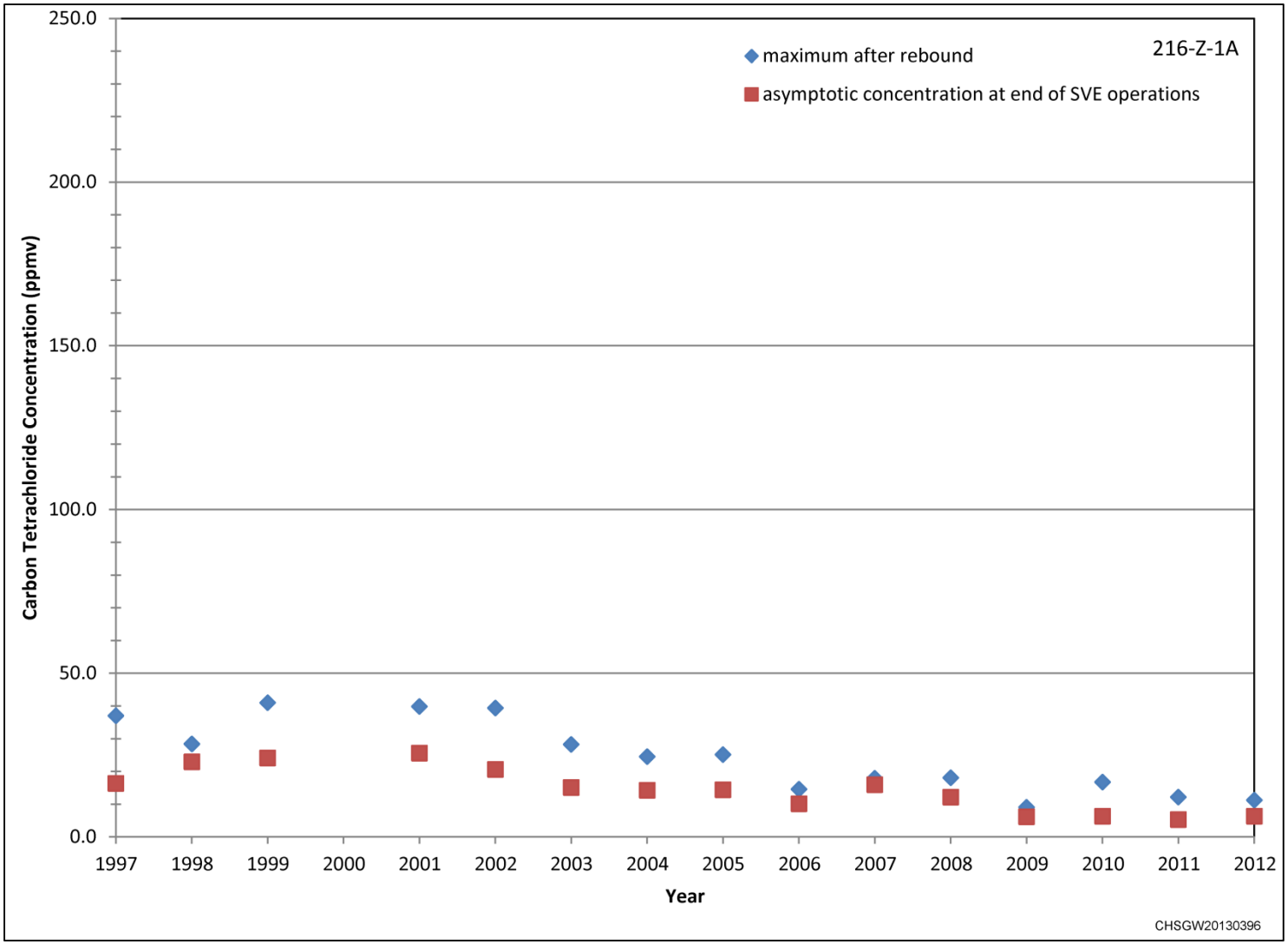


Figure 2-9. Maximum and Asymptotic Carbon Tetrachloride Concentrations in Vapor Extracted from the 216-Z-1A Site, 1997 through 2012

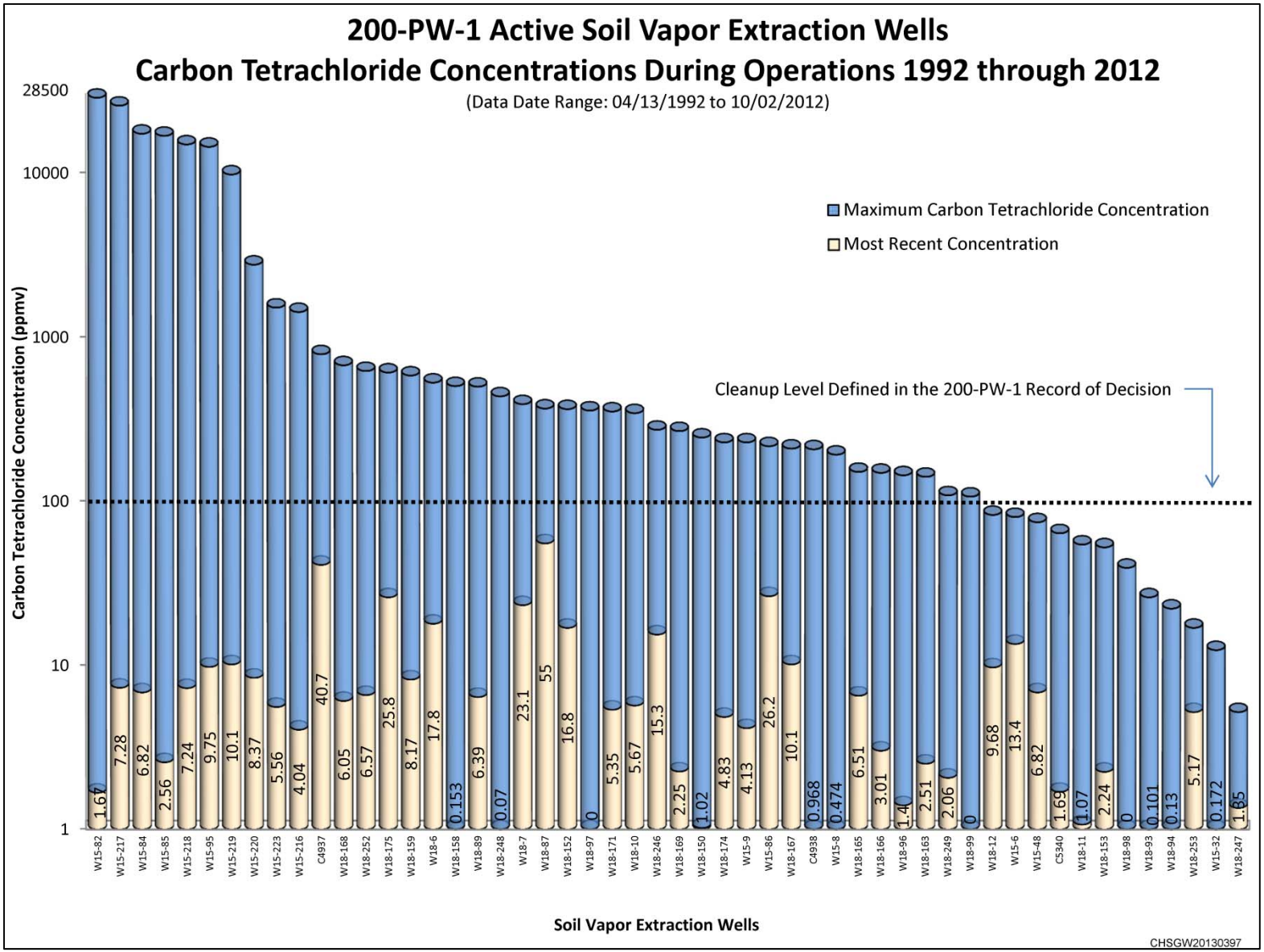


Figure 2-10. Decrease in Carbon Tetrachloride Concentrations in Soil Vapor Extraction Wells

Table 2-2. Volume of Vapor Extracted from Each Extraction Well above the Cold Creek Unit, April 1991 through October 2012

216-Z-9 Wells, March 1993 to October 2012	Extracted Vapor (1,000 m^3)	216-Z-18/ 216-Z-12 Wells, February 1992 to October 2012	Extracted Vapor (1,000 m^3)	216-Z-1A Wells, April 1991 to October 2012	Extracted Vapor (1,000 m^3)
299-W15-6U	150	299-W18-10U	660	299-W18-6U	190
299-W15-8U	320	299-W18-93	10	299-W18-87L	40
299-W15-9U	1,590	299-W18-94	0	299-W18-87M	20
299-W15-48	1,270	299-W18-96	450	299-W18-87U	40
299-W15-82	6,960	299-W18-97	230	299-W18-89	9,910
299-W15-84U	2,650	299-W18-98	0	299-W18-150L	380
299-W15-85	2,730	299-W18-99	160	299-W18-150M	40
299-W15-95U	1,040	299-W18-152	1,770	299-W18-150U	40
299-W15-216U	630	299-W18-153	480	299-W18-158L	290
299-W15-217	6,980	299-W18-246U	780	299-W18-158M	0
299-W15-218U	3,610	299-W18-249	1,170	299-W18-158U	820
299-W15-219U	2,900	299-W18-252U	1,290	299-W18-159	1,020
299-W15-220U	2,180	—	—	299-W18-163L	360
299-W15-223	1,730	—	—	299-W18-163M	10
C4937	30	—	—	299-W18-163U	520
C4938	30	—	—	299-W18-165	3,320
C5340	30	—	—	299-W18-166	2,150
CPT-21	20	—	—	299-W18-167	2,680
—	—	—	—	299-W18-168	2,820
—	—	—	—	299-W18-169	230
—	—	—	—	299-W18-171L	500
—	—	—	—	299-W18-171M	390
—	—	—	—	299-W18-171U	460
—	—	—	—	299-W18-174	7,030
—	—	—	—	299-W18-175	660
—	—	—	—	299-W18-248	3,590
—	—	—	—	299-W18-253	710
Total	**34,870**	**Total**	**7,010**	**Total**	**38,220**

Note: To convert cubic meters to cubic feet, multiply by 35.315.

1

Since system startup, 81 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), 37 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 Formation 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, 102 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.

Table 2-3. Volume of Vapor Extracted from Each Extraction Well below the Cold Creek Unit, April 1991 through October 2012

216-Z-9 Wells, March 1993 to October 2012	Extracted Vapor (1,000 m^3)	216-Z-18/ 216-Z-12 Wells, February 1992 to October 2012	Extracted Vapor (1,000 m^3)	216-Z-1A Wells, April 1991 to October 2012	Extracted Vapor (1,000 m^3)
299-W15-6L	2,430	299-W18-10L*	2,720	299-W18-6L*	2,360
299-W15-8L	270	299-W18-11L*	240	299-W18-7*	8,880
299-W15-9L	1,880	299-W18-12*	1,040	—	—
299-W15-32	450	299-W18-246L*	1,650	—	—
299-W15-84L	400	299-W18-252L*	3,650	—	—
299-W15-86	1,310	—	—	—	—
299-W15-95L	910	—	—	—	—
299-W15-216L	1,240	—	—	—	—
299-W15-218L	4,160	—	—	—	—
299-W15-219L	2,930	—	—	—	—
299-W15-220L	1,600	—	—	—	—
Total	**17,580**	**Total**	**9,290**	**Total**	**11,240**

Note: To convert cubic meters to cubic feet, multiply by 35.315.

* 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.

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 2012, approximately 162 kg (357 lb) of carbon tetrachloride were removed from the vadose zone using the SVE systems. Of that total,

approximately 79 kg (174 lb) of carbon tetrachloride was removed from the 216-Z-9 site and 83 kg (183 lb) were removed from the 216-Z-1A site (Table 2-1).

Between April 1991 (when the pilot test was conducted) and December 2012, approximately 80,107 kg (176,604 lb) of carbon tetrachloride was removed from the vadose zone. Of that total, 54,966 kg (121,178 lb) was removed from the 216-Z-9 well field and 25,140 kg (55,424 lb) was removed from 216-Z-1A/216-Z-18/216-Z-12 well field (Table 2-1).

Carbon tetrachloride removal rates decreased significantly between SVE startup and December 2012 (Figures 2-11 and 2-12; Table 2-1). Some of the variability in mass removed each year during cyclic operations (i.e.,1998 through 2012) is 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 1998 through 2012 by comparing the mass of carbon tetrachloride removed per volume of vapor extracted from the vadose zone (Table 2-1). At both the 216-Z-9 and 216-Z-1A sites, SVE system efficiencies decreased during the 15 years of cyclic operations (Figure 2-13). The two significant increases in SVE efficiency at the 216-Z-9 site occurred during extraction following extended periods of rebound.

Carbon tetrachloride concentrations were monitored at the eight passive wells in 2012 (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 2001 calculation (BHI-00720).

The mass of carbon tetrachloride removed using the eight passive SVE wells in 2012 is estimated to be approximately 5 kg (11 lb) (Table 2-4). Passive SVE was discontinued on March 18, 2013 based on the decline in carbon tetrachloride concentrations. During the first three months in 2013, the mass of carbon tetrachloride removed using the eight passive SVE wells is estimated to be approximately 315 g (0.7 lb) (Table 2-4). The data for January through March 2013 are included in this report for completeness.

Mass of Carbon Tetrachloride Removed by Soil Vapor Extraction Systems (0200W-CA-V0019) documents the mass of carbon tetrachloride removed between February 1992 and September 2001 using the active SVE systems. *200-PW-1 Operable Unit Carbon Tetrachloride Removal Using Soil Vapor Extraction* (ECF-200PW1-12-0033) documents the mass of carbon tetrachloride removed between April 2002 and October 2012 using the active SVE systems and the mass of carbon tetrachloride removed between October 2000 and March 2013 using the eight passive SVE wells.

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 system operation 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.

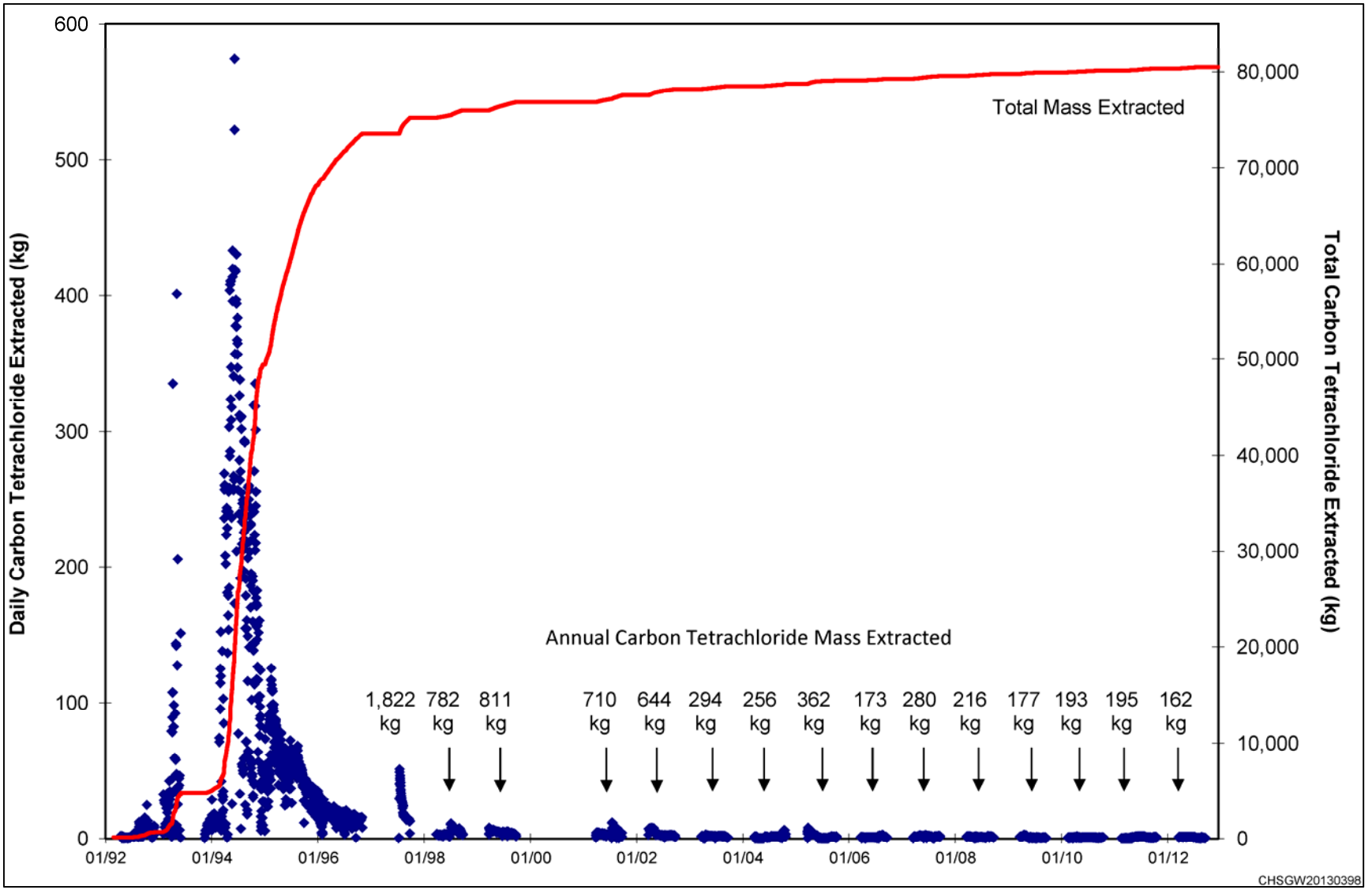


Figure 2-11. Daily Carbon Tetrachloride Mass Extracted, 1992 through 2012

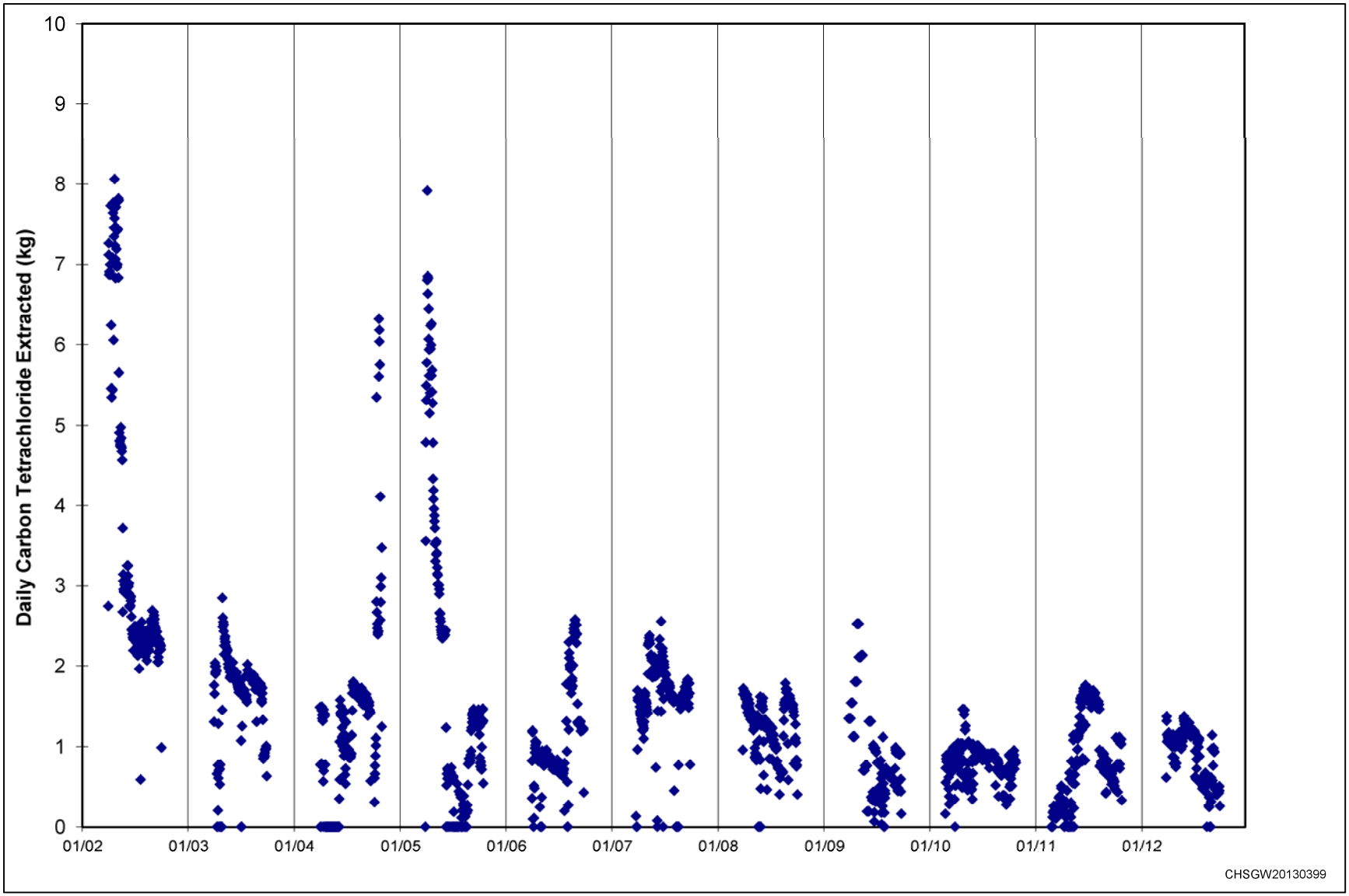
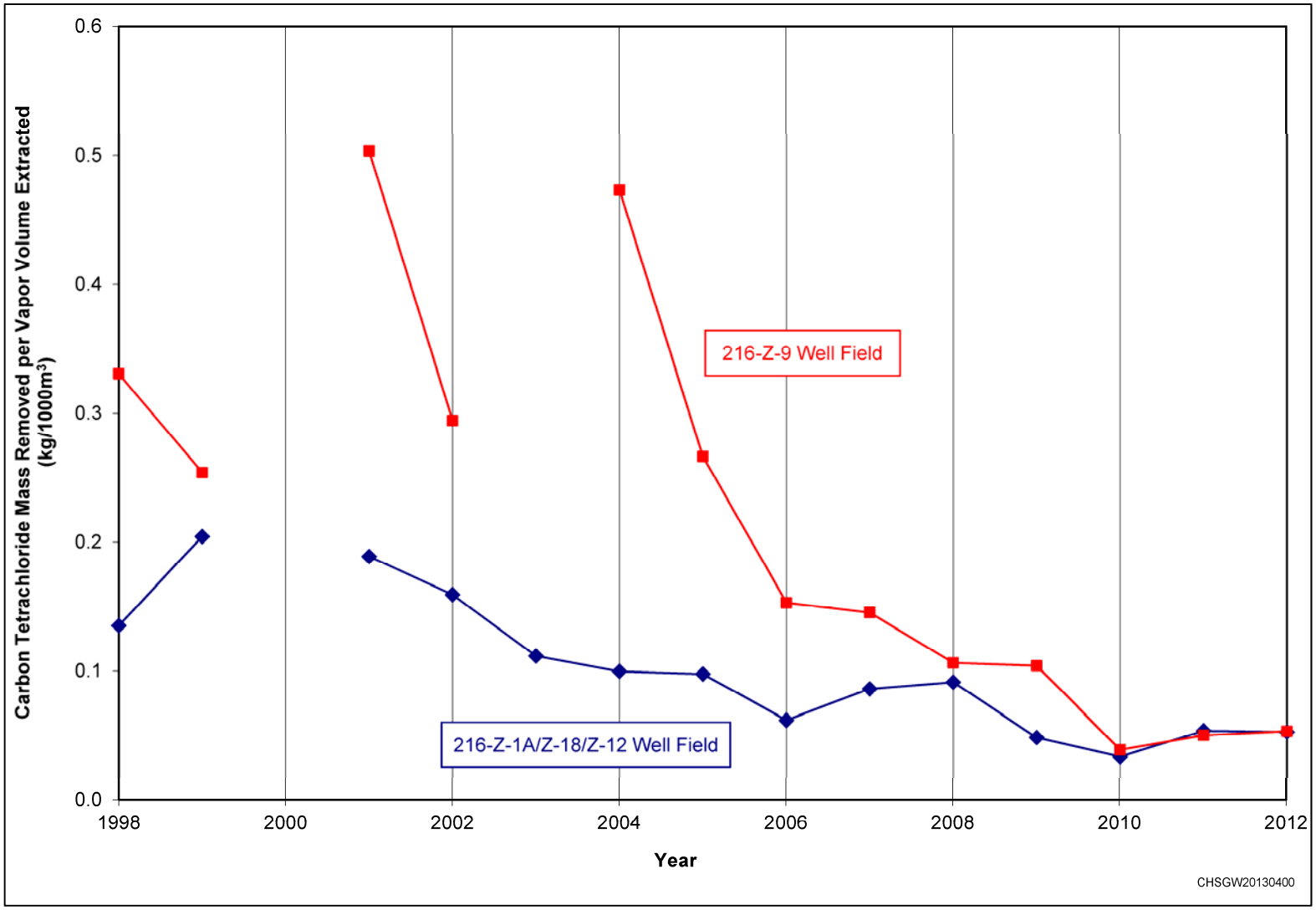


Figure 2-12. Daily Carbon Tetrachloride Mass Extracted, 2002 through 2012



Note: The soil vapor extraction system was offline in 2000. Extraction was not conducted at the 216-Z-9 well field in 2003 due to site characterization activities.

Figure 2-13. Carbon Tetrachloride Mass Removed per Volume of Vapor Recovered from the Vadose Zone, 1998 through 2012

Table 2-4. Carbon Tetrachloride Mass Removed Using Passive Soil Vapor Extraction

Well	Carbon Tetrachloride Mass Removed Each Year (kg)													
	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	CY 2010[a]	CY 2011	CY 2012	CY 2013[b]
299-W18-6L	0.8	7.5	4.3	2.8	3.0	2.9	0.5	1.0	1.1	0.6	0.7	0.9	1.6	0.2
299-W18-7	2.5	2.5	2.5	3.8	3.5	2.4	2.0	2.1	2.1	1.5	1.7	0.9	0.9	0.1
299-W18-10L	0.5	0.9	0.6	0.9	0.8	0.6	1.0	0.6	0.7	0.7	0.7	0.5	0.4	0.0
299-W18-11L	0.2	1.1	0.7	0.9	0	0.4	0.4	0.2	0.3	0.3	0.2	0.2	0.3	0.0
299-W18-12	2.0	2.5	0.7	1.2	1.6	0.5	0.3	0.4	0.1	0.2	0.2	0.5	1.0	0.0
299-W18-246L	2.3	1.7	0.4	1.5	2.3	1.4	0.1	0.5	0.5	0.5	0.6	0.7	0.7	0.0
299-W18-247L	0.3	0.7	0.4	0.5	0.4	0.4	0.2	0.2	0.2	0.2	0.1	0.3	0.5	0.0
299-W18-252L	1.2	2.8	1.6	1.7	1.6	0.9	0	0.3	0.4	0.5	0.1	0.1	0.4	0.0
Yearly Total	**10**	**20**	**11**	**13**	**13**	**9**	**5**	**5**	**5**	**4**	**4**	**4**	**6**	**0**
Cumulative Total	**10**	**30**	**41**	**54**	**67**	**77**	**81**	**86**	**91**	**96**	**100**	**104**	**110**	**110**

Note: To convert kilograms to pounds, multiply by 2.2046.

a. Includes mass removed in October through December 2009.

b. Includes mass removed in January through March 2013.

CY = calendar year

FY = fiscal year

Table 2-4 summarizes the availability of SVE systems during 2012.

Table 2-5. Soil Vapor Extraction System Availability, 2012

216-Z-9 SVE System Availability (Percent)		Month	216-Z-1A SVE System Availability (Percent)		Month
Average	79	April through October	Average	79	April through October
Minimum	22	August	Minimum	0	October
Maximum	100	June, October	Maximum	100	May, June

SVE = soil vapor extraction

2.4 Treatability Test

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, "Estimating Persistent Mass Flux of Volatile Contaminants from the Vadose Zone to Ground Water"). Additionally, the data set from operation of the 14.2 m^3/min (500 ft^3/min) SVE system in a cyclic mode (e.g., on for six months and off for six months), from 1997 through 2008, was 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 by Truex et al. (2009) to evaluate the future impact of the remaining vadose zone contamination on the groundwater at the Hanford Site. This analysis provided the following results, which were used to assess soil vapor contamination in terms of protection of groundwater:

- 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.

During 2011, a treatability test was conducted at the 216-Z-9 site to refine the conceptual site model of the location of the remaining carbon tetrachloride in the vadose zone, in accordance with the treatability test plan (DOE/RL-2010-79, *Treatability Test Plan for Characterization of Vadose Zone Carbon Tetrachloride Source Strength Using Tomographic Methods at the 216-Z-9 Site*).

The results of the test and details of the data collection activities were provided in 2012 in PNNL-21326. The treatability test data indicated that most of the remaining carbon tetrachloride mass is in the lower-permeability CCU, from which the carbon tetrachloride is slowly diffusing. The primary recommendation from this study was to increase future rebound periods, allowing the carbon tetrachloride to reach a higher concentration before beginning the next operating cycle.

3 Soil Vapor Monitoring

Nonoperational soil vapor monitoring data are collected at wells and probes that are not directly connected to the SVE systems. The objectives of monitoring the nonoperational wells and probes are as follows:

- To measure carbon tetrachloride concentrations and trends near the vadose/atmosphere and vadose/groundwater interfaces to evaluate whether nonoperation of the SVE systems 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 online wells

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

Carbon tetrachloride concentrations rebound during periods of nonoperation 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. The initial concentrations typically are lower than the initial concentrations following previous periods of rebound. However, the nonoperational duration for each well field varies from year to year, which also affects the rebound concentrations.

Soil vapor monitoring at offline wells and probes was conducted during 2012 using sampling methods similar to those developed for the rebound study in 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 offline 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. Appendix D provides the passive monitoring data for 2012; the soil vapor monitoring data for 2012 are provided in Appendix E. Both sets of data are included in the 2012 rebound data evaluation. The data for January through March 2013 are included in Appendices D and E for completeness.

Based on monitoring performed during 2012, 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 3 m (10 ft) in the 216-Z-9 well field (probe CPT-17).

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- Near the groundwater (between 53 and 66 m [175 and 217 ft] bgs), the maximum concentration was 13 ppmv at a depth of 63 m (208 ft) bgs at the 216-Z-1A site (well 299-W18-6L).

- Near the CCU at depths ranging from 25 to 44 m (83 to 144 ft) bgs, the maximum concentration detected was 215 ppmv at a depth of 26.5 m (87 ft) (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 78 ppmv at a depth of 26 m (86 ft) bgs (CPT-21A). At the 216-Z-1A well field, the maximum carbon tetrachloride concentration detected near the CCU was 44 ppmv at a depth of 32 m (106 ft) bgs (well 299-W18-167).

- The maximum carbon tetrachloride concentration detected in the vadose zone overlying the CCU (between 11 and 23 m [35 and 75 ft] bgs) was 49 ppmv at a depth of 20 m (65 ft) bgs on the south side of the 216-Z-9 Trench (CPT-21A). This relatively elevated carbon tetrachloride soil vapor concentration is 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 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, from 2008 through 2012, the maximum rebound concentrations were associated with the silt layer at a depth of 20 m (65.6 ft) on the south side of the 216-Z-9 Trench. The maximum rebound concentrations at each monitoring location in 2012 are compared to those from 1997 in Figure 3-2.

During SVE operations, carbon tetrachloride concentrations are periodically measured in individual offline soil vapor probes and in passive SVE wells. The initial carbon tetrachloride concentration is compared to the most recent concentration for each probe in Figure 3-3 and for each well in Figure 3-4. These data show that the carbon tetrachloride concentrations have decreased below the cleanup level (100 ppmv) specified in the 200-PW-1 ROD (EPA, 2011) in all but one probe (CPT-28) and in all passive extraction wells. As noted previously, the location of CPT-28 may be beyond the zone of influence of the SVE system (Figure 2-1). [Note: For soil probe locations with more than one sampling depth, the highest concentration from any sampling depth at that location is used in Figure 3-3.]

Because carbon tetrachloride concentrations did not increase significantly at the near-surface probes, temporarily suspending operation of the SVE systems 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 2012 suggest that the fine-grained layers near the source sites are the most likely source zones for the observed carbon tetrachloride vapor.

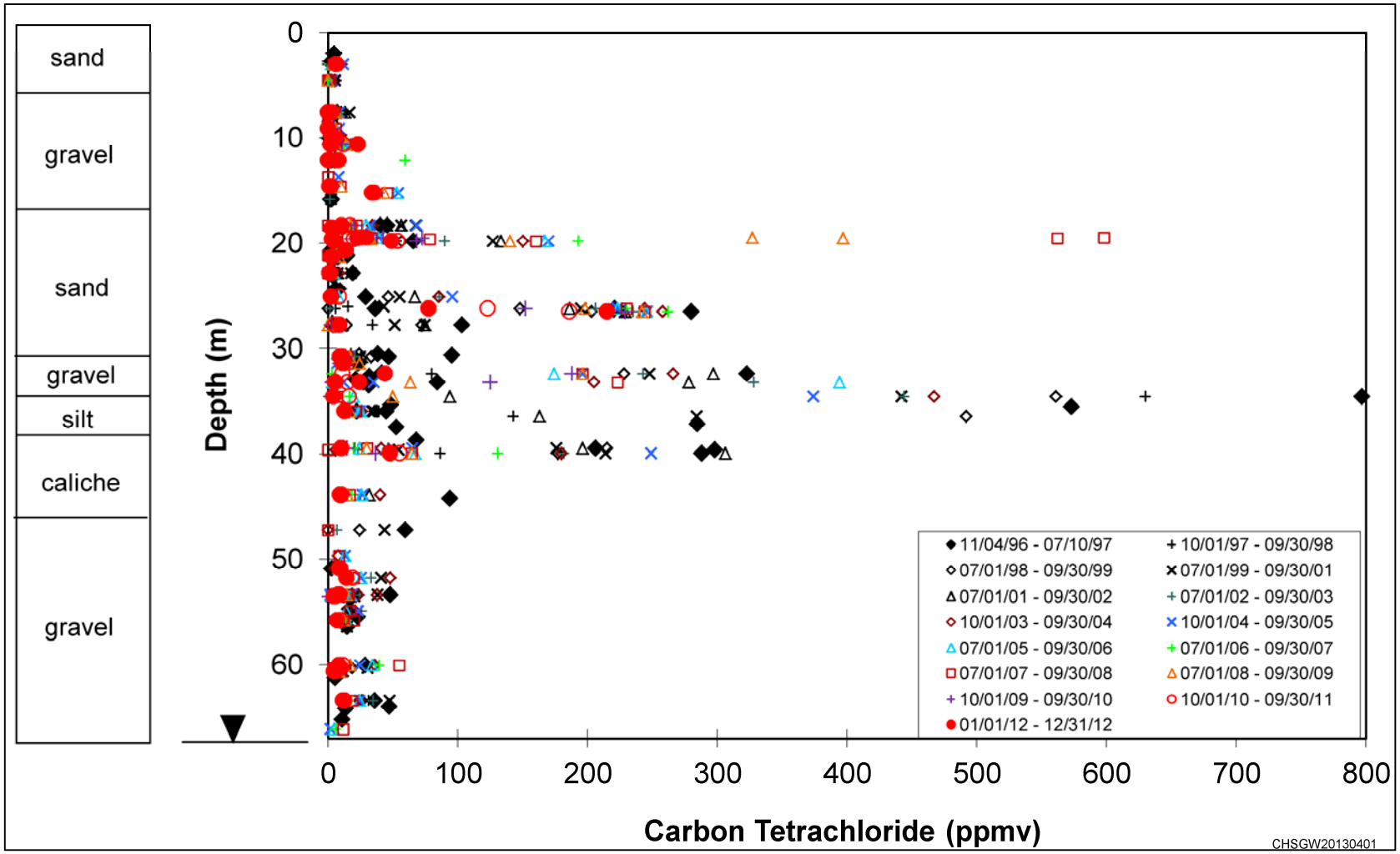

Figure 3-1. Maximum Carbon Tetrachloride Rebound Concentrations, 1997 through 2012

3-3

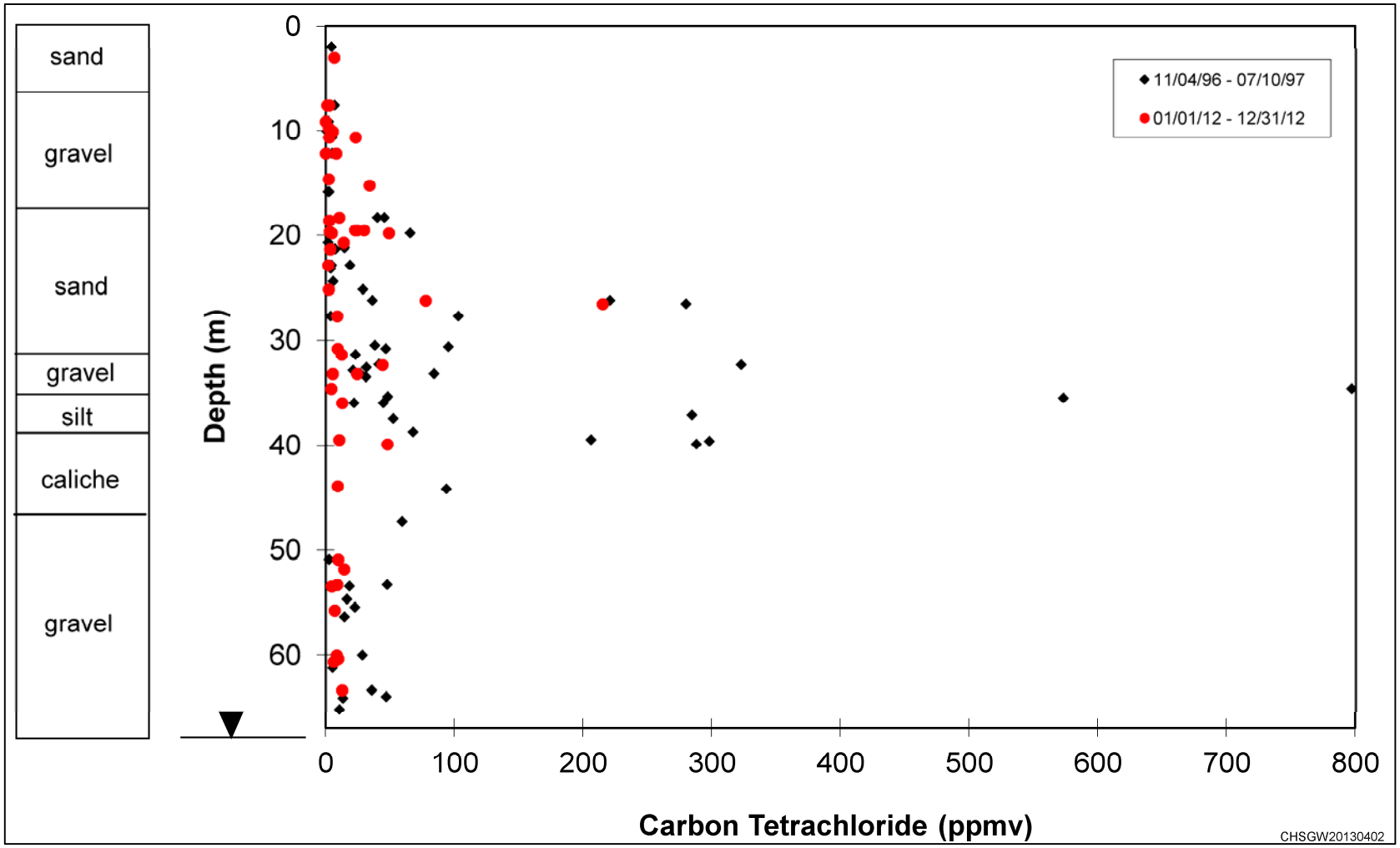

Figure 3-2. Maximum Carbon Tetrachloride Rebound Concentrations, 1997 and 2012

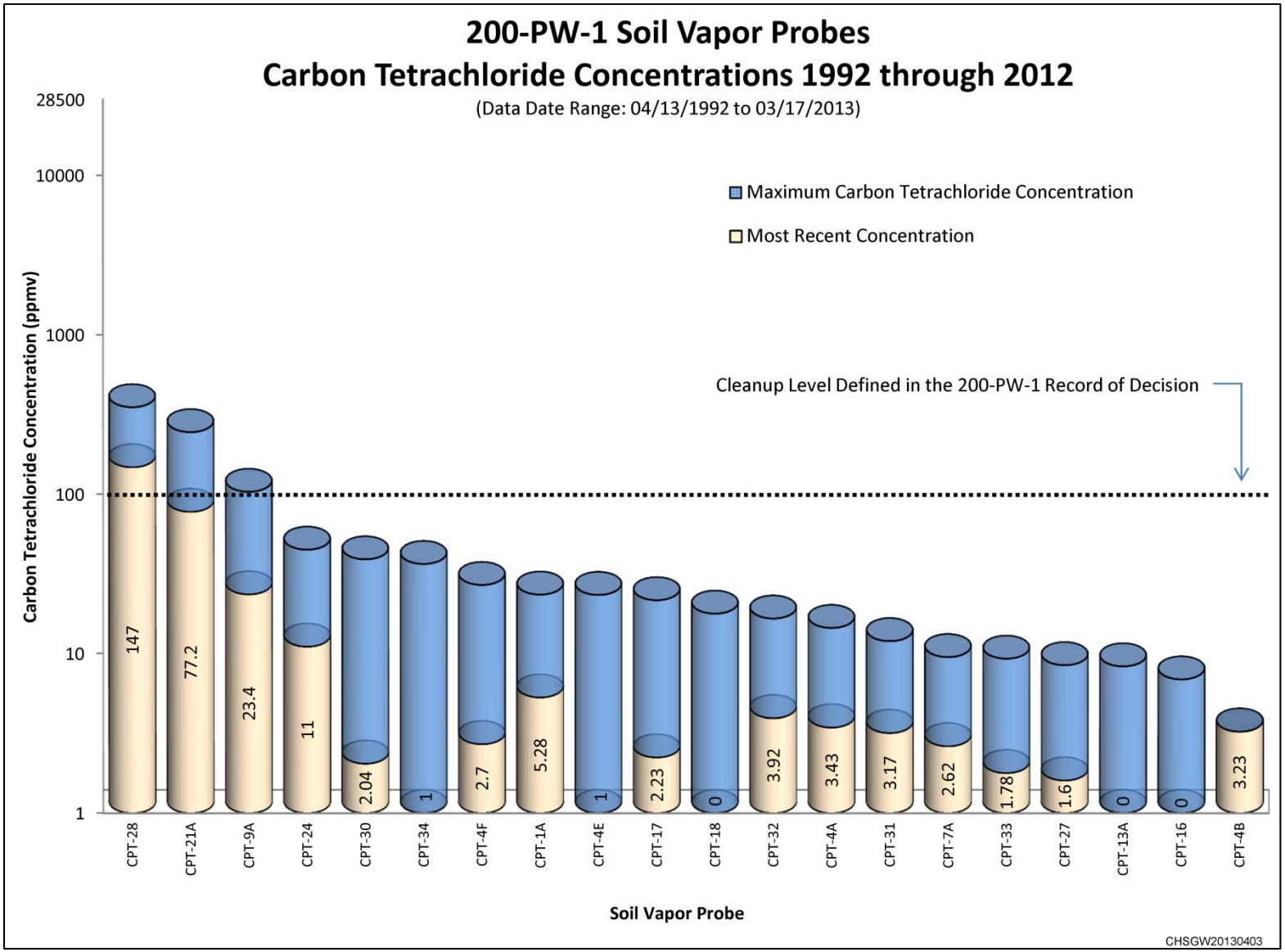

Figure 3-3. Decrease in Carbon Tetrachloride Concentrations in Soil Vapor Probes

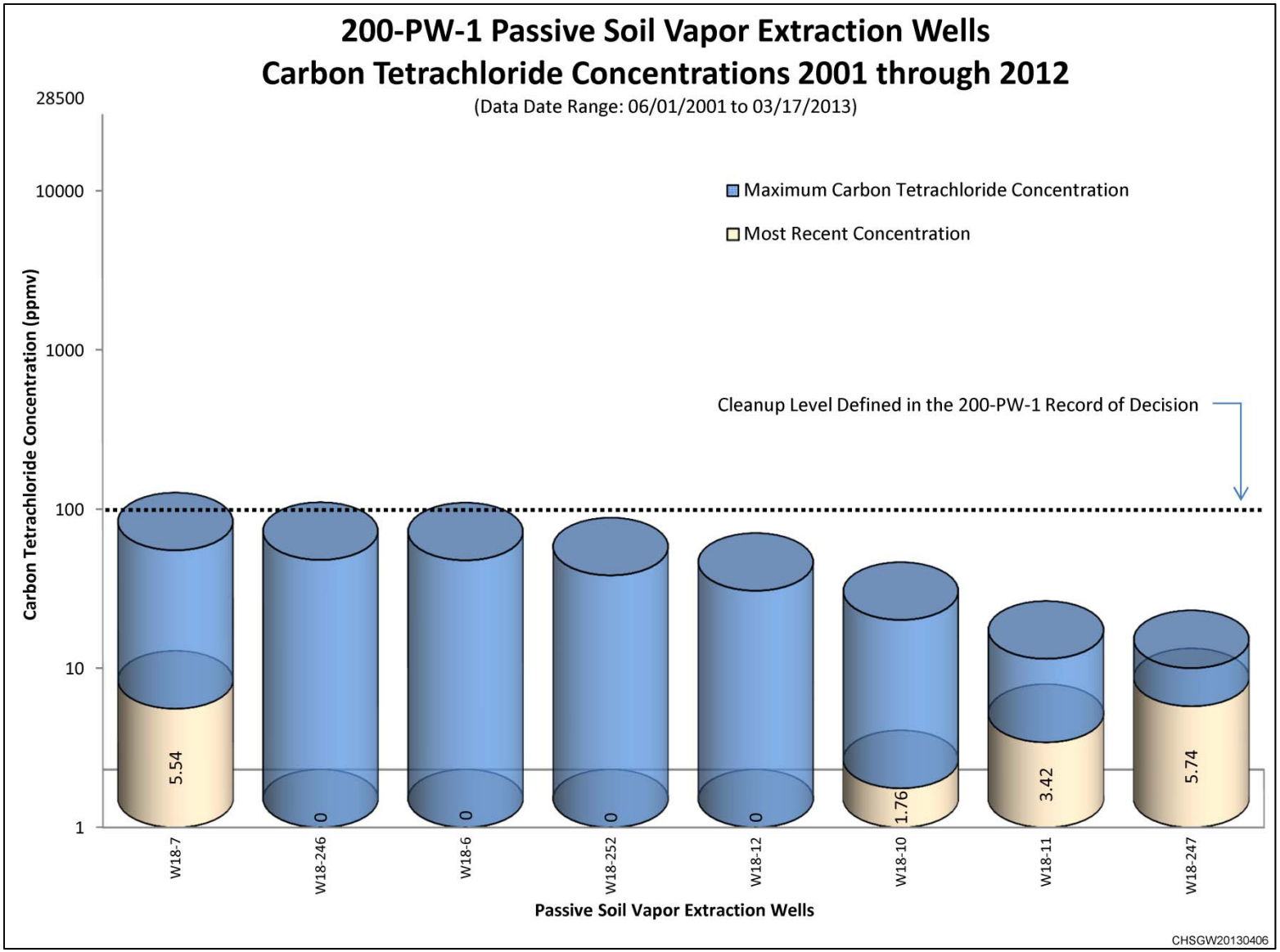

Figure 3-4. Decrease in Carbon Tetrachloride Concentrations in Passive Soil Vapor Extraction Wells

4 Status of Remedial Action

SVE was implemented in 1992 as an expedited response action to remove and treat carbon tetrachloride contamination in the vadose zone at the 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib (Smith and Stanley, 1992). The final ROD for the 200-PW-1 OU, which was issued in September 2011, incorporated SVE as a component of the selected remedy (EPA, 2011). After the RD/RAWP is approved, it will supersede the Action Memorandum (Smith and Stanley, 1992).

Between 1992 and 2009, 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, *Hanford Site Groundwater Monitoring and Performance Report for 2009: Volumes 1 & 2*). This reduction has likely 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.

A pump-and-treat system is currently operating in the 200-ZP-1 OU and will continue to operate under the requirements established in the final ROD (*Record of Decision Hanford 200 Area 200-ZP-1 Superfund Site, Benton County, Washington* [EPA et al., 2008]). The treatment system required by the ROD became operational in 2012, replacing the interim remedial measure pump-and-treat system that operated in the 200-ZP-1 OU from 1995 until 2012 (EPA/ROD/R10-95/114, *Record of Decision for the USDOE Hanford 200-ZP-1 Operable Unit, 200 Area NPL Site Interim Remedial Measure*).

One objective for the pump-and-treat interim remediation was the reduction of the carbon tetrachloride groundwater concentration that is greater than 2,000 µg/L. This goal for groundwater was met at both the 216-Z-1A and 216-Z-9 sites. Concentrations in groundwater in extraction well 299-W15-47 (near the 216-Z-9 Trench) declined from approximately 8,000 µg/L in 1997 to concentrations ranging from 770 to 1,300 µg/L in 2010, and concentrations in groundwater from well 299-W18-16 (east of the 216-Z-1A Tile Field) ranged from 160 to 240 µg/L.

The history of mass recovery using SVE at the carbon tetrachloride source cribs reflects two phases commonly observed during SVE remediation projects (e.g., Figure 2-11). 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 supply of the 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 the mass of carbon tetrachloride available for extraction as a result of previous mass removal using SVE
- Diffusion-controlled contaminant migration from low-permeability sediments

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5 Conclusions and Recommendations

This chapter presents the conclusions and recommendations for the 200-PW-1 OU SVE operations for the 2012 reporting period.

5.1 Conclusions

Operation of the SVE systems from 1991 to 2012 has resulted in the removal of 80,107 kg (176,604 lb) of carbon tetrachloride from the vadose zone underlying the primary carbon tetrachloride disposal sites. Of this total mass of carbon tetrachloride removed, 162 kg (357 lb) were removed in 2012.

During 2012, the two 14.2 m^3/min (500 ft^3/min) SVE systems that were installed and brought online in 2009 operated for 27 weeks from April through September. Removal rates decreased in recent years. Table 2-1 shows that annual recovery of carbon tetrachloride from the vadose zone by SVE ranged from 162 to 216 kg (357 to 476 lb) during the past five years. The most recent data (Figures 2-8 and 2-9) suggest that the increase of carbon tetrachloride concentration in soil vapor during rebound periods is becoming insignificant.

The passive SVE systems removed approximately 110 kg (243 lb) of carbon tetrachloride from the vadose zone between October 1999 and December 2012. Of this total mass of carbon tetrachloride removed using passive SVE systems, approximately 5 kg (11 lb) were removed during 2012. Table 2-4 shows that annual recovery of carbon tetrachloride from the vadose zone by the passive SVE systems ranged from 4 to 5 kg (9 to 11 lb) during the past five years.

Carbon tetrachloride concentrations in all active and passive SVE wells and all soil vapor probes except one have decreased below the cleanup level (100 ppmv) specified in the 200-PW-1 ROD (EPA, 2011) (Figures 2-10 and 3-3).

5.2 Recommendations

The following actions are recommended to maximize effectiveness of SVE operations and monitoring:

- Increase the length of time allowed for carbon tetrachloride concentration rebound by not operating the two SVE systems in 2013.
- Discontinue operation of the eight passive SVE systems. Carbon tetrachloride concentrations at these wells have decreased below the cleanup level (100 ppmv) specified in the 200-PW-1 ROD (EPA, 2011). [Note: EPA and DOE approved discontinuing passive SVE operations in March 2013.]
- Discontinue monthly monitoring in 2013 while the SVE systems are not operating.
- When SVE operations resume, implement an SVE operating strategy that supports demonstration of the successful completion of remediation using SVE. For example, potential operating strategies include lengthening the periods of shutdown to allow more time for rebound of vapor concentrations and focusing SVE in targeted areas.
- Continue assessing how the current carbon tetrachloride contamination in the vadose zone is impacting the groundwater.

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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 of the following specific activities for the 200-PW-1 OU SVE system for 2012:

- **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 online wells and engineering support, as required, during the course of SVE system operations and periodic maintenance.
- **Performance monitoring:** Includes monthly soil vapor sampling and analysis. 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 2012.
- **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 additional equipment expenses incurred to support SVE operation.

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

Activity	Actual Costs ($1,000)							
	FY 2005	**FY 2006**	**FY 2007**	**FY 2008**	**FY 2009**	**CY 2010**	**CY 2011**	**CY 2012**
Design	50.9	41.7	20.7	16.2	54.0	62.4	61.4	0.0
Operations and Maintenance	183.8	280.7	345.2	286.6	217.7	378.7	358.9	463.7
Performance Monitoring	55.6	47.0	85.0	140.5	189.0	214.0	181.2	98.0
Project Support	72.1	221.8	480.7	257.2	159.7	356.6	335.9	53.1
Waste Management	7.9	10.5	3.7	6.7	14.7	9.6	28.0	9.4
Treatment System Capital*	--	--	4.3	815.5	565.8	1,021.7	0.0	0.0
Totals	**370.4**	**601.6**	**939.6**	**1,522.6**	**1,201.0**	**1,045.8**	**966.1**	**624.2**

* 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.

CY = calendar year

FY = fiscal year

Based on the 2012 costs and yearly production rates of 3.0 million m^3 (107.5 million ft^3) of vapor treated and 162 kg (357 lb) of carbon tetrachloride removed (Table 2-1), the 2012 treatment costs equate to \$0.21/m^3 (\$0.01/ft^3) of vapor treated and \$3.85/g (\$3,853/kg) (\$1,748/lb) of carbon tetrachloride removed.

7 Previous Evaluations of Soil Vapor Extraction Data

Detailed information on previous SVE operating periods (fiscal years [FYs] and CYs 1992 through 2011) and on characterization data collected during the 200-PW-1 OU remedial investigation can be obtained from the following reports:

- **FY 1992 through FY 2001:** BHI-00720, *Performance Evaluation Report for Soil Vapor Extraction Operations at the Carbon Tetrachloride Site, February 1992 – September 2001*
- **FY 2002:** WMP-17869, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Carbon Tetrachloride Site, Fiscal Year 2002*
- **FY 2003:** WMP-21327, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Carbon Tetrachloride Site, Fiscal Year 2003*
- **FY 2004:** WMP-26178, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Carbon Tetrachloride Site, Fiscal Year 2004*
- **FY 2005:** WMP-30426, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Carbon Tetrachloride Site, Fiscal Year 2005*
- **FY 2006:** SGW-33746, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Fiscal Year 2006*
- **FY 2007:** SGW-37111, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Fiscal Year 2007*
- **FY 2008:** SGW-40456, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Fiscal Year 2008*
- **FY 2009:** SGW-44694, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Fiscal Year 2009*
- **CY 2010:** SGW-49388, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Calendar Year 2010*
- **CY 2011:** SGW-51807, *Performance Evaluation Report for Soil Vapor Extraction Operations at the 200-PW-1 Operable Unit Carbon Tetrachloride Site, Calendar Year 2011*
- DOE/RL-2006-51, *Remedial Investigation Report for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units*
- DOE/RL-2006-24, *Remedial Investigation Report for 200-ZP-1 Groundwater Operable Unit*
- DOE/RL-2006-58, *Carbon Tetrachloride Dense Non-Aqueous Phase Liquid (DNAPL) Source Term Interim Characterization Report*
- DOE/RL-2007-22, *Carbon Tetrachloride Dense Non-Aqueous Phase Liquid (DNAPL) Source Term Interim Characterization Report Addendum*

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Appendix A

Wells and Flow Rates for Each Cycle of Soil Vapor Extraction for 2012

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A1 Introduction

This appendix provides the following data for the wells and flow rates corresponding to each cycle of soil vapor extraction (SVE) during 2012 at two sites in the 200-PW-1 Operable Unit:

- Table A-1 provides a list of the wells and flow rates for SVE at the 216-Z-9 site.
- Table A-2 provides a list of the wells and flow rates for SVE 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 for 2012

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
04/02/12	05/30/12	6.7	W15-8U, W15-48, W15-84L, W15-84U, W15-86
05/31/12	07/11/12	7.2	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
07/12/12	07/15/12	0.0	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
07/16/12	07/26/12	7.1	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
07/27/12	08/13/12	0.0	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
08/14/12	08/15/12	6.9	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
08/16/12	08/20/12	0.0	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
08/21/12	08/29/12	7.2	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
08/30/12	09/03/12	0.0	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
09/04/12	10/04/12	7.2	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
2012 Summary		7.0	W15-8L, W15-8U, W15-9L, W15-9U, W15-48, W15-84L, W15-84U, W15-86, W15-95L, W15-95U, W15-217, W15-218L, W15-219L
04/02/12	10/04/12		

Note: To convert cubic meters to cubic feet, multiply by 35.315.

a. System downtimes of less than two days are included in the calculation of the average flow rate. System downtimes of two days or more are shown as intervals with an average flow rate of 0.0 m^3/min.

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

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Table A-2. Wells and Flow Rates for Soil Vapor Extraction at the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Start	Stop	Average Flow Rate[a] (m^3/min)	Soil Vapor Extraction Wells[b]
04/02/12	05/30/12	7.1	W18-150L, W18-163L, W18-166, W18-168, W18-174
05/31/12	06/06/12	7.8	W18-150L, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-175
06/07/12	08/19/12	7.7	W18-150L, W18-158L, W18-159, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-175
08/20/12	09/04/12	0.0	W18-150L, W18-158L, W18-159, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-175
09/05/12	09/07/12	8.6	W18-150L, W18-158L, W18-159, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-175
09/08/12	09/09/12	0.0	W18-150L, W18-158L, W18-159, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-175
09/10/12	09/16/12	8.2	W18-150L, W18-158L, W18-159, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-175
09/17/12	10/04/12	0.0	W18-150L, W18-158L, W18-159, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-175
2012 Summary		7.5	W18-150L, W18-158L, W18-159, W18-163L, W18-165, W18-166, W18-167, W18-168, W18-169, W18-174, W18-175
04/02/12	10/04/12		

Note: To convert cubic meters to cubic feet, multiply by 35.315.

a. System downtimes of less than two days are included in the calculation of the average flow rate. System downtimes of two days or more are shown as intervals with an average flow rate of 0.0 m^3/min.

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

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Appendix B

Daily Soil Vapor Extraction Data for 2012

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B1 Introduction

This appendix provides the daily data for 2012 soil vapor extraction operations for the following 200-PW-1 Operable Unit sites:

- Table B-1 for the 216-Z-9 site
- Table B-2 for the 216-Z-1A/216-Z-18/216-Z-12 site

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Table B-1. Daily Soil Vapor Extraction Data for the 216-Z-9 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
4/2/2012	13	13.7	13.7	6,479.7	5.313	5.313	0.4	0.4
4/3/2012	14	24	37.7	6,661.7	9.593	14.906	0.9	1.3
4/4/2012	14	24	61.7	6,606.6	9.514	24.420	0.8	2.1
4/5/2012	12	24	85.7	6,568.0	9.458	33.878	0.7	2.8
4/6/2012	11	24	109.7	6,488.0	9.343	43.220	0.6	3.4
4/7/2012	10	24	133.7	6,432.0	9.262	52.483	0.6	4.0
4/8/2012	10	24	157.7	6,416.1	9.239	61.722	0.6	4.6
4/9/2012	11	24	181.7	6,446.1	9.282	71.004	0.6	5.2
4/10/2012	11	24	205.5	6,651.2	9.511	80.515	0.6	5.9
4/11/2012	11	24	229.5	6,789.4	9.777	90.292	0.7	6.5
4/12/2012	10	24	253.5	6,734.1	9.697	99.989	0.6	7.2
4/13/2012	10	24	277.5	6,693.2	9.638	109.627	0.6	7.8
4/14/2012	10	24	301.5	6,697.2	9.644	119.271	0.6	8.4
4/15/2012	10	24	325.5	6,747.0	9.716	128.987	0.6	8.9
4/16/2012	9	24	349.5	6,749.5	9.719	138.706	0.6	9.5
4/17/2012	9	24	373.5	6,677.1	9.615	148.321	0.5	10.0
4/18/2012	9	24	397.5	6,661.0	9.592	157.913	0.6	10.6
4/19/2012	10	24	421.5	6,776.5	9.758	167.672	0.6	11.2
4/20/2012	11	24	445.5	6,673.4	9.610	177.281	0.6	11.9

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Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
4/21/2012	11	24	469.5	6,635.4	9.555	186.836	0.6	12.5
4/22/2012	11	24	493.5	6,656.1	9.585	196.421	0.7	13.2
4/23/2012	11	24	517.3	6,632.8	9.485	205.906	0.7	13.8
4/24/2012	11	24	541.3	6,613.1	9.523	215.429	0.7	14.5
4/25/2012	11	24	565.3	6,686.4	9.628	225.057	0.7	15.2
4/26/2012	10	24	589.3	6,678.0	9.616	234.673	0.6	15.8
4/27/2012	9	24	613.3	6,578.4	9.473	244.146	0.6	16.3
4/28/2012	10	24	637.3	6,649.2	9.575	253.721	0.6	16.9
4/29/2012	10	12	649.3	6,679.3	4.809	258.530	0.3	17.2
4/30/2012	10	14	662.9	6,725.5	5.481	264.012	0.4	17.6
5/1/2012	10	24	686.9	6,718.9	9.675	273.687	0.6	18.2
5/2/2012	9	23	710.1	6,685.7	9.293	282.980	0.5	18.7
5/3/2012	9	24	734.1	6,707.8	9.659	292.639	0.6	19.3
5/4/2012	9	24	758.1	6,597.1	9.500	302.139	0.5	19.8
5/5/2012	9	24	782.1	6,606.7	9.514	311.653	0.5	20.3
5/6/2012	8	13	794.8	6,625.7	5.036	316.688	0.3	20.6
5/7/2012	9	14	808.5	6,458.1	5.328	322.016	0.3	20.9
5/8/2012	10	24	832.5	6,636.5	9.557	331.573	0.6	21.5
5/9/2012	9	24	856.0	6,953.5	9.804	341.377	0.6	22.0

Table B-1. Daily Soil Vapor Extraction Data for the 216-Z-9 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
5/10/2012	9	24	880.0	6,853.5	9.869	351.246	0.5	22.6
5/11/2012	9	24	904.0	6,806.7	9.802	361.048	0.5	23.1
5/12/2012	9	24	928.0	6,746.1	9.714	370.762	0.6	23.7
5/13/2012	9	24	952.0	6,721.9	9.680	380.442	0.6	24.2
5/14/2012	9	24	976.0	6,719.5	9.676	390.118	0.6	24.8
5/15/2012	10	24	1000.0	6,714.8	9.669	399.787	0.6	25.4
5/16/2012	10	24	1024.0	6,755.7	9.728	409.515	0.6	26.0
5/17/2012	9	24	1048.0	6,768.6	9.747	419.262	0.6	26.6
5/18/2012	9	24	1072.0	6,758.3	9.732	428.994	0.5	27.1
5/19/2012	9	24	1096.0	6,745.2	9.713	438.707	0.5	27.6
5/20/2012	8	24	1120.0	6,774.3	9.755	448.462	0.5	28.1
5/21/2012	8	23	1143.4	6,825.7	9.590	458.052	0.5	28.6
5/22/2012	8	24	1167.4	6,791.0	9.779	467.831	0.5	29.1
5/23/2012	8	24	1191.4	6,723.1	9.681	477.513	0.5	29.6
5/24/2012	8	24	1215.4	6,673.9	9.610	487.123	0.5	30.1
5/25/2012	8	24	1239.4	6,684.3	9.625	496.748	0.5	30.6
5/26/2012	9	24	1263.4	6,703.4	9.653	506.401	0.5	31.2
5/27/2012	9	24	1287.4	6,704.1	9.654	516.055	0.5	31.7
5/28/2012	8	24	1311.4	6,745.7	9.714	525.769	0.5	32.2

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Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
5/29/2012	8	21	1332.4	6,835.0	8.612	534.381	0.4	32.6
5/30/2012	8	24	1356.4	6,873.6	9.898	544.279	0.5	33.1
5/31/2012	9	24	1380.3	7,173.5	10.294	554.573	0.6	33.7
6/1/2012	9	24	1404.3	7,298.4	10.510	565.083	0.6	34.3
6/2/2012	9	24	1428.3	7,328.8	10.553	575.636	0.6	34.9
6/3/2012	8	24	1452.3	7,340.6	10.570	586.207	0.6	35.4
6/4/2012	8	24	1476.3	7,402.7	10.660	596.867	0.6	36.0
6/5/2012	8	24	1500.3	7,360.7	10.599	607.466	0.5	36.5
6/6/2012	8	24	1524.3	7,348.2	10.581	618.048	0.5	37.0
6/7/2012	8	23	1547.6	6,947.2	9.691	627.739	0.5	37.5
6/8/2012	8	24	1571.6	6,682.8	9.623	637.362	0.5	38.0
6/9/2012	8	24	1595.6	6,682.8	9.623	646.985	0.5	38.4
6/10/2012	8	24	1619.6	6,682.8	9.623	656.609	0.5	38.9
6/11/2012	8	24	1643.6	7,254.3	10.446	667.055	0.5	39.5
6/12/2012	9	24	1667.6	7,296.2	10.507	677.561	0.6	40.0
6/13/2012	8	24	1691.6	7,307.8	10.523	688.085	0.5	40.6
6/14/2012	8	24	1715.6	7,350.7	10.585	698.670	0.5	41.1
6/15/2012	8	24	1739.6	7,330.5	10.556	709.225	0.5	41.6
6/16/2012	8	24	1763.6	7,309.3	10.525	719.751	0.6	42.2

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Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
6/17/2012	8	24	1787.6	7,294.5	10.504	730.255	0.6	42.7
6/18/2012	8	24	1811.6	7,343.7	10.575	740.830	0.5	43.3
6/19/2012	8	24	1835.6	7,327.0	10.551	751.381	0.5	43.8
6/20/2012	8	24	1859.6	7,296.5	10.507	761.888	0.5	44.3
6/21/2012	9	24	1883.6	7,238.7	10.424	772.311	0.6	44.9
6/22/2012	8	24	1907.6	7,261.5	10.457	782.768	0.6	45.4
6/23/2012	8	24	1931.6	7,270.8	10.470	793.238	0.5	46.0
6/24/2012	8	24	1955.6	7,243.2	10.430	803.668	0.5	46.5
6/25/2012	8	24	1979.6	7,276.2	10.478	814.146	0.5	47.0
6/26/2012	7	24	2003.6	7,343.1	10.574	824.720	0.5	47.5
6/27/2012	8	24	2027.6	7,261.6	10.457	835.177	0.5	48.0
6/28/2012	8	24	2051.6	7,233.2	10.416	845.592	0.5	48.5
6/29/2012	8	24	2075.6	7,208.2	10.380	855.972	0.5	49.1
6/30/2012	8	24	2099.6	7,246.7	10.435	866.407	0.5	49.6
7/1/2012	8	24	2123.6	7,212.7	10.386	876.794	0.5	50.1
7/2/2012	8	24	2147.6	7,224.1	10.403	887.197	0.5	50.7
7/3/2012	8	24	2171.6	7,244.8	10.433	897.629	0.5	51.2
7/4/2012	8	24	2195.6	7,246.7	10.435	908.064	0.5	51.7
7/5/2012	8	24	2219.6	7,230.7	10.412	918.476	0.5	52.2

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Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
7/6/2012	8	24	2243.6	7,187.2	10.350	928.826	0.5	52.7
7/7/2012	8	24	2267.6	7,149.6	10.295	939.121	0.5	53.3
7/8/2012	8	24	2291.6	7,125.3	10.260	949.382	0.5	53.8
7/9/2012	8	24	2315.6	7,115.0	10.246	959.627	0.5	54.3
7/10/2012	8	24	2339.6	7,095.7	10.218	969.845	0.5	54.9
7/11/2012	8	14	2353.9	7,108.1	6.113	975.958	0.3	55.2
7/12/2012	0	0	2353.9	0.0	0.000	975.958	0.0	55.2
7/13/2012	0	0	2353.9	0.0	0.000	975.958	0.0	55.2
7/14/2012	0	0	2353.9	0.0	0.000	975.958	0.0	55.2
7/15/2012	0	0	2353.9	0.0	0.000	975.958	0.0	55.2
7/16/2012	8	13	2367.3	7,090.6	5.708	981.666	0.3	55.5
7/17/2012	8	16	2382.9	7,021.8	6.565	988.232	0.3	55.8
7/18/2012	8	24	2406.9	7,065.7	10.175	998.406	0.5	56.3
7/19/2012	8	24	2430.9	7,101.2	10.226	1008.632	0.5	56.9
7/20/2012	8	24	2454.9	7,124.2	10.259	1018.891	0.5	57.4
7/21/2012	8	24	2478.9	7,164.1	10.316	1029.207	0.5	57.9
7/22/2012	8	24	2502.9	7,174.6	10.331	1039.538	0.5	58.4
7/23/2012	7	24	2526.9	7,194.4	10.360	1049.898	0.4	58.8
7/24/2012	8	24	2550.9	7,179.9	10.339	1060.237	0.5	59.3

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7/25/2012	8	24	2574.9	7,126.7	10.262	1070.500	0.5	59.9
7/26/2012	7	17	2591.7	7,172.2	7.208	1077.708	0.3	60.2
7/27/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
7/28/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
7/29/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
7/30/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
7/31/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/1/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/2/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/3/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/4/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/5/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/6/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/7/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/8/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/9/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/10/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/11/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/12/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2

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8/13/2012	0	0	2591.7	0.0	0.000	1077.708	0.0	60.2
8/14/2012	8	5	2596.8	6,912.8	2.143	1079.851	0.1	60.3
8/15/2012	9	5	2602.2	6,953.2	2.225	1082.076	0.1	60.4
8/16/2012	0	0	2602.2	0.0	0.000	1082.076	0.0	60.4
8/17/2012	0	0	2602.2	0.0	0.000	1082.076	0.0	60.4
8/18/2012	0	0	2602.2	0.0	0.000	1082.076	0.0	60.4
8/19/2012	0	0	2602.2	0.0	0.000	1082.076	0.0	60.4
8/20/2012	0	0	2602.2	0.0	0.000	1082.076	0.0	60.4
8/21/2012	9	17	2619.2	7,138.8	7.282	1089.357	0.4	60.8
8/22/2012	8	24	2643.2	7,208.3	10.380	1099.737	0.5	61.3
8/23/2012	8	24	2667.2	7,245.4	10.433	1110.171	0.5	61.9
8/24/2012	8	24	2691.2	7,253.1	10.444	1120.615	0.5	62.4
8/25/2012	8	24	2715.2	7,247.2	10.436	1131.051	0.5	63.0
8/26/2012	8	24	2739.2	7,183.9	10.345	1141.396	0.5	63.5
8/27/2012	8	13	2751.8	7,141.8	5.428	1146.824	0.3	63.8
8/28/2012	9	15	2767.1	7,198.3	6.586	1153.410	0.4	64.1
8/29/2012	9	10	2777.1	7,365.7	4.419	1157.830	0.3	64.4
8/30/2012	0	0	2777.1	0.0	0.000	1157.830	0.0	64.4
8/31/2012	0	0	2777.1	0.0	0.000	1157.830	0.0	64.4

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Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
9/1/2012	0	0	2777.1	0.0	0.000	1157.830	0.0	64.4
9/2/2012	0	0	2777.1	0.0	0.000	1157.830	0.0	64.4
9/3/2012	0	0	2777.1	0.0	0.000	1157.830	0.0	64.4
9/4/2012	8	14	2791.2	7,183.6	6.070	1163.900	0.3	64.7
9/5/2012	9	24	2815.2	7,252.6	10.444	1174.344	0.6	65.3
9/6/2012	9	24	2839.2	7,239.5	10.425	1184.768	0.6	65.9
9/7/2012	9	24	2863.2	7,251.4	10.442	1195.210	0.6	66.5
9/8/2012	9	24	2887.2	7,253.8	10.445	1205.656	0.6	67.1
9/9/2012	9	24	2911.2	7,221.4	10.399	1216.055	0.6	67.7
9/10/2012	8	24	2935.2	7,274.8	10.476	1226.530	0.5	68.2
9/11/2012	8	24	2959.2	7,299.7	10.512	1237.042	0.5	68.7
9/12/2012	8	24	2983.2	7,329.7	10.555	1247.597	0.5	69.2
9/13/2012	7	24	3007.2	7,343.5	10.575	1258.171	0.5	69.7
9/14/2012	7	24	3031.2	7,321.0	10.542	1268.714	0.5	70.1
9/15/2012	7	24	3055.2	7,251.0	10.441	1279.155	0.5	70.6
9/16/2012	7	24	3079.2	7,237.9	10.423	1289.578	0.5	71.1
9/17/2012	7	24	3103.2	7,263.7	10.460	1300.037	0.5	71.5
9/18/2012	8	24	3127.2	7,131.9	10.270	1310.307	0.5	72.0
9/19/2012	6	24	3151.2	7,037.9	10.135	1320.442	0.4	72.5

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Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
9/20/2012	6	24	3175.2	7,047.8	10.149	1330.591	0.4	72.9
9/21/2012	6	24	3199.2	7,058.9	10.165	1340.756	0.4	73.3
9/22/2012	6	24	3223.2	7,087.1	10.205	1350.961	0.4	73.7
9/23/2012	6	24	3247.2	7,090.7	10.211	1361.172	0.4	74.1
9/24/2012	6	24	3271.2	7,055.6	10.160	1371.332	0.4	74.5
9/25/2012	6	24	3294.7	7,037.3	9.923	1381.254	0.4	74.9
9/26/2012	6	24	3318.7	7,040.3	10.138	1391.392	0.4	75.3
9/27/2012	7	24	3342.7	7,047.8	10.149	1401.541	0.4	75.7
9/28/2012	7	24	3366.7	7,063.7	10.172	1411.713	0.4	76.2
9/29/2012	7	24	3390.7	7,015.5	10.102	1421.815	0.4	76.6
9/30/2012	7	24	3414.7	7,069.1	10.180	1431.995	0.4	77.0
10/1/2012	7	24	3438.7	7,077.4	10.191	1442.186	0.4	77.4
10/2/2012	7	24	3462.7	7,234.3	10.417	1452.604	0.5	77.9
10/3/2012	8	24	3486.7	7,396.2	10.651	1463.254	0.5	78.4
10/4/2012	8	12	3499.1	7,426.7	5.533	1468.787	0.3	78.6

Notes:

To convert liters to gallons, multiply by 0.2642.

To convert kilograms to pounds, multiply by 2.2046.

ppmv = parts per million by volume

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
4/2/2012	5	14	13.8	7,011.1	5.784	5.784	0.2	0.2
4/3/2012	8	24	37.8	7,282.1	10.486	16.270	0.5	0.7
4/4/2012	7	24	61.8	7,401.9	10.659	26.929	0.5	1.2
4/5/2012	7	24	85.8	7,277.3	10.479	37.409	0.4	1.6
4/6/2012	7	24	109.8	7,270.5	10.470	47.878	0.4	2.1
4/7/2012	7	24	133.8	7,309.2	10.525	58.403	0.5	2.5
4/8/2012	7	24	157.8	7,294.7	10.504	68.908	0.5	3.0
4/9/2012	7	24	181.8	7,302.2	10.515	79.423	0.5	3.5
4/10/2012	7	24	205.5	7,210.2	10.274	89.697	0.5	4.0
4/11/2012	8	24	229.5	7,242.9	10.430	100.127	0.5	4.5
4/12/2012	8	24	253.5	7,211.3	10.384	110.512	0.5	5.0
4/13/2012	8	24	277.5	7,140.9	10.283	120.794	0.5	5.5
4/14/2012	9	24	301.5	7,156.5	10.305	131.100	0.6	6.1
4/15/2012	9	24	325.5	7,155.8	10.304	141.404	0.6	6.7
4/16/2012	8	24	349.5	7,215.0	10.390	151.794	0.5	7.2
4/17/2012	8	24	373.5	7,078.5	10.193	161.987	0.5	7.7
4/18/2012	8	24	397.5	7,039.4	10.137	172.124	0.5	8.2
4/19/2012	8	24	421.5	6,996.3	10.075	182.198	0.5	8.7
4/20/2012	7	24	445.5	6,922.0	9.968	192.166	0.5	9.2

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
4/21/2012	8	24	469.5	6,976.6	10.046	202.212	0.5	9.7
4/22/2012	8	16	485.9	6,912.8	6.809	209.021	0.3	10.0
4/23/2012	8	10	496.2	6,887.0	4.235	213.257	0.2	10.2
4/24/2012	8	19	514.7	6,968.5	7.735	220.992	0.4	10.6
4/25/2012	8	23	538.1	7,021.1	9.865	230.856	0.5	11.1
4/26/2012	8	24	562.1	7,075.6	10.189	241.045	0.5	11.6
4/27/2012	8	24	586.1	7,062.3	10.170	251.215	0.5	12.1
4/28/2012	8	24	610.1	7,056.1	10.161	261.376	0.5	12.6
4/29/2012	8	24	634.1	7,027.7	10.120	271.496	0.5	13.1
4/30/2012	8	24	658.1	6,967.6	10.033	281.529	0.5	13.6
5/1/2012	8	24	682.1	6,910.4	9.951	291.480	0.5	14.0
5/2/2012	7	23	705.3	6,956.1	9.704	301.184	0.5	14.5
5/3/2012	8	24	729.3	6,996.0	10.074	311.258	0.5	15.0
5/4/2012	8	24	753.3	6,995.5	10.074	321.332	0.5	15.5
5/5/2012	8	24	777.3	7,051.6	10.154	331.486	0.5	15.9
5/6/2012	8	24	801.3	7,031.2	10.125	341.611	0.5	16.4
5/7/2012	8	24	825.3	6,991.5	10.068	351.679	0.5	16.9
5/8/2012	8	24	849.0	7,060.9	10.026	361.705	0.5	17.4
5/9/2012	8	24	873.0	7,324.9	10.548	372.253	0.5	17.9

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
5/10/2012	8	24	897.0	7,336.4	10.564	382.817	0.5	18.5
5/11/2012	8	24	921.0	7,321.9	10.544	393.361	0.5	19.0
5/12/2012	8	24	945.0	7,248.7	10.438	403.799	0.5	19.5
5/13/2012	8	24	969.0	7,149.2	10.295	414.094	0.5	20.0
5/14/2012	9	24	993.0	7,079.8	10.195	424.289	0.5	20.6
5/15/2012	9	24	1017.0	7,025.8	10.117	434.406	0.6	21.1
5/16/2012	9	24	1041.0	7,081.2	10.197	444.603	0.6	21.7
5/17/2012	9	24	1065.0	7,135.4	10.275	454.878	0.6	22.3
5/18/2012	8	24	1089.0	7,138.1	10.279	465.157	0.5	22.8
5/19/2012	8	24	1113.0	7,119.2	10.252	475.409	0.5	23.4
5/20/2012	8	24	1137.0	7,153.4	10.301	485.710	0.5	23.9
5/21/2012	8	24	1161.0	7,170.3	10.325	496.035	0.5	24.4
5/22/2012	8	24	1185.0	7,129.3	10.266	506.301	0.5	24.9
5/23/2012	8	24	1209.0	7,197.6	10.365	516.666	0.5	25.4
5/24/2012	8	23	1232.2	7,236.7	10.059	526.724	0.5	25.9
5/25/2012	8	24	1256.2	7,160.0	10.310	537.035	0.5	26.5
5/26/2012	9	24	1280.2	7,150.4	10.297	547.331	0.6	27.0
5/27/2012	9	24	1304.2	7,112.2	10.242	557.573	0.6	27.6
5/28/2012	9	24	1328.2	7,141.1	10.283	567.856	0.6	28.2

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
5/29/2012	9	24	1351.7	7,392.9	10.424	578.280	0.6	28.7
5/30/2012	10	24	1375.7	7,633.8	10.993	589.273	0.7	29.4
5/31/2012	10	23	1398.3	7,660.3	10.418	599.691	0.7	30.1
6/1/2012	11	24	1422.3	7,630.5	10.988	610.679	0.7	30.8
6/2/2012	11	24	1446.3	7,690.1	11.074	621.753	0.8	31.6
6/3/2012	11	24	1470.3	7,728.8	11.129	632.882	0.8	32.4
6/4/2012	10	24	1494.3	7,816.1	11.255	644.137	0.7	33.1
6/5/2012	11	24	1518.3	7,838.3	11.287	655.424	0.8	33.9
6/6/2012	10	24	1542.3	7,808.0	11.244	666.668	0.7	34.6
6/7/2012	10	24	1566.3	7,861.9	11.321	677.989	0.7	35.3
6/8/2012	10	24	1590.3	7,796.1	11.226	689.215	0.7	36.0
6/9/2012	10	24	1614.3	7,818.0	11.258	700.473	0.7	36.7
6/10/2012	10	24	1638.3	7,708.5	11.100	711.573	0.7	37.4
6/11/2012	10	24	1662.3	7,708.9	11.101	722.674	0.7	38.1
6/12/2012	10	24	1686.3	7,670.2	11.045	733.719	0.7	38.8
6/13/2012	10	23	1709.5	7,660.7	10.648	744.368	0.7	39.5
6/14/2012	10	24	1733.5	7,739.3	11.145	755.512	0.7	40.2
6/15/2012	10	24	1757.5	7,703.3	11.093	766.605	0.7	40.9
6/16/2012	10	24	1781.5	7,661.3	11.032	777.637	0.7	41.6

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
6/17/2012	10	24	1805.5	7,631.6	10.990	788.627	0.7	42.3
6/18/2012	10	24	1829.5	7,740.1	11.146	799.772	0.7	43.0
6/19/2012	10	24	1853.5	7,734.3	11.137	810.910	0.7	43.7
6/20/2012	10	24	1877.5	7,686.6	11.069	821.978	0.7	44.4
6/21/2012	10	24	1901.5	7,573.0	10.905	832.884	0.7	45.0
6/22/2012	11	24	1925.5	7,617.6	10.969	843.853	0.7	45.8
6/23/2012	10	24	1949.5	7,700.5	11.089	854.942	0.7	46.5
6/24/2012	10	24	1973.5	7,670.5	11.046	865.987	0.7	47.2
6/25/2012	9	24	1997.5	7,706.9	11.098	877.085	0.7	47.8
6/26/2012	9	24	2021.5	7,855.4	11.312	888.397	0.6	48.5
6/27/2012	9	24	2045.5	7,716.3	11.111	899.509	0.6	49.1
6/28/2012	9	24	2069.5	7,639.4	11.001	910.509	0.6	49.7
6/29/2012	9	24	2093.5	7,610.0	10.958	921.468	0.6	50.4
6/30/2012	9	24	2117.5	7,669.6	11.044	932.512	0.6	51.0
7/1/2012	9	24	2141.5	7,627.3	10.983	943.495	0.7	51.7
7/2/2012	9	24	2165.5	7,637.7	10.998	954.494	0.6	52.3
7/3/2012	9	24	2189.5	7,678.3	11.057	965.550	0.7	53.0
7/4/2012	9	24	2213.5	7,683.5	11.064	976.615	0.6	53.6
7/5/2012	9	24	2237.5	7,632.3	10.990	987.605	0.6	54.2

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
7/6/2012	9	24	2261.5	7,577.3	10.911	998.517	0.6	54.8
7/7/2012	9	24	2285.5	7,532.5	10.847	1009.363	0.6	55.5
7/8/2012	10	24	2309.5	7,500.0	10.800	1020.163	0.6	56.1
7/9/2012	9	24	2333.5	7,496.3	10.795	1030.958	0.6	56.8
7/10/2012	9	24	2357.5	7,481.8	10.774	1041.732	0.6	57.4
7/11/2012	9	24	2381.5	7,514.7	10.821	1052.553	0.6	58.0
7/12/2012	9	24	2405.5	7,512.7	10.818	1063.371	0.6	58.6
7/13/2012	9	24	2429.5	7,545.6	10.866	1074.237	0.6	59.3
7/14/2012	9	24	2453.5	7,569.7	10.900	1085.137	0.6	59.9
7/15/2012	9	24	2477.5	7,564.4	10.893	1096.030	0.6	60.5
7/16/2012	9	22	2499.8	7,589.1	10.169	1106.199	0.6	61.0
7/17/2012	8	17	2516.6	7,441.7	7.479	1113.678	0.4	61.4
7/18/2012	9	24	2540.6	7,506.8	10.810	1124.488	0.6	62.0
7/19/2012	8	24	2564.6	7,557.9	10.883	1135.371	0.5	62.5
7/20/2012	8	24	2588.6	7,586.6	10.925	1146.296	0.5	63.1
7/21/2012	8	24	2612.6	7,623.8	10.978	1157.275	0.6	63.6
7/22/2012	8	24	2636.6	7,610.8	10.959	1168.234	0.5	64.2
7/23/2012	8	24	2660.6	7,668.4	11.043	1179.277	0.6	64.7
7/24/2012	8	24	2684.1	7,964.6	11.230	1190.507	0.6	65.3

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
7/25/2012	8	24	2708.1	7,703.7	11.093	1201.600	0.6	65.9
7/26/2012	9	24	2732.1	7,523.8	10.834	1212.434	0.6	66.5
7/27/2012	8	24	2756.1	7,577.8	10.912	1223.346	0.6	67.0
7/28/2012	8	24	2780.1	7,641.2	11.003	1234.350	0.6	67.6
7/29/2012	8	24	2804.1	7,625.4	10.981	1245.330	0.5	68.2
7/30/2012	8	24	2828.1	7,621.3	10.975	1256.305	0.5	68.7
7/31/2012	8	24	2852.1	7,642.4	11.005	1267.310	0.5	69.3
8/1/2012	8	24	2876.1	7,627.1	10.983	1278.293	0.5	69.8
8/2/2012	8	24	2900.1	7,633.6	10.992	1289.285	0.5	70.3
8/3/2012	8	24	2924.1	7,625.6	10.981	1300.266	0.6	70.9
8/4/2012	8	24	2948.1	7,593.5	10.935	1311.201	0.6	71.5
8/5/2012	8	24	2972.1	7,533.2	10.848	1322.048	0.6	72.0
8/6/2012	7	23	2995.2	7,558.4	10.468	1332.517	0.5	72.5
8/7/2012	7	24	3019.2	7,598.8	10.942	1343.459	0.5	73.0
8/8/2012	8	24	3043.2	7,546.1	10.866	1354.326	0.6	73.6
8/9/2012	8	24	3067.2	7,660.0	11.030	1365.356	0.5	74.1
8/10/2012	8	24	3091.2	7,590.6	10.931	1376.286	0.5	74.7
8/11/2012	8	24	3115.2	7,588.3	10.927	1387.214	0.6	75.2
8/12/2012	8	24	3139.2	7,571.8	10.903	1398.117	0.6	75.8

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
8/13/2012	8	24	3163.2	7,536.8	10.853	1408.970	0.6	76.3
8/14/2012	8	24	3187.2	7,536.8	10.853	1419.823	0.6	76.9
8/15/2012	8	24	3211.2	7,584.5	10.922	1430.745	0.6	77.4
8/16/2012	8	24	3235.2	8,073.6	11.626	1442.371	0.6	78.0
8/17/2012	8	24	3259.2	8,580.8	12.356	1454.727	0.6	78.6
8/18/2012	8	24	3283.2	8,553.7	12.317	1467.044	0.6	79.2
8/19/2012	8	24	3307.2	8,519.1	12.268	1479.312	0.6	79.9
8/20/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/21/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/22/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/23/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/24/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/25/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/26/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/27/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/28/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/29/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/30/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
8/31/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
9/1/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
9/2/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
9/3/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
9/4/2012	0	0	3307.2	0.0	0.000	1479.312	0.0	79.9
9/5/2012	0	10	3317.3	8,596.6	5.244	1484.556	0.0	79.8
9/6/2012	5	24	3341.3	8,670.6	12.486	1497.041	0.4	80.2
9/7/2012	7	23	3364.2	8,634.6	11.829	1508.871	0.6	80.8
9/8/2012	0	0	3364.2	0.0	0.000	1508.871	0.0	80.8
9/9/2012	0	0	3364.2	0.0	0.000	1508.871	0.0	80.8
9/10/2012	7	2	3365.7	7,834.4	0.705	1509.576	0.0	80.8
9/11/2012	6	14	3379.2	8,223.2	6.661	1516.237	0.3	81.1
9/12/2012	6	24	3403.2	8,310.7	11.967	1528.204	0.5	81.5
9/13/2012	6	24	3427.2	8,285.1	11.930	1540.135	0.5	82.0
9/14/2012	6	24	3451.2	8,250.4	11.881	1552.015	0.5	82.5
9/15/2012	6	24	3475.2	8,164.9	11.757	1563.773	0.5	82.9
9/16/2012	6	24	3499.2	8,182.5	11.783	1575.555	0.5	83.4
9/17/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/18/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/19/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4

Table B-2. Daily Soil Vapor Extraction Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Date	Carbon Tetrachloride Concentration (ppmv)	Daily Operating Hours (hr)	Year-to-Date Operating Hours (hr)	Daily Flow Rate (L/min)	Daily Volume Treated (million L)	Year-to-Date Volume Treated (million L)	Daily Mass Extracted (kg)	Year-to-Date Mass Extracted (kg)
9/20/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/21/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/22/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/23/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/24/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/25/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/26/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/27/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/28/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/29/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
9/30/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
10/1/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
10/2/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
10/3/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4
10/4/2012	0	0	3499.2	0.0	0.000	1575.555	0.0	83.4

Notes:

To convert liters to gallons, multiply by 0.2642.

To convert kilograms to pounds, multiply by 2.2046.

ppmv = parts per million by volume

Appendix C

Soil Vapor Extraction Well Characterization Data for 2012

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C1 Introduction

This appendix provides the well characterization data for 2012 for soil vapor extraction operations at the following 200-PW-1 Operable Unit sites:

- Table C-1 for the 216-Z-9 site
- Table C-2 for the 216-Z-1A/216-Z-18/216-Z-12 site

Table C-1. Soil Vapor Extraction Well Characterization Data for the 216-Z-9 Site for 2012

Z-9 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)
W15-8L	5/31/2012	3.7	0.2	0.1	0.0	0.287	1.73	0.224
W15-8L	6/13/2012	3.5	0.0	0.1	0.0	0.714	0	0.067
W15-8L	6/27/2012	3.7	0.0	0.0	0.0	0.653	0	0
W15-8L	7/11/2012	3.7	0.0	3.6	0.0	0.591	0.332	0.334
W15-8L	7/25/2012	3.7	0.0	7.3	0.0	0.533	3.93	0.628
W15-8L	8/22/2012	3.5	0.0	2.2	0.0	0.127	1.90	0.358
W15-8L	9/5/2012	3.7	0.0	0.3	0.0	0.530	0	0.060
W15-8L	9/18/2012	3.7	0.0	2.9	0.0	0.122	0	0
W15-8L	10/2/2012	6.2	0.0	0.5	0.0	0.521	0	0
W15-8U	4/5/2012	7.5	0.1	11.5	0.0	0.488	5.60	0.528
W15-8U	5/1/2012	7.7	0.1	8.2	0.0	1.50	0	0
W15-8U	5/16/2012	6.5	0.1	9.0	0.0	0.417	0.374	0.359
W15-8U	5/31/2012	3.5	0.0	3.4	0.0	0.193	2.12	0.352
W15-8U	6/13/2012	3.2	0.0	0.5	0.0	1.17	0	0
W15-8U	6/27/2012	3.5	0.0	3.2	0.0	1.84	0	0
W15-8U	7/11/2012	3.5	0.0	1.7	0.0	1.14	0.167	0.479
W15-8U	7/25/2012	3.0	0.0	4.1	0.0	0.402	3.65	0.660
W15-8U	8/22/2012	3.7	0.0	2.9	0.0	0.146	2.74	0.471
W15-8U	9/5/2012	2.7	0.0	4.1	0.0	0.734	0.428	0.292
W15-8U	9/18/2012	3.5	0.0	14.7	0.0	0	1.14	0
W15-8U	10/2/2012	5.0	0.1	7.6	0.0	1.24	0	0
W15-9L	5/31/2012	5.0	0.0	1.1	0.0	0	2.67	0.375
W15-9L	6/13/2012	7.5	0.0	0.1	0.0	1.04	0	0
W15-9L	6/27/2012	7.2	0.0	0.0	0.0	1.69	0	0
W15-9L	7/11/2012	5.2	0.1	0.0	0.0	0.908	0.144	0.028
W15-9L	7/25/2012	6.7	0.0	0.3	0.0	0	3.16	0.524
W15-9L	8/22/2012	7.5	0.0	0.2	0.0	0.123	1.30	0.236
W15-9L	9/5/2012	7.2	0.0	0.2	0.0	0.121	0	0.054

Table C-1. Soil Vapor Extraction Well Characterization Data for the 216-Z-9 Site for 2012

Z-9 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)
W15-9L	9/18/2012	7.5	0.0	0.0	0.0	0	0	0
W15-9L	10/2/2012	7.5	0.0	4.1	0.0	0.713	0	0
W15-9U	5/31/2012	5.0	0.0	0.3	0.0	0	2.26	0.425
W15-9U	6/13/2012	7.5	0.0	1.1	0.0	0.578	0	0.121
W15-9U	6/27/2012	7.2	0.0	0.0	0.0	1.18	0	0
W15-9U	7/11/2012	6.0	0.1	0.0	0.0	1.19	0	0.073
W15-9U	7/25/2012	6.7	0.0	0.2	0.0	0.130	2.79	0.537
W15-9U	8/22/2012	7.0	0.0	0.4	0.0	0.063	1.51	0.317
W15-9U	9/5/2012	7.2	0.0	0.1	0.0	0.193	0.143	0.138
W15-9U	9/18/2012	7.5	0.0	0.0	0.0	0.091	0	0
W15-9U	10/2/2012	7.5	0.0	1.4	0.0	0.601	0	0
W15-48	4/5/2012	28.6	0.5	8.1	0.0	0.108	2.49	0.241
W15-48	5/1/2012	30.1	0.5	7.0	0.0	2.40	0	0
W15-48	5/16/2012	30.9	0.5	7.2	0.0	1.18	1.36	0.284
W15-48	5/31/2012	29.4	0.5	7.8	0.0	0	5.10	0.893
W15-48	6/13/2012	29.9	0.6	6.9	0.0	1.34	1.39	0.409
W15-48	6/27/2012	29.9	0.5	6.5	0.0	3.95	0	0
W15-48	7/11/2012	26.2	0.7	4.2	0.0	2.37	0.475	0.291
W15-48	7/25/2012	28.4	0.5	6.5	0.0	0.416	5.74	0.984
W15-48	8/22/2012	30.1	0.5	7.2	0.0	0.487	3.66	0.587
W15-48	9/5/2012	29.9	0.5	6.0	0.0	1.13	1.36	0.333
W15-48	9/18/2012	27.4	0.5	5.6	0.0	0.934	1.04	0
W15-48	10/2/2012	29.9	0.5	6.8	0.0	1.35	0	0
W15-84L	4/5/2012	15.4	0.4	9.0	0.0	0.416	1.92	0.303
W15-84L	5/1/2012	17.4	0.2	7.8	0.0	1.48	0	0
W15-84L	5/16/2012	15.4	0.2	8.1	0.0	1.08	0.601	0
W15-84L	5/31/2012	8.5	0.1	6.9	0.0	0	3.79	0.448
W15-84L	6/13/2012	6.2	0.1	7.3	0.0	0.547	1.32	0.223

Table C-1. Soil Vapor Extraction Well Characterization Data for the 216-Z-9 Site for 2012

Z-9 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)
W15-84L	6/27/2012	7.2	0.1	6.9	0.0	1.84	0.189	0
W15-84L	7/11/2012	6.5	0.1	7.1	0.0	0.809	1.41	0.511
W15-84L	7/25/2012	6.5	0.1	7.5	0.0	0.250	4.60	0.721
W15-84L	8/22/2012	6.2	0.1	7.9	0.0	0.389	3.20	0.433
W15-84L	9/5/2012	6.5	0.1	7.6	0.0	0.817	0.869	0.235
W15-84L	9/18/2012	7.0	0.1	6.8	0.0	0	0	0
W15-84U	4/5/2012	10.5	1.0	10.0	0.1	0.598	4.18	0.435
W15-84U	5/1/2012	12.5	0.4	5.3	0.0	1.48	0	0
W15-84U	5/16/2012	10.5	0.4	5.2	0.0	0.880	0	0.142
W15-84U	5/31/2012	6.2	0.3	3.7	0.0	0	3.25	0.445
W15-84U	6/13/2012	5.0	0.3	2.9	0.0	0.221	0.239	0.647
W15-84U	6/27/2012	5.0	0.3	2.6	0.0	0.696	0.077	0.222
W15-84U	7/11/2012	5.0	0.3	4.2	0.0	0.806	0.889	0.611
W15-84U	7/25/2012	5.0	0.2	4.2	0.0	0.324	3.77	0.716
W15-84U	8/22/2012	5.0	0.3	3.0	0.0	0.005	3.26	0.602
W15-84U	9/5/2012	5.0	0.3	4.6	0.0	0.595	0.490	0.312
W15-84U	9/18/2012	5.2	0.3	4.6	0.0	0	0	0
W15-86	4/5/2012	13.7	0.3	18.5	0.0	0.447	1.61	0.119
W15-86	5/1/2012	14.9	0.3	16.1	0.0	1.45	0.221	0
W15-86	5/16/2012	12.7	0.3	15.9	0.0	1.45	0.772	0.298
W15-86	5/31/2012	7.5	0.2	13.2	0.0	0	3.54	0.633
W15-86	6/13/2012	5.5	0.2	15.7	0.0	0.477	1.56	0.829
W15-86	6/27/2012	6.2	0.2	15.5	0.0	1.81	0.480	0.084
W15-86	7/11/2012	5.5	0.2	15.3	0.0	0.876	2.46	0.778
W15-86	7/25/2012	5.2	0.2	15.1	0.0	0.599	4.45	0.721
W15-86	8/22/2012	6.0	0.2	16.0	0.0	0.632	3.58	0.406
W15-86	9/5/2012	5.5	0.2	15.3	0.0	1.01	0.990	0.286
W15-86	9/18/2012	6.0	0.1	14.0	0.0	0	2.01	0

Table C-1. Soil Vapor Extraction Well Characterization Data for the 216-Z-9 Site for 2012

Z-9 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)
W15-86	10/2/2012	6.0	0.2	26.2	0.0	1.22	0	0
W15-95L	5/31/2012	4.2	0.7	11.3	0.1	0	6.19	0.686
W15-95L	6/13/2012	3.7	0.3	9.4	0.0	0.618	2.48	0.533
W15-95L	6/27/2012	4.2	0.2	10.5	0.0	1.21	3.42	0
W15-95L	7/11/2012	3.0	0.3	6.9	0.0	1.69	1.74	0.322
W15-95L	7/25/2012	3.7	0.3	9.8	0.0	0.412	5.89	0.827
W15-95L	8/22/2012	4.0	0.2	10.4	0.0	0.173	4.68	0.562
W15-95L	9/5/2012	3.7	0.2	10.8	0.0	0.532	3.10	0.271
W15-95L	9/18/2012	4.0	0.2	9.3	0.0	0	3.97	0
W15-95L	10/2/2012	4.0	0.2	9.8	0.0	0.864	1.37	0
W15-95U	5/31/2012	5.2	0.7	8.7	0.1	0	5.88	0.799
W15-95U	6/13/2012	3.7	0.3	7.0	0.0	1.20	1.65	0.070
W15-95U	6/27/2012	3.7	0.3	2.4	0.0	2.50	0	0
W15-95U	7/11/2012	3.2	0.3	1.4	0.0	2.06	0.187	0.291
W15-95U	7/25/2012	3.7	0.3	2.6	0.0	0.501	5.07	0.738
W15-95U	8/22/2012	3.7	0.3	4.5	0.0	0.250	3.70	0.537
W15-95U	9/5/2012	3.7	0.3	3.0	0.0	0.633	1.49	0.382
W15-95U	9/18/2012	4.0	0.3	3.0	0.0	0	1.71	0
W15-95U	10/2/2012	4.0	0.2	3.4	0.0	0.482	0	0
W15-217	5/31/2012	7.2	0.5	5.5	0.0	0.214	2.79	0.350
W15-217	6/13/2012	4.2	0.3	6.7	0.0	0	1.04	0.320
W15-217	6/27/2012	6.0	0.2	7.9	0.0	0.716	0	0.002
W15-217	7/11/2012	5.7	0.2	9.5	0.0	0.871	1.02	0.314
W15-217	7/25/2012	5.5	0.2	13.3	0.0	0.449	4.59	0.830
W15-217	8/22/2012	5.5	0.2	15.8	0.0	0.390	3.46	0.546
W15-217	9/5/2012	5.7	0.2	13.8	0.0	0.994	1.56	0.383
W15-217	9/18/2012	6.2	0.1	7.3	0.0	0	1.52	0
W15-218L	5/31/2012	6.2	0.1	4.3	0.0	0.053	3.80	0.669

Table C-1. Soil Vapor Extraction Well Characterization Data for the 216-Z-9 Site for 2012

Z-9 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)
W15-218L	6/13/2012	6.2	0.1	5.9	0.0	0.368	1.77	0.569
W15-218L	6/27/2012	6.0	0.1	3.0	0.0	2.70	0	0
W15-218L	7/11/2012	4.2	0.2	3.1	0.0	1.43	0.444	0.360
W15-218L	7/25/2012	5.5	0.1	6.5	0.0	0.482	5.72	0.777
W15-218L	8/22/2012	5.5	0.1	4.7	0.0	0.051	3.59	0.555
W15-218L	9/5/2012	5.2	0.1	4.5	0.0	0.673	1.22	0.153
W15-218L	9/18/2012	6.0	0.1	0.0	0.0	0.243	0	0
W15-218L	10/2/2012	5.7	0.1	7.2	0.0	0.180	1.26	0
W15-219L	5/31/2012	7.0	0.1	6.1	0.0	0	4.64	0.623
W15-219L	6/13/2012	6.2	0.1	8.4	0.0	1.06	2.35	0.591
W15-219L	6/27/2012	6.7	0.1	8.4	0.0	2.62	1.55	0
W15-219L	7/11/2012	5.0	0.1	4.7	0.0	0.722	1.90	0.489
W15-219L	7/25/2012	6.0	0.1	9.7	0.0	0.155	7.28	0.896
W15-219L	8/22/2012	6.2	0.1	9.4	0.0	0.383	4.99	0.486
W15-219L	9/5/2012	6.0	0.1	9.0	0.0	0.677	3.18	0.295
W15-219L	9/18/2012	6.2	0.1	6.0	0.0	0	2.02	0
W15-219L	10/2/2012	6.2	0.1	10.1	0.0	0.083	2.42	0

Notes:

To convert cubic meters to cubic feet, multiply by 35.315.

To convert kilograms to pounds, multiply by 2.2046.

To convert kPa to inches (water), multiply by 4.0149.

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

Table C-2. Soil Vapor Extraction Well Characterization Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Z-1A 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)
W18-150L	4/5/2012	8.7	0.0	3.6	0.001	0.736	0.323	0.106
W18-150L	5/1/2012	5.0	0.0	2.7	0.001	2.15	2.20	0
W18-150L	5/16/2012	7.7	0.0	3.3	0.001	1.97	0	0
W18-150L	5/31/2012	3.7	0.0	2.0	0.001	0.975	1.32	0.367
W18-150L	6/7/2012	3.5	0.0	1.4	0.000	2.22	0	0
W18-150L	6/20/2012	3.5	0.0	1.3	0.000	2.07	0	0.005
W18-150L	7/2/2012	3.7	0.0	1.4	0.000	2.63	0	0
W18-150L	7/18/2012	3.0	0.0	1.2	0.000	0.942	2.34	0.768
W18-150L	7/30/2012	3.5	0.0	1.7	0.000	0.299	2.34	0.602
W18-150L	8/15/2012	3.5	0.0	1.0	0.000	0.186	1.69	0.437
W18-158L	6/7/2012	1.7	0.0	0.0	0.000	1.52	0	0
W18-158L	6/20/2012	1.7	0.0	0.1	0.000	0.170	0	0.132
W18-158L	7/2/2012	1.7	0.0	0.0	0.000	0.416	0	0.004
W18-158L	7/18/2012	1.7	0.0	0.1	0.000	0.072	2.75	0.864
W18-158L	7/30/2012	1.7	0.0	0.5	0.000	0.093	2.37	0.520
W18-158L	8/15/2012	2.0	0.0	0.2	0.000	0.066	1.67	0.451
W18-159	6/7/2012	1.4	0.2	7.9	0.012	2.70	0	0
W18-159	6/20/2012	1.5	0.2	7.9	0.012	1.44	0.569	0.125
W18-159	7/2/2012	1.5	0.2	8.0	0.012	1.94	0.236	0.061
W18-159	7/18/2012	1.5	0.2	7.4	0.011	1.13	3.48	1.04
W18-159	7/30/2012	1.5	0.2	8.0	0.012	0.519	3.23	0.669
W18-159	8/15/2012	1.8	0.2	8.2	0.013	0.303	2.79	0.572
W18-163L	4/5/2012	2.5	0.1	5.6	0.003	0.392	0.428	0.116
W18-163L	5/1/2012	4.7	0.1	5.2	0.007	1.98	0	0
W18-163L	5/16/2012	5.0	0.1	6.3	0.008	1.81	0	0
W18-163L	5/31/2012	1.0	0.0	3.3	0.001	0.670	1.85	0.188
W18-163L	6/7/2012	0.5	0.0	0.2	0.000	1.37	0	0
W18-163L	6/20/2012	0.9	0.0	3.2	0.001	1.63	0	0.116

Table C-2. Soil Vapor Extraction Well Characterization Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Z-1A 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)
W18-163L	7/2/2012	0.9	0.0	2.7	0.001	2.47	0	0
W18-163L	7/18/2012	0.9	0.0	4.2	0.001	0.692	2.75	0.987
W18-163L	7/30/2012	0.9	0.0	4.7	0.001	0.355	2.13	0.596
W18-163L	8/15/2012	1.1	0.0	2.5	0.001	0.032	2.42	0.497
W18-165	5/31/2012	2.2	0.1	11.6	0.009	0.456	2.46	0.274
W18-165	6/7/2012	1.7	0.1	7.4	0.006	1.11	0	0
W18-165	6/20/2012	1.7	0.1	6.9	0.005	0.928	0	0
W18-165	7/2/2012	1.7	0.1	5.4	0.003	1.27	0	0
W18-165	7/18/2012	1.8	0.1	0.1	0.000	0.821	4.35	0.937
W18-165	7/30/2012	1.7	0.1	6.1	0.005	0.227	2.93	0.892
W18-165	8/15/2012	2.0	0.1	6.5	0.003	0.340	2.33	0.658
W18-166	4/5/2012	3.0	0.1	6.1	0.005	0.455	0.514	0.098
W18-166	5/1/2012	6.0	0.2	5.6	0.010	2.37	0	0
W18-166	5/16/2012	5.5	0.2	5.2	0.008	2.32	0	0
W18-166	5/31/2012	2.2	0.1	4.3	0.002	0.710	1.91	0.346
W18-166	6/7/2012	1.8	0.0	3.5	0.001	2.67	0	0
W18-166	6/20/2012	1.7	0.0	3.2	0.001	2.58	0	0
W18-166	7/2/2012	1.7	0.0	3.0	0.001	1.96	0	0
W18-166	7/18/2012	1.6	0.1	2.9	0.002	0.354	3.55	1.21
W18-166	7/30/2012	1.8	0.0	3.3	0.001	0.113	2.92	0.695
W18-166	8/15/2012	2.0	0.0	3.0	0.001	0.048	2.38	0.601
W18-167	5/31/2012	1.3	0.3	7.5	0.019	2.65	1.54	0.056
W18-167	6/7/2012	0.7	0.3	7.7	0.022	3.21	0	0
W18-167	6/20/2012	0.9	0.3	9.9	0.028	2.42	0	0
W18-167	7/2/2012	0.8	0.3	8.6	0.024	3.23	0	0
W18-167	7/18/2012	0.9	0.3	8.9	0.025	1.96	1.40	0.552
W18-167	7/30/2012	0.9	0.3	8.8	0.025	0.765	2.35	0.764
W18-167	8/15/2012	1.1	0.3	10.1	0.029	0.819	1.69	0.492

Table C-2. Soil Vapor Extraction Well Characterization Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Z-1A 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)
W18-168	4/5/2012	2.7	0.1	15.3	0.016	0.907	0.837	0.137
W18-168	5/1/2012	3.7	0.1	15.7	0.016	2.18	0	0
W18-168	5/16/2012	4.0	0.1	17.7	0.023	3.02	0	0
W18-168	5/31/2012	1.1	0.0	13.4	0.003	1.50	2.67	0.321
W18-168	6/7/2012	0.8	0.0	11.1	0.003	3.20	0	0
W18-168	6/20/2012	0.9	0.0	1.0	0.000	1.68	0	0
W18-168	7/2/2012	1.0	0.0	0.1	0.000	3.09	0	0
W18-168	7/18/2012	1.0	0.0	4.7	0.001	1.72	1.11	0.563
W18-168	7/30/2012	1.1	0.0	5.7	0.001	0.483	2.35	0.741
W18-168	8/15/2012	1.2	0.0	6.1	0.002	0.519	1.84	0.493
W18-169	5/31/2012	1.4	0.0	3.1	0.001	1.46	1.05	0.187
W18-169	6/7/2012	1.2	0.0	2.8	0.001	2.83	0	0
W18-169	6/20/2012	1.3	0.0	2.2	0.001	1.81	0	0.099
W18-169	7/2/2012	1.2	0.0	2.3	0.001	2.73	0	0
W18-169	7/18/2012	1.1	0.0	2.2	0.001	1.90	1.25	0.673
W18-169	7/30/2012	1.2	0.0	0.2	0.000	0.395	2.08	0.676
W18-169	8/15/2012	1.5	0.0	2.3	0.001	0.411	1.33	0.474
W18-174	4/5/2012	6.2	0.1	5.5	0.004	0.411	0.179	0.165
W18-174	5/1/2012	3.5	0.1	3.4	0.003	2.21	2.20	0
W18-174	5/16/2012	6.0	0.1	4.3	0.004	2.32	0	0
W18-174	5/31/2012	2.2	0.0	3.3	0.001	0.714	1.97	0.215
W18-174	6/7/2012	1.5	0.0	3.2	0.001	2.23	0	0
W18-174	6/20/2012	1.4	0.0	4.3	0.001	1.09	0	0
W18-174	7/2/2012	1.4	0.0	2.6	0.001	1.70	0	0
W18-174	7/18/2012	1.5	0.0	3.8	0.001	0.792	2.53	0.960
W18-174	7/30/2012	1.5	0.0	5.3	0.001	0.319	1.93	0.625
W18-174	8/15/2012	1.8	0.0	4.8	0.001	0.199	1.74	0.499
W18-175	5/31/2012	2.3	0.0	47.4	0.012	0	22.3	1.64

Table C-2. Soil Vapor Extraction Well Characterization Data for the 216-Z-1A/216-Z-18/216-Z-12 Site for 2012

Z-1A 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)
W18-175	6/7/2012	1.6	0.0	43.2	0.011	0	14.5	0.686
W18-175	6/20/2012	1.6	0.0	27.1	0.007	0	20.1	1.56
W18-175	7/2/2012	1.6	0.0	35.8	0.009	0	19.5	1.41
W18-175	7/18/2012	1.7	0.0	29.2	0.007	0	23.6	2.31
W18-175	7/30/2012	1.6	0.0	28.7	0.007	0.066	15.7	1.30
W18-175	8/15/2012	1.9	0.0	25.8	0.007	0	17.3	1.21

Notes:

To convert cubic meters to cubic feet, multiply by 35.315.

To convert kilograms to pounds, multiply by 2.2046.

To convert kPa to inches (water), multiply by 4.0149.

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

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Appendix D

Passive Soil Vapor Extraction Data for 2012

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D1 Introduction

This appendix contains the following four tables providing passive soil vapor extraction data for 2012:

- 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.

Passive soil vapor extraction was discontinued on March 18, 2013 based on the decline in carbon tetrachloride concentrations. The passive soil vapor extraction well monitoring data for January through March 2013 are included in this appendix for completeness.

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data for the 216-Z-1A/Z-18/Z-12 Site for 2012

Sample Location	Depth (m bgs)	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
299-W18-6L	63	03/04/12 09:17	9.40	1.00 U	1.00 U	1.51	8,500
299-W18-6L	63	04/22/12 08:44	11.8	1.00 U	1.00 U	2.67	11,700
299-W18-6L	63	05/20/12 09:08	11.3	1.00 U	1.00 U	1.00 U	9,380
299-W18-6L	63	06/10/12 08:49	8.97	1.00 U	1.00 U	1.00 U	9,490
299-W18-6L	63	07/15/12 08:37	12.7	1.00 U	1.64	3.76	12,400
299-W18-6L	63	08/26/12 07:48	11.8	1.00 U	1.00 U	1.00 U	10,100
299-W18-6L	63	08/26/12 07:48	12.2	1.00 U	1.00 U	1.00 U	10,900
299-W18-6L	63	09/23/12 08:44	2.73	1.00 U	1.00 U	1.00 U	14,900
299-W18-6L	63	10/14/12 08:53	8.62	1.00 U	1.00 U	1.00 U	13,000
299-W18-6L	63	11/18/12 08:25	11.8	1.00 U	1.00 U	1.00 U	7,410
299-W18-6L	63	12/16/12 09:08	8.33	1.00 U	1.00 U	1.62	7,360
299-W18-6L	63	01/20/13 08:46	3.92	1.00 U	1.00 U	1.00 U	6,180
299-W18-6L	63	02/24/13 08:50	8.98	1.00 U	1.00 U	1.34	6,670
299-W18-6L	63	03/17/13 09:06	1.00 U	1.00 U	1.00 U	1.00 U	6,670
299-W18-7	60	03/04/12 08:58	1.00 U	1.00 U	1.00 U	1.14	8,140
299-W18-7	60	04/22/12 08:27	4.69	1.00 U	1.00 U	1.79	11,200
299-W18-7	60	05/20/12 08:43	6.67	1.00 U	1.00 U	1.00 U	9,510
299-W18-7	60	06/10/12 08:35	5.93	1.00 U	1.00 U	1.00 U	10,900
299-W18-7	60	07/15/12 08:20	8.06	1.00 U	1.85	3.77	14,600
299-W18-7	60	08/26/12 07:22	8.31	1.00 U	1.00 U	1.00 U	10,500
299-W18-7	60	09/23/12 08:25	4.12	1.00 U	1.00 U	1.00 U	13,900
299-W18-7	60	10/14/12 08:35	3.35	1.00 U	1.00 U	1.00 U	13,200
299-W18-7	60	11/18/12 07:56	8.13	1.00 U	1.00 U	1.00 U	7,060
299-W18-7	60	12/16/12 08:35	4.16	1.00 U	1.00 U	1.19	6,990
299-W18-7	60	01/20/13 08:20	1.00 U	1.00 U	1.00 U	1.00 U	6,090
299-W18-7	60	02/24/13 08:23	1.53	1.00 U	1.00 U	1.22	6,650
299-W18-7	60	03/17/13 08:29	5.54	1.00 U	1.00 U	1.00 U	6,490
299-W18-10L	56	03/04/12 10:36	1.00 U	1.00 U	1.00 U	1.32	8,430
299-W18-10L	56	04/22/12 09:39	1.86	1.00 U	1.00 U	2.54	10,600
299-W18-10L	56	05/20/12 10:16	3.34	1.00 U	1.00 U	1.34	10,100
299-W18-10L	56	06/10/12 09:53	2.80	1.00 U	1.00 U	1.00 U	9,930
299-W18-10L	56	07/15/12 09:56	5.50	1.00 U	1.80	4.26	14,200

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data for the 216-Z-1A/Z-18/Z-12 Site for 2012

Sample Location	Depth (m bgs)	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
299-W18-10L	56	08/26/12 08:53	6.88	1.00 U	1.00 U	1.46	11,000
299-W18-10L	56	09/23/12 09:47	1.16	1.00 U	1.00 U	1.00 U	12,800
299-W18-10L	56	10/14/12 10:01	1.98	1.00 U	1.00 U	1.2	12,600
299-W18-10L	56	11/18/12 09:23	6.24	1.00 U	1.00 U	1.00 U	7,710
299-W18-10L	56	12/16/12 10:03	6.94	1.00 U	1.00 U	2.84	8,330
299-W18-10L	56	01/20/13 09:28	1.00 U	1.00 U	1.00 U	1.00 U	6,280
299-W18-10L	56	02/24/13 09:40	1.00 U	1.00 U	1.00 U	1.00 U	6,800
299-W18-10L	56	03/17/13 10:07	1.76	1.00 U	1.00 U	1.00 U	6,370
299-W18-11L	61	03/04/12 10:30	2.82	1.00 U	1.00 U	1.56	9,430
299-W18-11L	61	04/22/12 09:31	3.14	1.00 U	1.00 U	2.16	10,100
299-W18-11L	61	05/20/12 10:10	1.63	1.00 U	1.00 U	1.00 U	9,230
299-W18-11L	61	06/10/12 09:47	1.04	1.00 U	1.00 U	1.00 U	8,920
299-W18-11L	61	07/15/12 09:47	6.14	1.00 U	1.48	3.44	13,600
299-W18-11L	61	08/26/12 08:47	4.08	1.00 U	1.00 U	1.00 U	9,320
299-W18-11L	61	09/23/12 09:41	1.00 U	1.00 U	1.00 U	1.00 U	13,000
299-W18-11L	61	10/14/12 09:54	1.00 U	1.00 U	1.00 U	1.24	12,200
299-W18-11L	61	11/18/12 09:16	5.45	1.00 U	1.00 U	1.00 U	7,780
299-W18-11L	61	12/16/12 09:56	5.42	1.00 U	1.00 U	1.35	8,260
299-W18-11L	61	01/20/13 09:23	1.00 U	1.00 U	1.00 U	1.00 U	6,200
299-W18-11L	61	02/24/13 09:33	1.56	1.00 U	1.00 U	1.00 U	6,870
299-W18-11L	61	03/17/13 09:59	3.42	1.00 U	1.00 U	1.00 U	6,400
299-W18-12	60	03/04/12 10:42	3.13	1.00 U	1.00 U	1.23	9,520
299-W18-12	60	04/22/12 09:45	8.76	1.00 U	1.00 U	1.89	11,900
299-W18-12	60	05/20/12 10:22	1.37	1.00 U	1.00 U	1.00 U	9,070
299-W18-12	60	06/10/12 09:58	9.00	1.00 U	1.00 U	1.06	9,380
299-W18-12	60	07/15/12 10:03	9.53	1.00 U	1.41	3.46	14,300
299-W18-12	60	08/26/12 09:00	9.58	1.00 U	1.00 U	1.00 U	10,500
299-W18-12	60	09/23/12 09:54	1.93	1.00 U	1.00 U	1.00 U	12,100
299-W18-12	60	10/14/12 10:09	3.02	1.00 U	1.00 U	1.00 U	12,200
299-W18-12	60	11/18/12 09:34	7.55	1.00 U	1.00 U	1.00 U	7,930
299-W18-12	60	12/16/12 10:14	7.62	1.00 U	1.00 U	1.04	8,360
299-W18-12	60	01/20/13 09:39	1.00 U	1.00 U	1.00 U	1.00 U	5,980

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data for the 216-Z-1A/Z-18/Z-12 Site for 2012

Sample Location	Depth (m bgs)	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
299-W18-12	60	02/24/13 09:52	1.00 U	1.00 U	1.00 U	1.04	6,780
299-W18-12	60	03/17/13 10:20	1.00 U	1.00 U	1.00 U	1.00 U	6,140
299-W18-246L	52	03/04/12 09:28	2.99	1.00 U	1.00 U	1.21	8,420
299-W18-246L	52	04/22/12 08:49	3.50	1.00 U	1.00 U	1.16	11,900
299-W18-246L	52	05/20/12 09:17	8.97	1.00 U	1.00 U	1.00 U	9,420
299-W18-246L	52	06/10/12 08:56	6.81	1.00 U	1.00 U	1.00 U	10,800
299-W18-246L	52	07/15/12 08:47	13.7	1.00 U	1.34	3.15	14,200
299-W18-246L	52	07/15/12 08:47	14.1	1.00 U	2.16	3.93	14,200
299-W18-246L	52	08/26/12 07:57	12.3	1.00 U	1.00 U	1.00 U	10,300
299-W18-246L	52	09/23/12 08:51	4.91	1.00 U	1.00 U	1.00 U	13,500
299-W18-246L	52	1014/12 09:02	3.91	1.00 U	1.00 U	1.00 U	12,900
299-W18-246L	52	11/18/12 08:33	12.6	1.00 U	1.00 U	1.00 U	7,730
299-W18-246L	52	12/16/12 09:18	12.0	1.00 U	1.00 U	1.40	7,480
299-W18-246L	52	01/20/13 08:53	1.00 U	1.00 U	1.00 U	1.00 U	6,240
299-W18-246L	52	02/24/13 08:57	1.32	1.00 U	1.00 U	1.02	6,520
299-W18-246L	52	03/17/13 09:19	1.00 U	1.00 U	1.00 U	1.00 U	6,540
299-W18-247L	51	03/04/12 10:50	8.32	1.00 U	1.00 U	1.86	10,100
299-W18-247L	51	04/22/12 09:53	7.75	1.00 U	1.00 U	1.90	11,400
299-W18-247L	51	05/20/12 10:30	9.65	1.00 U	1.00 U	2.06	11,200
299-W18-247L	51	06/10/12 10:09	4.56	1.00 U	1.00 U	1.16	10,900
299-W18-247L	51	07/15/12 10:13	5.25	1.00 U	1.90	3.79	14,300
299-W18-247L	51	08/26/12 09:09	5.29	1.00 U	1.00 U	1.38	10,700
299-W18-247L	51	09/23/12 10:02	1.42	1.00 U	1.00 U	1.00 U	12,300
299-W18-247L	51	10/14/12 10:19	2.07	1.00 U	1.00 U	1.11	13,000
299-W18-247L	51	11/18/12 09:41	5.51	1.00 U	1.00 U	1.00 U	7,930
299-W18-247L	51	12/16/12 10:24	4.91	1.00 U	1.00 U	1.01	8,530
299-W18-247L	51	01/20/13 09:45	1.95	1.00 U	1.00 U	1.00 U	6,090
299-W18-247L	51	02/24/13 10:02	1.00 U	1.00 U	1.00 U	1.07	7,670
299-W18-247L	51	03/17/13 10:30	5.74	1.00 U	1.00 U	1.00 U	6,720
299-W18-252L	53	03/04/12 09:39	1.00 U	1.00 U	1.00 U	1.05	8,140
299-W18-252L	53	04/22/12 09:00	4.66	1.00 U	1.00 U	1.87	10,900
299-W18-252L	53	05/20/12 09:31	2.14	1.00 U	1.00 U	1.00 U	9,300

Table D-1. Passive Soil Vapor Extraction Well Monitoring Data for the 216-Z-1A/Z-18/Z-12 Site for 2012

Sample Location	Depth (m bgs)	Sample Date Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
299-W18-252L	53	05/20/12 09:31	2.69	1.00 U	1.00 U	1.35	9,390
299-W18-252L	53	06/10/12 09:08	1.18	1.00 U	1.00 U	1.00 U	9,200
299-W18-252L	53	07/15/12 09:03	8.64	1.00 U	1.23	3.26	14,000
299-W18-252L	53	08/26/12 08:10	5.72	1.00 U	1.00 U	1.00 U	10,100
299-W18-252L	53	09/23/12 09:06	1.00 U	1.00 U	1.00 U	1.00 U	12,900
299-W18-252L	53	10/14/12 09:15	2.64	1.00 U	1.00 U	1.00 U	12,500
299-W18-252L	53	11/18/12 08:51	8.49	1.00 U	1.00 U	1.00 U	7,690
299-W18-252L	53	12/16/12 09:30	7.02	1.00 U	1.00 U	1.50	7,600
299-W18-252L	53	12/16/12 09:30	7.19	1.00 U	1.00 U	1.39	7,800
299-W18-252L	53	01/20/13 09:08	1.00 U	1.00 U	1.00 U	1.00 U	6,240
299-W18-252L	53	02/24/13 09:14	1.00 U	1.00 U	1.00 U	1.00 U	6,690
299-W18-252L	53	03/17/13 09:34	1.00 U	1.00 U	1.00 U	1.18	6,320

Note: To convert from meters to feet, multiply by 3.2808.

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
25.0	21.7	03/04/12	12:22	1715232
25.0	21.4	03/04/12	14:10	1715232
200.0	177.0	03/04/12	14:16	1715232
25.0	20.8	04/22/12	11:22	1715232
25.0	20.5	04/22/12	13:10	1715232
200.0	203.0	04/22/12	13:15	1715232
25.0	21.2	05/20/12	12:28	1715232
25.0	21.4	05/20/12	14:16	1715232
200.0	207.0	05/20/12	14:21	1715232
25.0	20.3	06/10/12	11:46	1715232
25.0	20.8	06/10/12	13:36	1715232
200.0	197.0	06/10/12	13:40	1715232
25.0	20.6	07/15/12	12:00	1715232
25.0	20.8	07/15/12	13:48	1715232
200.0	233.0	07/15/12	14:04	1715232
25.0	20.0	08/26/12	10:36	1715232
25.0	20.6	08/26/12	12:26	1715232
200.0	202.0	08/26/12	12:32	1715232
25.0	20.1	09/23/12	11:23	1715232
25.0	20.7	09/23/12	13:11	1715232
200.0	205.0	09/23/12	13:18	1715232
25.0	20.0	10/14/12	11:46	1715232
25.0	20.6	10/14/12	13:34	1715232
200.0	204.0	10/14/12	13:41	1715232
25.0	19.7	11/18/12	11:40	1715232
25.0	20.2	11/18/12	13:38	1715232
200.0	195.0	11/18/12	13:52	1715232
25.0	20.6	12/16/12	12:20	1715232
25.0	20.5	12/16/12	14:16	1715232
200.0	202.0	12/16/12	14:19	1715232
25.0	19.9	01/20/13	11:50	1715232

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
25.0	20.6	01/20/13	13:44	1715232
200.0	200.0	01/20/13	13:58	1715232
25.0	20.8	02/24/13	11:55	1715232
25.0	20.8	02/24/13	13:53	1715232
200.0	211.0	02/24/13	14:02	1715232
25.0	20.9	03/17/13	12:17	1715232
25.0	20.9	03/17/13	14:13	1715232
200.0	211.0	03/17/13	14:18	1715232

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

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Table D-3. Blank Analyses

Sample Location	Sample Date	Sample Analysis Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
Blank	03/04/12	12:24	1.00 U	1.00 U	1.00 U	1.00 U	8,140
Blank	03/04/12	14:12	1.00 U	1.00 U	1.00 U	1.00 U	9,260
Blank	04/22/12	11:20	1.00 U	1.00 U	1.00 U	1.00 U	3,500
Blank	04/22/12	13:12	1.00 U	1.00 U	1.00 U	1.00 U	10,200
Blank	05/20/12	12:26	1.00 U	1.00 U	1.00 U	1.00 U	2,760
Blank	05/20/12	14:18	1.00 U	1.00 U	1.00 U	1.00 U	7,630
Blank	06/10/12	11:44	1.00 U	1.00 U	1.00 U	1.00 U	3,030
Blank	06/10/12	13:38	1.00 U	1.00 U	1.00 U	1.00 U	8,080
Blank	07/15/12	11:58	1.00 U	1.00 U	1.00 U	1.00 U	8,830
Blank	07/15/12	13:50	1.00 U	1.00 U	1.00 U	1.00 U	13,100
Blank	08/26/12	10:34	1.00 U	1.00 U	1.00 U	1.00 U	3,270
Blank	08/26/12	12:24	1.00 U	1.00 U	1.00 U	1.00 U	7,960
Blank	09/23/12	11:21	1.00 U	1.00 U	1.00 U	1.00 U	8,580
Blank	09/23/12	13:13	1.00 U	1.00 U	1.00 U	1.00 U	10,400
Blank	10/14/12	11:44	1.00 U	1.00 U	1.00 U	1.00 U	7,270

Blank	10/14/12	13:36	1.00 U	1.00 U	1.00 U	1.00 U	11,700
Blank	11/18/12	11:38	1.00 U	1.00 U	1.00 U	1.00 U	2,940
Blank	11/18/12	13:36	1.00 U	1.00 U	1.00 U	1.00 U	6,510
Blank	12/16/12	12:18	1.00 U	1.00 U	1.00 U	1.00 U	4,090
Blank	12/16/12	14:18	1.00 U	1.00 U	1.00 U	1.00 U	7,540
Blank	01/20/13	11:48	1.00 U	1.00 U	1.00 U	1.00 U	2,710
Blank	01/20/13	13:46	1.00 U	1.00 U	1.00 U	1.00 U	6,310
Blank	02/24/13	11:53	1.00 U	1.00 U	1.00 U	1.00 U	2,850
Blank	02/24/13	13:51	1.00 U	1.00 U	1.00 U	1.00 U	4,420
Blank	03/17/13	12:15	1.00 U	1.00 U	1.00 U	1.00 U	2,440
Blank	03/17/13	14:15	1.00 U	1.00 U	1.00 U	1.00 U	4,390

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)
Field Blank	03/04/12	11:50	14:08	1.00 U	1.00 U	1.00 U	1.55	8,560
Field Blank	04/22/12	10:47	13:08	1.00 U	1.00 U	1.00 U	1.61	10,600
Field Blank	05/20/12	11:27	14:14	1.00 U	1.00 U	1.00 U	1.13	8,740
Field Blank	06/10/12	11:08	13:34	1.00 U	1.00 U	1.00 U	1.28	8,470
Field Blank	07/15/12	11:15	13:46	1.00 U	1.00 U	1.40	3.47	13,300
Field Blank	08/26/12	10:09	12:22	1.00 U	1.00 U	1.08	1.65	8,690
Field Blank	09/23/12	10:56	13:09	1.18	1.00 U	1.00 U	1.60	12,300
Field Blank	10/14/12	11:24	13:32	1.00 U	1.00 U	1.00 U	1.57	12,200
Field Blank	11/18/12	11:07	13:34	1.00 U	1.00 U	1.00 U	1.00 U	7,040
Field Blank	12/16/12	12:03	14:14	1.00 U	1.00 U	1.00 U	1.00 U	8,000
Field Blank	01/20/13	11:06	13:42	1.00 U	1.00 U	1.00 U	1.00 U	5,920
Field Blank	02/24/13	11:37	13:49	1.00 U	1.00 U	1.00 U	1.10	6,750
Field Blank	03/17/13	11:56	14:11	1.00 U	1.00 U	1.00 U	1.00 U	4,690

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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

Soil Vapor Monitoring Data for 2012

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E1 Introduction

This appendix contains the following five tables providing soil vapor monitoring data for 2012:

- Table E-1 provides monitoring data for nonoperational wells and probes at the 216-Z-1A/216-Z-18/216-Z-12 site.
- Table E-2 provides monitoring data for nonoperational 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.

Soil vapor monitoring was temporarily suspended on March 18, 2013. The soil vapor monitoring data for January through March 2013 are included in this appendix for completeness.

Table E-1. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-1A/Z-18/Z-12 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
CPT-4E/25 ft	8	03/04/12 09:54	1.00 U	1.00 U	1.00 U	1.12	8,470
CPT-4E/25 ft	8	04/22/12 09:08	1.12	1.00 U	1.00 U	1.79	11,200
CPT-4E/25 ft	8	05/20/12 09:45	1.00 U	1.00 U	1.00 U	1.00 U	10,000
CPT-4E/25 ft	8	06/10/12 09:20	1.00 U	1.00 U	1.00 U	1.00 U	10,500
CPT-4E/25 ft	8	07/15/12 09:16	1.00 U	1.00 U	1.93	2.99	14,100
CPT-4E/25 ft	8	08/26/12 08:23	1.00 U	1.00 U	1.00 U	1.00 U	8,760
CPT-4E/25 ft	8	09/23/12 09:16	1.00 U	1.00 U	1.00 U	1.00 U	14,200
CPT-4E/25 ft	8	10/14/12 09:26	1.00 U	1.00 U	1.00 U	1.00 U	13,300
CPT-32/25 ft	8	03/04/12 09:08	1.00 U	1.00 U	1.00 U	1.47	8,120
CPT-32/25 ft	8	04/22/12 08:36	1.00 U	1.00 U	1.00 U	1.64	11,400
CPT-32/25 ft	8	05/20/12 08:53	1.00 U	1.00 U	1.00 U	1.09	9,780
CPT-32/25 ft	8	06/10/12 08:44	1.00 U	1.00 U	1.00 U	1.00 U	10,400
CPT-32/25 ft	8	07/15/12 08:30	1.00 U	1.00 U	1.89	3.00	14,400
CPT-32/25 ft	8	08/26/12 07:39	1.00 U	1.00 U	1.00 U	1.00 U	10,700
CPT-32/25 ft	8	09/23/12 08:35	1.00 U	1.00 U	1.00 U	1.00 U	13,700
CPT-32/25 ft	8	10/14/12 08:43	1.00 U	1.00 U	1.00 U	1.00 U	13,000
CPT-32/25 ft	8	10/14/12 08:43	1.00 U	1.00 U	1.00 U	1.00 U	12,900
CPT-32/25 ft	8	11/18/12 08:21	2.73	1.00 U	1.00 U	1.00 U	7,350
CPT-32/25 ft	8	12/16/12 09:04	1.82	1.00 U	1.00 U	1.00 U	7,310
CPT-32/25 ft	8	01/20/13 08:42	1.16	1.00 U	1.00 U	1.00 U	6,190
CPT-32/25 ft	8	02/24/13 08:46	5.21	1.00 U	1.00 U	1.61	6,720
CPT-32/25 ft	8	03/17/13 08:59	3.92	1.00 U	1.00 U	1.00 U	6,840
CPT-13A/30 ft	9	03/04/12 10:57	1.00 U	1.00 U	1.00 U	1.00 U	9,850
CPT-13A/30 ft	9	04/22/12 10:04	1.00 U	1.00 U	1.00 U	1.60	11,700
CPT-13A/30 ft	9	05/20/12 10:37	1.00 U	1.00 U	1.00 U	1.31	10,100
CPT-13A/30 ft	9	06/10/12 10:15	1.00 U	1.00 U	1.00 U	1.00 U	9,840
CPT-13A/30 ft	9	07/15/12 10:23	1.00 U	1.00 U	1.51	3.38	14,400
CPT-13A/30 ft	9	08/26/12 09:19	1.00 U	1.00 U	1.00 U	1.00 U	11,000
CPT-13A/30 ft	9	09/23/12 10:09	1.00 U	1.00 U	1.00 U	1.00 U	12,800

Table E-1. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-1A/Z-18/Z-12 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
CPT-13A/30 ft	9	10/14/12 10:27	1.00 U	1.00 U	1.00 U	1.00 U	13,400
CPT-13A/30 ft	9	10/14/12 10:27	1.00 U	1.00 U	1.00 U	1.00 U	13,700
CPT-13A/30 ft	9	11/18/12 09:49	1.00 U	1.00 U	1.00 U	1.00 U	7,600
CPT-13A/30 ft	9	12/16/12 10:38	1.00 U	1.00 U	1.00 U	1.00 U	7,380
CPT-13A/30 ft	9	01/20/13 09:51	1.00 U	1.00 U	1.00 U	1.00 U	6,010
CPT-13A/30 ft	9	02/24/13 10:11	1.00 U	1.00 U	1.00 U	1.00 U	7,120
CPT-13A/30 ft	9	03/17/13 10:41	1.00 U	1.00 U	1.00 U	1.00 U	6,100
CPT-7A/32 ft	10	03/04/12 08:46	2.27	1.00 U	1.00 U	1.00 U	8,310
CPT-7A/32 ft	10	04/22/12 08:17	1.67	1.00 U	1.00 U	1.09	11,500
CPT-7A/32 ft	10	05/20/12 08:31	1.29	1.00 U	1.00 U	1.00 U	9,950
CPT-7A/32 ft	10	06/10/12 08:25	1.07	1.00 U	1.00 U	1.00 U	10,500
CPT-7A/32 ft	10	07/15/12 08:08	1.55	1.00 U	1.20	2.72	14,700
CPT-7A/32 ft	10	08/26/12 07:06	1.34	1.00 U	1.00 U	1.00 U	10,100
CPT-7A/32 ft	10	09/23/12 08:14	1.77	1.00 U	1.00 U	1.00 U	14,200
CPT-7A/32 ft	10	10/14/12 08:25	2.04	1.00 U	1.00 U	1.00 U	13,000
CPT-7A/32 ft	10	11/18/12 07:45	1.35	1.00 U	1.00 U	1.00 U	7,030
CPT-7A/32 ft	10	12/16/12 08:21	1.51	1.00 U	1.00 U	1.00 U	6,740
CPT-7A/32 ft	10	01/20/13 08:12	1.28	1.00 U	1.00 U	1.00 U	5,990
CPT-7A/32 ft	10	02/24/13 08:12	2.41	1.00 U	1.00 U	1.00 U	6,500
CPT-7A/32 ft	10	03/17/13 08:17	2.62	1.00 U	1.00 U	1.00 U	6,750
CPT-1A/35 ft	21	03/04/12 10:04	3.67	1.00 U	1.00 U	1.57	8,510
CPT-1A/35 ft	11	03/04/12 10:04	4.97	1.00 U	1.00 U	2.05	9,250
CPT-1A/35 ft	11	04/22/12 09:15	4.99	1.00 U	1.00 U	2.14	10,700
CPT-1A/35 ft	11	05/20/12 09:53	5.64	1.00 U	1.00 U	1.69	9,640
CPT-1A/35 ft	11	06/10/12 09:33	5.07	1.00 U	1.00 U	1.00 U	9,780
CPT-1A/35 ft	11	07/15/12 09:24	12.5	1.00 U	1.56	3.96	14,300
CPT-1A/35 ft	11	08/26/12 08:31	1.00 U	1.00 U	1.00 U	1.00 U	8,590
CPT-1A/35 ft	11	09/23/12 09:22	23.3	1.34	1.00 U	1.00 U	14,100
CPT-1A/35 ft	11	10/14/12 09:34	22.8	1.20	1.00 U	1.28	13,200
CPT-1A/35 ft	11	11/18/12 09:11	14.1	1.00 U	1.00 U	1.00 U	7,510
CPT-1A/35 ft	11	12/16/12 09:45	11.7	1.00 U	1.00 U	1.75	7,790
CPT-1A/35 ft	11	01/20/13 09:19	5.38	1.00 U	1.00 U	1.00 U	6,510

Table E-1. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-1A/Z-18/Z-12 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
CPT-1A/35 ft	11	02/24/13 09:22	5.31	1.00 U	1.00 U	1.51	6,930
CPT-1A/35 ft	11	03/17/13 09:47	5.28	1.00 U	1.00 U	1.00 U	5,750
CPT-34/40 ft	12	03/04/12 10:25	1.00 U	1.00 U	1.00 U	1.68	8,900
CPT-34/40 ft	12	04/22/12 09:25	1.00 U	1.00 U	1.00 U	2.75	10,900
CPT-34/40 ft	12	04/22/12 09:25	1.00 U	1.00 U	1.00 U	2.62	11,000
CPT-34/40 ft	12	05/20/12 10:04	1.00 U	1.00 U	1.00 U	1.63	9,760
CPT-34/40 ft	12	06/10/12 09:43	1.00 U	1.00 U	1.00 U	1.02	10,200
CPT-34/40 ft	12	07/15/12 09:41	1.00 U	1.00 U	2.06	3.62	14,300
CPT-34/40 ft	12	08/26/12 08:41	1.00 U	1.00 U	1.00 U	1.00 U	10,600
CPT-34/40 ft	12	09/23/12 09:34	1.00 U	1.00 U	1.00 U	1.00 U	14,100
CPT-34/40 ft	12	10/14/12 09:49	1.00 U	1.00 U	1.00 U	1.00 U	13,700
CPT-30/48 ft	15	03/04/12 09:35	2.23	1.00 U	1.00 U	2.01	8,400
CPT-30/48 ft	15	04/22/12 08:55	1.00 U	1.00 U	1.00 U	3.27	11,600
CPT-30/48 ft	15	05/20/12 09:27	1.00 U	1.00 U	1.00 U	2.40	9,980
CPT-30/48 ft	15	06/10/12 09:02	1.00 U	1.00 U	1.00 U	2.20	10,200
CPT-30/48 ft	15	06/10/12 09:02	1.00 U	1.00 U	1.00 U	2.13	10,100
CPT-30/48 ft	15	07/15/12 08:58	1.00 U	1.00 U	1.32	4.48	14,300
CPT-30/48 ft	15	08/26/12 08:06	1.00 U	1.00 U	1.00 U	1.67	10,600
CPT-30/48 ft	15	09/23/12 08:59	1.00 U	1.00 U	1.00 U	1.81	13,700
CPT-30/48 ft	15	10/14/12 09:11	1.00 U	1.00 U	1.00 U	1.49	13,300
CPT-30/48 ft	15	11/18/12 08:41	1.16	1.00 U	1.00 U	1.00 U	7,500
CPT-30/48 ft	15	12/16/12 09:25	1.08	1.00 U	1.00 U	2.21	7,430
CPT-30/48 ft	15	01/20/13 09:03	2.69	1.00 U	1.00 U	1.00 U	6,400
CPT-30/48 ft	15	01/20/13 09:03	2.80	1.00 U	1.00 U	1.00 U	6,390
CPT-30/48 ft	15	02/24/13 09:10	2.36	1.00 U	1.00 U	1.60	7,040
CPT-30/48 ft	15	03/17/13 09:30	2.04	1.00 U	1.00 U	1.40	6,560
C3872/63 ft	19	03/04/12 08:53	2.77	1.00 U	1.00 U	1.77	8,180
C3872/63 ft	19	04/22/12 08:24	2.19	1.00 U	1.00 U	2.38	11,900
C3872/63 ft	19	05/20/12 08:37	1.97	1.00 U	1.00 U	1.45	9,810
C3872/63 ft	19	06/10/12 08:31	1.47	1.00 U	1.00 U	1.00 U	10,200
C3872/63 ft	19	07/15/12 08:15	1.48	1.00 U	1.59	3.18	14,500
C3872/63 ft	19	08/26/12 07:15	1.00 U	1.00 U	1.00 U	1.00 U	10,100

Table E-1. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-1A/Z-18/Z-12 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
C3872/63 ft	19	09/23/12 08:21	1.17	1.00 U	1.00 U	1.00 U	13,900
C3872/63 ft	19	10/14/12 08:31	1.27	1.00 U	1.00 U	1.00 U	13,000
C3872/63 ft	19	11/18/12 07:52	1.46	1.00 U	1.00 U	1.00 U	7,200
C3872/63 ft	19	12/16/12 08:29	1.74	1.00 U	1.00 U	1.19	6,890
C3872/63 ft	19	01/20/13 08:16	2.02	1.00 U	1.00 U	1.00 U	6,170
C3872/63 ft	19	02/24/13 08:19	3.69	1.00 U	1.00 U	1.72	6,630
C3872/63 ft	19	03/17/13 08:24	4.61	1.00 U	1.00 U	1.22	6,320
CPT-1A/68 ft	21	03/04/12 10:14	11.2	1.00 U	1.00 U	2.31	8,760
CPT-1A/68 ft	21	04/22/12 09:17	9.75	1.00 U	1.00 U	2.44	11,700
CPT-1A/68 ft	21	05/20/12 09:55	7.40	1.00 U	1.00 U	1.89	9,850
CPT-1A/68 ft	21	06/10/12 09:35	2.08	1.00 U	1.00 U	1.00 U	9,550
CPT-1A/68 ft	21	07/15/12 09:27	8.69	1.00 U	1.54	4.31	14,900
CPT-1A/68 ft	21	08/26/12 08:33	1.00 U	1.00 U	1.00 U	1.00 U	8,620
CPT-1A/68 ft	21	09/23/12 09:25	13.90	1.37	1.00 U	1.00 U	14,100
CPT-1A/68 ft	21	10/14/12 09:37	13.70	1.00 U	1.00 U	1.6	13,400
CPT-32/70 ft	21	03/04/12 09:11	1.15	1.00 U	1.00 U	1.44	8,360
CPT-32/70 ft	21	04/22/12 08:39	1.69	1.00 U	1.00 U	2.38	11,700
CPT-32/70 ft	21	05/20/12 08:55	2.96	1.00 U	1.00 U	2.04	9,840
CPT-32/70 ft	21	06/10/12 08:46	3.39	1.00 U	1.00 U	1.67	10,600
CPT-32/70 ft	21	07/15/12 08:32	3.01	1.00 U	1.75	4.22	14,400
CPT-32/70 ft	21	08/26/12 07:42	1.85	1.00 U	1.00 U	1.00 U	11,100
CPT-32/70 ft	21	09/23/12 08:38	1.55	1.00 U	1.00 U	1.00 U	13,900
CPT-32/70 ft	21	09/23/12 08:38	1.63	1.00 U	1.00 U	1.00 U	14,300
CPT-32/70 ft	21	10/14/12 08:48	1.48	1.00 U	1.00 U	1.00 U	13,100
299-W18-152/101 ft	31	11/18/12 09:05	7.63	1.00 U	1.00 U	1.00 U	7,710
299-W18-152/101 ft	31	11/18/12 09:05	7.72	1.00 U	1.00 U	1.00 U	7,810
299-W18-152/101 ft	31	01/20/13 09:15	6.92	1.00 U	1.00 U	1.00 U	6,470
299-W18-152/101 ft	31	02/24/13 09:28	8.02	1.00 U	1.00 U	1.50	7,230
299-W18-152/101 ft	31	03/17/13 09:53	9.21	1.00 U	1.00 U	1.35	6,830
299-W18-152/101 ft	31	12/16/12 09:50	9.31	1.00 U	1.00 U	2.23	7,970
299-W18-167/106 ft	32	11/18/12 08:15	38.6	1.00 U	1.00 U	1.56	7,370
299-W18-167/106 ft	32	12/16/12 08:56	43.8	1.00 U	1.00 U	3.35	7,140

Table E-1. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-1A/Z-18/Z-12 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
299-W18-167/106 ft	32	01/20/13 08:37	59.7	1.00 U	1.00 U	2.33	6,190
299-W18-167/106 ft	32	02/24/13 08:41	73.1	1.00 U	1.00 U	5.18	6,560
299-W18-167/106 ft	32	03/17/13 08:52	58.0	1.00 U	1.00 U	4.24	6,480
CPT-4F/109 ft	33	03/04/12 09:47	5.47	1.00 U	1.00 U	1.20	8,760
CPT-4F/109 ft	33	04/22/12 09:06	4.42	1.00 U	1.00 U	2.01	11,700
CPT-4F/109 ft	33	05/20/12 09:40	2.28	1.00 U	1.00 U	1.32	9,960
CPT-4F/109 ft	33	06/10/12 09:15	1.69	1.00 U	1.00 U	1.00 U	10,500
CPT-4F/109 ft	33	07/15/12 09:12	3.45	1.00 U	1.74	3.89	14,200
CPT-4F/109 ft	33	08/26/12 08:19	1.79	1.00 U	1.00 U	1.00 U	9,780
CPT-4F/109 ft	33	09/23/12 09:13	1.59	1.00 U	1.00 U	1.00 U	14,400
CPT-4F/109 ft	33	10/14/12 09:23	2.70	1.00 U	1.00 U	1.00 U	13,100
299-W18-165/109 ft	33	11/18/12 08:10	21.3	1.32	1.00 U	4.85	7,360
299-W18-165/109 ft	33	12/16/12 08:52	24.1	1.66	1.00 U	7.16	7,370
299-W18-165/109 ft	33	01/20/13 08:32	53.5	1.00 U	1.00 U	6.47	6,170
299-W18-165/109 ft	33	02/24/13 08:37	78.0	1.00 U	1.07	8.73	6,590
299-W18-165/109 ft	33	03/17/13 08:46	44.3	1.86	1.00 U	8.46	6,570
299-W18-249/130 ft	40	11/18/12 09:30	7.10	1.00 U	1.00 U	1.00 U	7,770
299-W18-249/130 ft	40	12/16/12 10:10	10.2	1.00 U	1.00 U	1.71	8,280
299-W18-249/130 ft	40	01/20/13 09:35	5.29	1.00 U	1.00 U	1.00 U	6,240
299-W18-249/130 ft	40	02/24/13 09:48	6.78	1.00 U	1.00 U	2.03	7,360
299-W18-249/130 ft	40	03/17/13 10:16	8.97	1.00 U	1.00 U	1.34	6,170
299-W18-248/131 ft	40	11/18/12 08:04	36.2	1.00 U	1.00 U	1.00 U	7,380
299-W18-248/131 ft	40	12/16/12 08:44	48.0	1.00 U	1.00 U	1.74	7,080
299-W18-248/131 ft	40	01/20/13 08:25	36.4	1.00 U	1.00 U	1.00 U	6,150
299-W18-248/131 ft	40	02/24/13 08:30	35.2	1.00 U	1.00 U	1.54	6,570
299-W18-248/131 ft	40	03/17/13 08:39	58.1	1.00 U	1.00 U	1.26	6,800

Note: To convert meters to feet, multiply by 3.2808.

bgs = below ground surface

CCl_4 = carbon tetrachloride

$CHCl_3$ = chloroform

CH_2Cl_2 = methylene chloride

MEK = methyl ethyl ketone

1

2

Table E-2. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-9 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
CPT-17/10 ft	3	03/04/12 11:09	2.03	1.00 U	1.00 U	2.06	9,070
CPT-17/10 ft	3	04/22/12 10:16	1.28	1.00 U	1.00 U	1.85	11,600
CPT-17/10 ft	3	05/20/12 10:49	4.30	1.00 U	1.00 U	1.72	9,950
CPT-17/10 ft	3	06/10/12 10:27	4.38	1.00 U	1.00 U	1.00 U	10,300
CPT-17/10 ft	3	07/15/12 10:35	4.68	1.00 U	1.42	3.54	14,300
CPT-17/10 ft	3	07/15/12 10:35	4.78	1.00 U	2.00	3.53	14,200
CPT-17/10 ft	3	08/26/12 09:32	4.02	1.00 U	1.00 U	1.00 U	11,300
CPT-17/10 ft	3	09/23/12 10:22	6.54	1.00 U	1.00 U	1.00 U	13,100
CPT-17/10 ft	3	10/14/12 10:44	6.31	1.00 U	1.00 U	1.00 U	13,400
CPT-17/10 ft	3	11/18/12 09:57	5.86	1.00 U	1.00 U	1.00 U	7,660
CPT-17/10 ft	3	12/16/12 10:51	1.24	1.00 U	1.00 U	1.00 U	7,440
CPT-17/10 ft	3	01/20/13 09:58	4.26	1.00 U	1.00 U	1.00 U	6,130
CPT-17/10 ft	3	02/24/13 10:22	4.99	1.00 U	1.00 U	1.18	7,150
CPT-17/10 ft	3	03/17/13 10:52	2.23	1.00 U	1.00 U	1.06	6,130
CPT-16/25 ft	8	03/04/12 11:44	1.74	1.00 U	1.00 U	1.21	9,560
CPT-16/25 ft	8	04/22/12 10:43	1.13	1.00 U	1.00 U	1.04	12,000
CPT-16/25 ft	8	05/20/12 11:23	1.83	1.00 U	1.00 U	1.00 U	10,400
CPT-16/25 ft	8	06/10/12 11:03	1.33	1.00 U	1.00 U	1.00 U	10,700
CPT-16/25 ft	8	07/15/15 11:09	1.75	1.00 U	1.65	3.59	14,100
CPT-16/25 ft	8	08/26/12 10:05	1.19	1.00 U	1.00 U	1.00 U	11,100
CPT-16/25 ft	8	09/23/12 10:52	2.71	1.00 U	1.00 U	1.00 U	13,500
CPT-16/25 ft	8	10/14/12 11:19	2.58	1.00 U	1.00 U	1.03	14,000
CPT-16/25 ft	8	11/18/12 11:04	1.23	1.00 U	1.00 U	1.00 U	7,990
CPT-16/25 ft	8	12/16/12 12:00	1.00 U	1.00 U	1.00 U	1.00 U	8,620
CPT-16/25 ft	8	01/20/13 11:04	1.00 U	1.00 U	1.00 U	1.00 U	6,390
CPT-16/25 ft	8	02/24/13 11:34	1.05	1.00 U	1.00 U	1.06	8,420
CPT-16/25 ft	8	03/17/13 11:54	1.00 U	1.00 U	1.00 U	1.00 U	7,300
CPT-27/33 ft	10	03/04/12 11:39	3.24	1.00 U	1.00 U	2.49	9,740
CPT-27/33 ft	10	04/22/12 10:38	2.57	1.00 U	1.00 U	1.67	11,800
CPT-27/33 ft	10	04/22/12 10:38	1.59	1.00 U	1.00 U	1.56	11,500
CPT-27/33 ft	10	05/20/12 11:19	3.82	1.00 U	1.00 U	1.15	10,300
CPT-27/33 ft	10	06/10/12 10:53	1.66	1.00 U	1.00 U	1.00 U	10,800

Table E-2. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-9 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
CPT-27/33 ft	10	07/15/12 11:05	2.98	1.00 U	2.33	3.88	14,300
CPT-27/33 ft	10	08/26/12 10:00	1.91	1.00 U	1.10	1.00 U	10,900
CPT-27/33 ft	10	09/23/12 00:00	5.48	1.00 U	1.00 U	1.17	13,600
CPT-27/33 ft	10	10/14/12 11:15	4.77	1.00 U	1.00 U	1.42	14,500
CPT-27/33 ft	10	11/18/12 10:48	3.98	1.00 U	1.00 U	1.00 U	8,250
CPT-27/33 ft	10	12/16/12 11:40	2.82	1.00 U	1.00 U	1.02	8,540
CPT-27/33 ft	10	01/20/13 10:41	1.59	1.00 U	1.00 U	1.51	6,390
CPT-27/33 ft	10	02/24/13 11:13	2.89	1.00 U	1.00 U	2.28	7,960
CPT-27/33 ft	10	03/17/13 11:35	1.60	1.00 U	1.00 U	1.13	7,200
CPT-18/35 ft	10	03/04/12 11:18	1.00 U	1.00 U	1.00 U	1.78	9,270
CPT-18/35 ft	10	04/22/12 10:20	1.00 U	1.00 U	1.00 U	1.56	11,600
CPT-18/35 ft	10	05/20/12 10:54	1.27	1.00 U	1.00 U	1.37	10,100
CPT-18/35 ft	10	06/10/12 10:32	1.47	1.00 U	1.00 U	1.03	9,990
CPT-18/35 ft	10	07/15/12 10:43	1.00 U	1.00 U	1.24	3.25	13,500
CPT-18/35 ft	10	08/26/12 09:37	1.27	1.00 U	1.33	1.00 U	11,000
CPT-18/35 ft	10	09/23/12 10:26	2.48	1.00 U	1.00 U	1.40	13,000
CPT-18/35 ft	10	10/14/12 10:49	2.37	1.00 U	1.00 U	1.24	14,400
CPT-18/35 ft	10	11/18/12 10:05	1.22	1.00 U	1.00 U	1.00 U	7,760
CPT-18/35 ft	10	12/16/12 10:59	1.00 U	1.00 U	1.00 U	2.17	7,780
CPT-18/35 ft	10	01/20/13 10:06	1.00 U	1.00 U	1.00 U	1.00 U	6,060
CPT-18/35 ft	10	02/24/13 10:34	1.00 U	1.00 U	1.00 U	1.44	7,700
CPT-18/35 ft	10	02/24/13 10:34	1.00 U	1.00 U	1.00 U	1.23	7,580
CPT-18/35 ft	10	03/17/13 11:02	1.00 U	1.00 U	1.00 U	1.00 U	6,660
CPT-28/40 ft	12	03/04/12 11:09	8.19	1.00 U	1.00 U	1.27	9,230
CPT-28/40 ft	12	04/22/12 10:12	5.58	1.00 U	1.00 U	1.70	11,600
CPT-28/40 ft	12	05/20/12 10:42	2.86	1.00 U	1.00 U	1.00 U	10,000
CPT-28/40 ft	12	06/10/12 10:21	2.29	1.00 U	1.00 U	1.00 U	10,500
CPT-28/40 ft	12	07/15/12 10:27	1.73	1.00 U	1.63	3.23	14,100
CPT-28/40 ft	12	08/26/12 09:24	1.35	1.00 U	1.00 U	1.08	11,000
CPT-28/40 ft	12	09/23/12 10:13	1.06	1.00 U	1.00 U	1.00 U	13,000
CPT-28/40 ft	12	09/23/12 10:13	1.07	1.00 U	1.00 U	1.00 U	13,000
CPT-28/40 ft	12	10/14/12 10:36	1.22	1.00 U	1.00 U	1.00 U	14,000

Table E-2. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-9 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
CPT-9A/50 ft	15	03/14/12 08:32	33.9	1.00 U	1.00 U	3.75	8,050
CPT-9A/50 ft	15	04/22/12 08:06	33.7	1.00 U	1.11	4.44	11,400
CPT-9A/50 ft	15	05/20/12 08:14	32.3	1.00 U	1.00 U	3.61	9,740
CPT-9A/50 ft	15	06/10/12 08:13	31.8	1.00 U	1.00 U	2.51	10,100
CPT-9A/50 ft	15	07/15/12 07:56	32.8	1.00 U	2.01	5.44	15,000
CPT-9A/50 ft	15	08/26/12 06:54	30.9	1.00 U	1.00 U	2.57	9,880
CPT-9A/50 ft	15	09/23/12 08:02	31.0	1.00 U	1.00 U	2.06	13,700
CPT-9A/50 ft	15	10/14/12 08:14	29.3	1.00 U	1.00 U	1.83	12,600
CPT-9A/50 ft	15	11/18/12 07:31	29.9	1.00 U	1.00 U	1.59	6,930
CPT-9A/50 ft	15	12/16/12 08:08	31.9	1.00 U	1.00 U	3.53	6,560
CPT-9A/50 ft	15	01/20/13 08:02	26.8	1.00 U	1.00 U	1.29	5,880
CPT-9A/50 ft	15	02/24/13 08:00	31.8	1.00 U	1.00 U	3.60	6,290
CPT-9A/50 ft	15	03/17/13 08:05	32.0	1.00 U	1.00 U	3.08	6,280
CPT-9A/60 ft	18	03/14/12 08:28	10.7	1.00 U	1.00 U	1.79	7,800
CPT-9A/60 ft	18	04/22/12 08:04	7.81	1.00 U	1.00 U	2.27	9,610
CPT-9A/60 ft	18	05/20/12 08:11	7.11	1.00 U	1.00 U	1.00 U	8,430
CPT-9A/60 ft	18	06/10/12 08:10	2.80	1.00 U	1.00 U	1.00 U	8,680
CPT-9A/60 ft	18	07/15/12 07:54	10.4	1.00 U	1.17	3.78	14,200
CPT-9A/60 ft	18	08/26/12 06:51	8.84	1.00 U	1.00 U	1.00 U	8,890
CPT-9A/60 ft	18	09/23/12 07:59	10.4	1.20	1.00 U	1.00 U	12,900
CPT-9A/60 ft	18	10/14/12 08:11	12.8	1.27	1.00 U	1.00 U	12,400
CPT-9A/60 ft	18	11/18/12 07:28	10.1	1.00 U	1.00 U	1.00 U	6,530
CPT-9A/60 ft	18	12/16/12 08:05	7.05	1.00 U	1.00 U	1.31	6,050
CPT-9A/60 ft	18	01/20/13 08:00	6.32	1.00 U	1.00 U	1.00 U	5,540
CPT-9A/60 ft	18	02/24/13 07:57	4.32	1.00 U	1.00 U	1.00 U	5,780
CPT-9A/60 ft	18	03/17/13 08:01	8.17	1.00 U	1.00 U	1.00 U	5,910
CPT-9A/64 ft	20	03/04/12 08:38	22.9	1.00 U	1.00 U	2.66	7,950
CPT-9A/64 ft	20	04/22/12 08:08	24.3	1.00 U	1.00 U	3.74	11,400
CPT-9A/64 ft	20	05/20/12 08:21	22.2	1.00 U	1.00 U	2.40	9,700
CPT-9A/64 ft	20	06/10/12 08:16	19.3	1.00 U	1.00 U	2.12	10,300
CPT-9A/64 ft	20	07/15/12 07:59	24.2	1.00 U	1.46	4.71	14,500
CPT-9A/64 ft	20	08/26/12 06:58	22.8	1.00 U	1.00 U	1.90	10,000

Table E-2. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-9 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
CPT-9A/64 ft	20	09/23/12 08:06	22.1	1.00 U	1.00 U	1.17	14,000
CPT-9A/64 ft	20	10/14/12 08:17	22.0	1.00 U	1.00 U	1.70	12,800
CPT-9A/64 ft	20	11/18/12 07:36	22.7	1.00 U	1.00 U	1.00 U	7,100
CPT-9A/64 ft	20	12/16/12 08:11	21.1	1.00 U	1.00 U	2.54	6,720
CPT-9A/64 ft	20	01/20/13 08:05	21.2	1.00 U	1.00 U	1.05	6,020
CPT-9A/64 ft	20	02/24/13 08:04	22.4	1.00 U	1.00 U	2.58	6,390
CPT-9A/64 ft	20	03/17/13 08:08	23.4	1.00 U	1.00 U	2.43	6,290
C4938/64.0 ft	20	11/18/12 10:32	1.00 U	1.00 U	1.00 U	1.00 U	7,940
C4938/64.0 ft	20	11/18/12 10:32	1.00 U	1.00 U	1.00 U	1.00 U	8,200
C4938/64.0 ft	20	12/16/12 11:28	29.5	1.19	1.26	6.87	8,340
C4938/64.0 ft	20	01/20/13 10:22	1.00 U	1.00 U	1.00 U	1.00 U	6,370
C4938/64.0 ft	20	02/24/13 11:02	1.00 U	1.00 U	1.00 U	1.39	7,800
C4938/64.0 ft	20	03/17/13 11:14	1.00 U	1.00 U	1.00 U	1.04	6.630
C4937/64.1 ft	20	11/18/12 10:26	1.00 U	1.00 U	1.00 U	1.00 U	7,970
C4937/64.1 ft	20	12/16/12 11:23	22.9	1.00 U	1.28	12.4	8,500
C4937/64.1 ft	20	01/20/13 10:26	1.00 U	1.00 U	1.00 U	1.00 U	6,420
C4937/64.1 ft	20	02/24/13 10:57	1.00 U	1.00 U	1.00 U	1.21	7,880
C4937/64.1 ft	20	03/17/13 11:19	1.00 U	1.00 U	1.00 U	1.00 U	6,810
C5340/64.5 ft	20	11/18/12 10:20	1.00 U	1.00 U	1.00 U	1.00 U	7,980
C5340/64.5 ft	20	12/16/12 11:17	3.19	1.00 U	1.00 U	8.00	8,440
C5340/64.5 ft	20	01/20/13 10:30	1.00 U	1.00 U	1.00 U	1.00 U	6,410
C5340/64.5 ft	20	02/24/13 10:53	1.00 U	1.00 U	1.00 U	1.16	8,000
C5340/64.5 ft	20	03/17/13 11:24	1.00 U	1.00 U	1.00 U	1.00 U	6,890
CPT-16/65 ft	20	03/04/12 11:47	4.33	1.00 U	1.00 U	1.88	9,560
CPT-16/65 ft	20	04/22/12 10:46	2.99	1.00 U	1.00 U	2.00	12,000
CPT-16/65 ft	20	05/20/12 11:25	4.76	1.00 U	1.00 U	1.24	10,100
CPT-16/65 ft	20	06/10/12 11:05	3.38	1.00 U	1.00 U	1.32	10,300
CPT-16/65 ft	20	07/15/12 11:12	3.96	1.00 U	1.92	3.43	14,100
CPT-16/65 ft	20	08/26/12 10:07	3.99	1.00 U	1.06	1.00 U	11,300
CPT-16/65 ft	20	09/23/12 10:54	4.43	1.00 U	1.00 U	1.33	13,300
CPT-16/65 ft	20	10/14/12 11:22	1.69	1.00 U	1.00 U	1.24	14,400
CPT-21A/65 ft	20	03/04/12 11:30	46.6	1.00 U	1.00 U	2.48	9,470

Table E-2. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-9 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
CPT-21A/65 ft	20	03/04/12 11:30	47.4	1.00 U	1.00 U	2.30	9,400
CPT-21A/65 ft	20	04/22/12 10:32	46.1	1.00 U	1.00 U	3.10	11,700
CPT-21A/65 ft	20	05/20/12 11:11	43.7	1.00 U	1.17	3.14	10,300
CPT-21A/65 ft	20	06/10/12 10:46	41.0	1.00 U	1.00 U	2.53	10,600
CPT-21A/65 ft	20	07/15/12 10:57	42.9	1.00 U	2.21	4.68	14,200
CPT-21A/65 ft	20	08/26/12 09:52	41.7	1.00 U	1.11	1.00 U	11,400
CPT-21A/65 ft	20	09/23/12 10:41	38.9	1.00 U	1.00 U	2.27	13,500
CPT-21A/65 ft	20	10/14/12 11:07	38.5	1.00 U	1.00 U	2.18	14,900
CPT-21A/65 ft	20	11/18/12 10:39	41.6	1.00 U	1.00 U	1.00 U	8,240
CPT-21A/65 ft	20	12/16/12 11:33	48.9	1.00 U	1.00 U	2.30	8,220
CPT-21A/65 ft	20	01/20/13 10:34	40.9	1.00 U	1.00 U	1.04	6,260
CPT-21A/65 ft	20	02/24/13 11:06	47.3	1.00 U	1.00 U	1.96	8,050
CPT-21A/65 ft	20	03/17/13 11:28	48.6	1.00 U	1.00 U	1.27	7,240
CPT-18/75 ft	23	03/04/12 11:21	1.11	1.00 U	1.00 U	2.10	9,660
CPT-18/75 ft	23	04/22/12 10:22	1.00 U	1.00 U	1.00 U	1.52	11,900
CPT-18/75 ft	23	05/20/12 10:57	1.11	1.00 U	1.00 U	1.39	10,400
CPT-18/75 ft	23	06/10/12 10:34	1.73	1.00 U	1.00 U	1.40	9,760
CPT-18/75 ft	23	06/10/12 10:34	1.00 U	1.00 U	1.00 U	1.34	10,200
CPT-18/75 ft	23	07/15/12 10:46	1.11	1.00 U	1.54	3.54	14,100
CPT-18/75 ft	23	08/26/12 09:40	1.26	1.00 U	1.00 U	1.00 U	10,800
CPT-18/75 ft	23	09/23/12 10:28	2.07	1.00 U	1.00 U	1.00 U	13,100
CPT-18/75 ft	23	10/14/12 10:52	1.49	1.00 U	1.00 U	1.07	14,100
299-W15-82/83 ft	25	11/18/12 10:51	2.32	1.00 U	1.00 U	1.00 U	8,500
299-W15-82/83 ft	25	12/16/12 11:44	1.87	1.00 U	1.00 U	2.10	8,960
299-W15-82/83 ft	25	01/20/13 10:45	1.00 U	1.00 U	1.00 U	1.00 U	6,380
299-W15-82/83 ft	25	02/24/13 11:18	1.00 U	1.00 U	1.00 U	1.28	8,270
299-W15-82/83 ft	25	03/17/13 11:39	1.87	1.00 U	1.00 U	1.05	7,400
CPT-21A/86 ft	26	03/04/12 11:35	77.5	1.00 U	1.00 U	3.15	9,780
CPT-21A/86 ft	26	04/22/12 10:34	73.5	1.00 U	1.00 U	3.74	13,300
CPT-21A/86 ft	26	05/20/12 11:13	72.9	1.00 U	1.03	2.56	11,500
CPT-21A/86 ft	26	06/10/12 10:48	71.5	1.00 U	1.00 U	2.23	11,500
CPT-21A/86 ft	26	07/15/12 11:00	73.1	1.00 U	1.91	5.47	14,400

Table E-2. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-9 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
CPT-21A/86 ft	26	08/26/12 09:55	68.6	1.00 U	1.01	1.00 U	11,200
CPT-21A/86 ft	26	09/23/12 10:44	65.5	1.00 U	1.00 U	2.20	13,300
CPT-21A/86 ft	26	10/14/12 11:10	67.7	1.00 U	1.00 U	2.57	14,200
CPT-21A/86 ft	26	11/18/12 10:43	67.3	1.00 U	1.00 U	1.00 U	8,360
CPT-21A/86 ft	26	12/16/12 11:35	75.6	1.00 U	1.06	2.44	8,320
CPT-21A/86 ft	26	01/20/13 10:37	70.9	1.00 U	1.00 U	1.35	6,300
CPT-21A/86 ft	26	02/24/13 11:09	77.1	1.00 U	1.00 U	2.19	7,860
CPT-21A/86 ft	26	03/17/13 11:31	77.2	1.00 U	1.00 U	1.80	7,300
CPT-28/87 ft	27	03/04/12 11:02	174	1.00 U	1.11	3.34	10,100
CPT-28/87 ft	27	04/22/12 10:10	177	1.00 U	1.26	3.81	12,000
CPT-28/87 ft	27	05/20/12 10:44	170	1.00 U	1.31	3.32	10,700
CPT-28/87 ft	27	06/10/12 10:23	172	1.00 U	1.05	2.61	10,900
CPT-28/87 ft	27	07/15/12 10:30	215	1.00 U	2.23	5.42	14,300
CPT-28/87 ft	27	08/26/12 09:26	166	1.00 U	1.14	1.00 U	10,900
CPT-28/87 ft	27	08/26/12 09:26	177	1.00 U	1.23	1.00 U	10,100
CPT-28/87 ft	27	09/23/12 10:18	149	1.00 U	1.00 U	2.62	13,300
CPT-28/87 ft	27	10/14/12 10:39	160	1.00 U	1.15	3.12	13,800
CPT-28/87 ft	27	11/18/12 09:53	140	1.00 U	1.00 U	1.24	7,940
CPT-28/87 ft	27	12/16/12 10:43	164	1.00 U	1.00 U	2.64	7,690
CPT-28/87 ft	27	01/20/13 09:55	148	1.00 U	1.00 U	1.39	6,150
CPT-28/87 ft	27	02/24/13 10:17	176	1.00 U	1.06	2.87	7,660
CPT-28/87 ft	27	03/17/13 10:46	147	1.00 U	1.00 U	1.74	6,430
CPT-1A/91 ft	28	03/04/12 10:20	4.08	1.00 U	1.00 U	1.57	8,460
CPT-1A/91 ft	28	04/22/12 09:20	1.00 U	1.00 U	1.00 U	1.70	10,100
CPT-1A/91 ft	28	05/20/12 10:00	2.64	1.00 U	1.00 U	1.24	9,150
CPT-1A/91 ft	28	06/10/12 09:37	1.00 U	1.00 U	1.00 U	1.00 U	8,930
CPT-1A/91 ft	28	07/15/12 09:33	2.66	1.00 U	2.14	3.85	14,200
CPT-1A/91 ft	28	08/26/12 08:36	1.00 U	1.00 U	1.00 U	1.00 U	8,590
CPT-1A/91 ft	28	09/23/12 09:28	1.00 U	1.00 U	1.00 U	1.00 U	14,000
CPT-1A/91 ft	28	10/14/12 09:41	8.88	1.29	1.00 U	1.31	13,600
299-W15-8U/103 ft	31	11/18/12 10:10	3.45	1.00 U	1.00 U	1.04	7,750
299-W15-8U/103 ft	31	12/16/12 11:05	12.2	1.00 U	1.00 U	4.97	8,120

Table E-2. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-9 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
299-W15-8U/103 ft	31	01/20/13 10:11	5.15	1.00 U	1.00 U	7.30	6,240
299-W15-8U/103 ft	31	01/20/13 10:11	5.23	1.00 U	1.00 U	7.71	6,240
299-W15-8U/103 ft	31	02/24/13 10:42	9.12	1.00 U	1.00 U	5.91	7,700
299-W15-8U/103 ft	31	03/17/13 11:07	7.88	1.00 U	1.00 U	4.77	6,340
299-W15-217/ 114 ft	35	11/18/12 10:01	1.07	1.00 U	1.00 U	1.00 U	7,830
299-W15-217/ 114 ft	35	12/16/12 10:55	4.30	1.00 U	1.00 U	1.62	7,770
299-W15-217/ 114 ft	35	01/20/13 10:03	1.00 U	1.00 U	1.00 U	1.00 U	6,030
299-W15-217/ 114 ft	35	02/24/13 10:30	1.00 U	1.00 U	1.00 U	1.00 U	7,550
299-W15-217/ 114 ft	35	03/17/13 10:56	1.00 U	1.00 U	1.00 U	1.00 U	6,350
299-W15-217/ 114 ft	35	03/17/13 10:56	1.00 U	1.00 U	1.00 U	1.00 U	6,580
CPT-24/118 ft	36	03/04/12 1124	12.6	1.00 U	1.05	4.80	9,290
CPT-24/118 ft	36	04/22/12 10:26	12.5	1.00 U	1.26	5.29	11,500
CPT-24/118 ft	36	05/20/12 11:02	12.5	1.00 U	1.38	5.22	10,300
CPT-24/118 ft	36	05/20/12 11:02	12.3	1.00 U	1.22	5.02	10,000
CPT-24/118 ft	36	06/10/12 10:41	11.9	1.00 U	1.23	4.68	10,200
CPT-24/118 ft	36	07/15/12 10:51	11.6	1.00 U	2.55	7.01	14,100
CPT-24/118 ft	36	08/26/12 09:45	11.3	1.00 U	1.37	1.00 U	11,100
CPT-24/118 ft	36	09/23/12 10:33	10.7	1.00 U	1.09	4.34	13,400
CPT-24/118 ft	36	10/14/12 10:57	11.0	1.00 U	1.12	4.72	14,500
299-W15-95L/ 144 ft	44	11/18/12 11:00	6.35	1.00 U	1.00 U	2.87	8,170
299-W15-95L/ 144 ft	44	12/16/12 11:55	9.29	1.00 U	1.00 U	5.26	9,000
299-W15-95L/ 144 ft	44	01/20/13 11:01	9.36	1.00 U	1.00 U	4.56	6,440
299-W15-95L/ 144 ft	44	02/24/13 11:30	8.97	1.00 U	1.00 U	4.21	8,250
299-W15-95L/ 144 ft	44	03/17/13 11:50	9.67	1.00 U	1.00 U	4.64	7,060
299-W15-9L/176 ft	54	11/18/12 10:56	4.28	1.00 U	1.00 U	1.26	8,160

Table E-2. Monitoring Data for Nonoperational Wells and Probes at the 216-Z-9 Site for 2012

Sample Location	Depth (m bgs)	Sample Date/Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
299-W15-9L/176 ft	54	12/16/12 11:50	4.50	1.00 U	1.00 U	2.61	8,810
299-W15-9L/176 ft	54	01/20/13 10:57	1.73	1.00 U	1.00 U	1.00 U	6,480
299-W15-9L/176 ft	54	02/24/13 11:24	3.18	1.00 U	1.00 U	2.35	8,140
299-W15-9L/176 ft	54	03/17/13 11:44	1.27	1.00 U	1.00 U	1.00 U	7,280
299-W15-8L/180 ft	55	11/18/12 10:14	4.36	1.00 U	1.00 U	5.60	7,930
299-W15-8L/180 ft	55	12/16/12 11:09	5.36	1.00 U	1.50	19.1	8,480
299-W15-8L/180 ft	55	12/16/12 11:09	5.54	1.00 U	2.05	17.9	8,440
299-W15-8L/180 ft	55	01/20/13 10:17	1.98	1.00 U	1.53	4.00	6,300
299-W15-8L/180 ft	55	02/24/13 10:47	3.14	1.00 U	1.33	19.3	7,870
299-W15-8L/180 ft	55	03/17/13 11:11	4.52	1.00 U	2.06	41.2	6,570

Note: To convert meters to feet, multiply by 3.2808.

bgs = below ground surface

CCl_4 = carbon tetrachloride

$CHCl_3$ = chloroform

CH_2Cl_2 = methylene chloride

MEK = methyl ethyl ketone

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
25.0	21.7	03/04/12	12:22	1715232
25.0	21.4	03/04/12	14:10	1715232
200.0	177.0	03/04/12	14:16	1715232
25.0	20.8	04/22/12	11:22	1715232
25.0	20.5	04/22/12	13:10	1715232
200.0	203.0	04/22/12	13:15	1715232
25.0	21.2	05/20/12	12:28	1715232
25.0	21.4	05/20/12	14:16	1715232
200.0	207	05/20/12	14:21	1715232
25.0	20.3	06/10/12	11:46	1715232
25.0	20.8	06/10/12	13:36	1715232
200.0	197.0	06/10/12	13:40	1715232
25.0	20.6	07/15/12	12:00	1715232
25.0	20.8	07/15/12	13:48	1715232
200.0	233.0	07/15/12	14:04	1715232
25.0	20.0	08/26/12	10:36	1715232
25.0	20.6	08/26/12	12:26	1715232
200.0	202.0	08/26/12	12:32	1715232
25.0	20.1	09/23/12	11:23	1715232
25.0	20.7	09/23/12	13:11	1715232
200.0	205.0	09/23/12	13:18	1715232
25.0	20.0	10/14/12	11:46	1715232
25.0	20.6	10/14/12	13:34	1715232
200.0	204.0	10/14/12	13:41	1715232
25.0	19.7	11/18/12	11:40	1715232
25.0	20.2	11/18/12	13:38	1715232
200.0	195.0	11/18/12	13:52	1715232
25.0	20.6	12/16/12	12:20	1715232
25.0	20.5	12/16/12	14:16	1715232
200.0	202	12/16/12	14:19	1715232
25.0	19.9	01/20/13	11:50	1715232
25.0	20.6	01/20/13	13:44	1715232
200.0	200	01/20/13	13:58	1715232
25.0	20.8	02/24/13	11:55	1715232
25.0	20.8	02/24/13	13:53	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
200.0	211	02/24/13	14:02	1715232
25.0	20.9	03/17/13	12:17	1715232
25.0	20.9	03/17/13	14:13	1715232
200.0	211	03/17/13	14:18	1715232

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Table E-4. Blank Analyses

Sample Location	Sample Date	Sample Analysis Time	CCl_4 (ppmv)	$CHCl_3$ (ppmv)	MEK (ppmv)	CH_2Cl_2 (ppmv)	Water (ppmv)
Blank	03/04/12	12:24	1.00 U	1.00 U	1.00 U	1.00 U	8,140
Blank	03/04/12	14:12	1.00 U	1.00 U	1.00 U	1.00 U	9,260
Blank	04/22/12	11:20	1.00 U	1.00 U	1.00 U	1.00 U	3,500
Blank	04/22/12	13:12	1.00 U	1.00 U	1.00 U	1.00 U	10,200
Blank	05/20/12	12:26	1.00 U	1.00 U	1.00 U	1.00 U	2,760
Blank	05/20/12	14:18	1.00 U	1.00 U	1.00 U	1.00 U	7,630
Blank	06/10/12	11:44	1.00 U	1.00 U	1.00 U	1.00 U	3,030
Blank	06/10/12	13:38	1.00 U	1.00 U	1.00 U	1.00 U	8,080
Blank	07/15/12	11:58	1.00 U	1.00 U	1.00 U	1.00 U	8,830
Blank	07/15/12	13:50	1.00 U	1.00 U	1.00 U	1.00 U	13,100
Blank	08/26/12	10:34	1.00 U	1.00 U	1.00 U	1.00 U	3,270
Blank	08/26/12	12:24	1.00 U	1.00 U	1.00 U	1.00 U	7,960
Blank	09/23/12	11:21	1.00 U	1.00 U	1.00 U	1.00 U	8,580
Blank	09/23/12	13:13	1.00 U	1.00 U	1.00 U	1.00 U	10,400
Blank	10/14/12	11:44	1.00 U	1.00 U	1.00 U	1.00 U	7,270
Blank	10/14/12	13:36	1.00 U	1.00 U	1.00 U	1.00 U	11,700
Blank	11/18/12	11:38	1.00 U	1.00 U	1.00 U	1.00 U	2,940
Blank	11/18/12	13:36	1.00 U	1.00 U	1.00 U	1.00 U	6,510
Blank	12/16/12	12:18	1.00 U	1.00 U	1.00 U	1.00 U	4,090
Blank	12/16/12	14:18	1.00 U	1.00 U	1.00 U	1.00 U	7,540
Blank	01/20/13	11:48	1.00 U	1.00 U	1.00 U	1.00 U	2,710
Blank	01/20/13	13:46	1.00 U	1.00 U	1.00 U	1.00 U	6,310
Blank	02/24/13	11:53	1.00 U	1.00 U	1.00 U	1.00 U	2,850
Blank	02/24/13	13:51	1.00 U	1.00 U	1.00 U	1.00 U	4,420
Blank	03/17/13	12:15	1.00 U	1.00 U	1.00 U	1.00 U	2,440
Blank	03/17/13	14:15	1.00 U	1.00 U	1.00 U	1.00 U	4.390

CCl_4 = carbon tetrachloride
$CHCl_3$ = chloroform
CH_2Cl_2 = methylene chloride
MEK = methyl ethyl ketone
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)
Field Blank	03/04/12	11:50	14:08	1.00 U	1.00 U	1.00 U	1.55	8,560
Field Blank	04/22/12	10:47	13:08	1.00 U	1.00 U	1.00 U	1.61	10,600
Field Blank	05/20/12	11:27	14:14	1.00 U	1.00 U	1.00 U	1.13	8,740
Field Blank	06/10/12	11:08	13:34	1.00 U	1.00 U	1.00 U	1.28	8,470
Field Blank	07/15/12	11:15	13:46	1.00 U	1.00 U	1.40	3.47	13,300
Field Blank	08/26/12	10:09	12:22	1.00 U	1.00 U	1.08	1.65	8,690
Field Blank	09/23/12	10:56	13:09	1.18	1.00 U	1.00 U	1.60	12,300
Field Blank	10/14/12	11:24	13:32	1.00 U	1.00 U	1.00 U	1.57	12,200
Field Blank	11/18/12	11:07	13:34	1.00 U	1.00 U	1.00 U	1.00 U	7,040
Field Blank	12/16/12	12:03	14:14	1.00 U	1.00 U	1.00 U	1.00 U	8,000
Field Blank	01/20/13	11:06	13:42	1.00 U	1.00 U	1.00 U	1.00 U	5,920
Field Blank	02/24/13	11:37	13:49	1.00 U	1.00 U	1.00 U	1.10	6,750
Field Blank	03/17/13	11:56	14:11	1.00 U	1.00 U	1.00 U	1.00 U	4,690

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CCl_4 = carbon tetrachloride

$CHCl_3$ = chloroform

CH_2Cl_2 = methylene chloride

MEK = ethyl ketone

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

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Distribution

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