780108-1004270003

LMS/MND/S06200

Mound Site

Phase I Groundwater Monitoring Report Calendar Year 2009

March 2010

U.S. DEPARTMENT OF ENERGY | Legacy Management

LMS/MND/S06200

Office of Legacy Management

Mound Site

Phase I Groundwater Monitoring Report
Calendar Year 2009

March 2010

This page intentionally left blank

Contents

Abbreviations iii
1.0 Introduction 1–1
1.1 Purpose 1–1
1.2 Summary of 2008 Annual Report 1–1
2.0 Monitoring Program 2–1
2.1 Monitored Natural Attenuation of TCE 2–1
2.2 Confirmatory Sampling for Radium, Barium, Chromium, and Nickel 2–3
2.3 Triggers 2–3
2.4 Groundwater Flow 2–4
2.5 Deviations from the Sampling Plan 2–4
3.0 Phase I MNA Remedy 3–1
3.1 Monitoring Results 3–1
3.2 Trend Analysis 3–3
3.3 Recommendations 3–5
4.0 Phase I Confirmatory Sampling 4–1
4.1 Barium and Radium 4–1
4.1.1 Monitoring Results 4–1
4.1.2 Trend Analysis 4–6
4.1.3 Recommendations 4–7
4.2 Chromium and Nickel 4–7
4.2.1 Monitoring Results 4–8
4.2.2 Trend Analysis 4–8
4.2.3 Recommendations 4–9
5.0 Inspection of the Monitoring System 5–1
6.0 Data Validation 6–1
7.0 Summary 7–1
7.1 MNA Remedy 7–1
7.2 Radium and Barium 7–1
7.3 Chromium and Nickel 7–2
8.0 References 8–1

Figures

Figure 2–1. Phase I MNA Remedy Monitoring Locations 2–2
Figure 2–2. Regional Groundwater Flow at the Mound Site 2–5
Figure 3–1. TCE Concentrations over Time—1999 through 2009 3–2
Figure 3–2. cis-1,2-DCE Concentrations—1999 through 2009 3–3
Figure 3–3. Distribution of TCE and DCE in Phase I Groundwater 3–4
Figure 4–1. Barium Concentrations—2000 through 2009 4–2
Figure 4–2. Ra-226/228 Levels—2002 through 2009 4–3
Figure 4–3. Distribution of Radium and Barium in Phase I Groundwater 4–4
Figure 4–4. Sodium Concentrations—2000 through 2009 4–5
Figure 4–5. Chloride Concentrations—2000 through 2009 4–6
Figure 4–6. Chromium and Nickel Concentrations in Well 0443—2000 through 2009 4–9
Figure 4–7. Distribution of Chromium and Nickel in Phase I Groundwater 4–10

Tables

Table 2–1. Remedy (MNA) Monitoring for Phase I 2–3
Table 2–2. Confirmatory Monitoring for Phase I 2–3
Table 2–3. Trigger Levels for Phase I MNA Remedy 2–4
Table 3–1. Summary of VOC Monitoring Results in Phase I for 2009 3–1
Table 3–2. Summary of Trend Analysis Results for TCE in Phase I for 2009 3–5
Table 4–1. Summary of 2009 Confirmatory Monitoring Results for Barium and Radium 4–1
Table 4–2. Summary of 2009 Confirmatory Monitoring Results for Sodium and Chloride 4–3
Table 4–3. Summary of Trend Analysis Results for Barium, Sodium, and Chloride in Phase I for 2009 4–7
Table 4–4. Summary of Confirmatory Monitoring Results for Chromium and Nickel for 2009 4–8

Appendix

Appendix A 2009 Phase I MNA and Confirmatory Sampling Data

1.0 Introduction

Phase I is an approximately 52-acre area made up of three distinct sections of the site property and lies on the southern border of the Mound plant. This area contains monitoring wells that are screened in both the Buried Valley Aquifer (BVA) and the upgradient bedrock aquifer system. Monitored Natural Attenuation (MNA) is being used as the remedy for a small, discrete section of the bedrock groundwater system contaminated with trichloroethylene (TCE) to ensure that concentrations of TCE within the bedrock groundwater are decreasing to levels below the Safe Drinking Water Act maximum contaminant level (MCL) and do not impact the downgradient BVA.

Several wells in this area also have levels of barium, radium, chromium, and nickel that exceed MCLs established by the Safe Drinking Water Act. The elevated levels of barium and radium were evaluated and determined to be naturally occurring within the local bedrock matrix serving as the mineral source. The elevated chromium and nickel levels were determined to be the result of corrosion of the stainless-steel well casings. The U.S. Department of Energy (DOE) has committed to monitor selected wells to confirm the results of previous investigations in which these conclusions were reached.

1.1 Purpose

This Groundwater Monitoring Report was prepared in support of the selected remedy for Phase I as outlined in the Record of Decision (DOE 2003a) and summarizes the data collected in 2009. This report represents the fourth submittal of an annual report documenting the progress of the MNA remedy for Phase I. All sampling and data analyses were performed in accordance with the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan* (DOE 2004), unless noted otherwise.

The report includes data collected during the four quarterly groundwater sampling events performed in 2009. In addition to data collected in support of MNA, additional data are presented in support of the confirmatory monitoring for radium, barium, nickel, and chromium in selected wells located within Phase I. Data are presented in both time-series plots and map-view plots. Trend analysis was performed on selected wells using the non-parametric Mann-Kendall test. This type of long-term trend analysis can be used to confirm trends in contaminant concentrations over time. The time-series plots will also be used to evaluate changes in data over time and to interpret the effectiveness of the MNA remedy.

The report also documents operational changes that occurred during the reporting period and identifies maintenance or repair activities associated with the monitoring wells being sampled.

1.2 Summary of 2008 Annual Report

The conclusions and recommendations from the 2008 Annual report (DOE 2009a) were as follows:

- Volatile organic compound (VOC) data collected in support of the MNA remedy demonstrated that the BVA was not impacted by the localized TCE contamination in the bedrock groundwater system. TCE concentrations in source wells 0441 and 0443 and

seep 0617 continued to exceed the MCL of 5 micrograms per liter (µg/L). TCE concentrations in well 0411 have decreased since monitoring began in 1999, and concentrations have leveled off over the past few years. A slight upward trend in TCE was indicated in well 0443, which is downgradient from well 0411. Statistical analysis did not indicate a trend in VOC data from seep 0617 during 2008.

- Combined Ra-226/228 and barium levels remained within background levels in the downgradient BVA wells during 2008. Radium and barium levels are slightly higher in well P033 than in the other two BVA wells. Confirmatory sampling showed that combined Ra-226/228 and barium in well 0445 continue to be variable and at times exceed MCLs. Concentrations of barium in well 0445 trended downward since removal of the salt storage building in 2003. Changes in sodium and chloride concentrations corresponded with similar changes in barium and combined Ra-226/228 in wells 0445 and P033.
- Confirmatory monitoring for nickel and chromium was modified in 2008 to address the elevated chromium and nickel results reported at the end of 2007 in well 0443. Well 0411, which is the stainless-steel well with historically elevated metals results and seep 0617 were added to the monitoring program. Chromium and nickel concentrations continue to be elevated in well 0411. Results from well 0443 and seep 0617 indicated levels of chromium and nickel that are similar to background. Sampling will continue in 2009 because of the lack of data collected in 2008.

2.0 Monitoring Program

Groundwater in Phase I is monitored for TCE and its degradation products to verify that the concentration of TCE is decreasing by natural attenuation to concentrations less than the MCL. This groundwater monitoring program was established to ensure that the BVA is not negatively affected by TCE-contaminated groundwater within the Phase I bedrock aquifer system. The objective of this monitoring is to protect the BVA by verifying that the concentration of TCE in the vicinity of well 0411, well 0443, and seep 0617 is decreasing and that TCE is not adversely affecting the BVA. This program may be decreased or terminated when TCE concentrations in well 0411, well 0443, and seep 0617 meet conditions outlined in the monitoring plan, such as reaching the MCL for four consecutive sampling events.

Although not part of the selected remedy, monitoring is performed to evaluate barium, radium, chromium, and nickel impact in the Phase I groundwater. On the basis of investigations, none of these parameters were considered to be contaminants of concern in Phase I.

Monitoring for barium and radium is performed to provide assurance that the understanding of the barium and radium in groundwater is correct. If monitoring indicates that the concentrations are not decreasing below the MCL within a reasonable timeframe, the need for an active remediation for these contaminants or additional characterization will be considered. Investigations in this area confirmed that an upgradient salt source located on the surface had been infiltrating into the bedrock formation and mobilizing naturally occurring barium and radium in a low-flow area of the bedrock aquifer. Use of the salt storage shed was discontinued in 2003.

Nickel and chromium concentrations in bedrock well 0411 are the result of corrosion of the stainless-steel well casing and not the result of plant operations (DOE 2002). Monitoring is performed near well 0411 to obtain a more comprehensive set of data to support this conclusion and to evaluate recent increases in metals in this area. When nickel and chromium concentrations remain below the MCL for two years, monitoring for nickel and chromium can be discontinued.

In the 2007 Groundwater Monitoring Report, modifications to the monitoring program were recommended on the basis of the data collected in 2007. These modifications included reducing sampling frequencies and removing sampling locations for the MNA and confirmatory sampling programs. Minor changes to the program recommended in the 2007 Groundwater Monitoring Report (DOE 2008) were made based on comments from the regulators. The programs discussed below reflect those adjustments.

2.1 Monitored Natural Attenuation of TCE

Under the Phase I MNA monitoring program, samples are collected semiannually from selected wells and a seep (Figure 2–1) and analyzed as outlined in Section 4.3 of the Phase I Groundwater Monitoring Plan (DOE 2004) and in Table 2–1. Sampling was performed in first and third quarters of 2009.

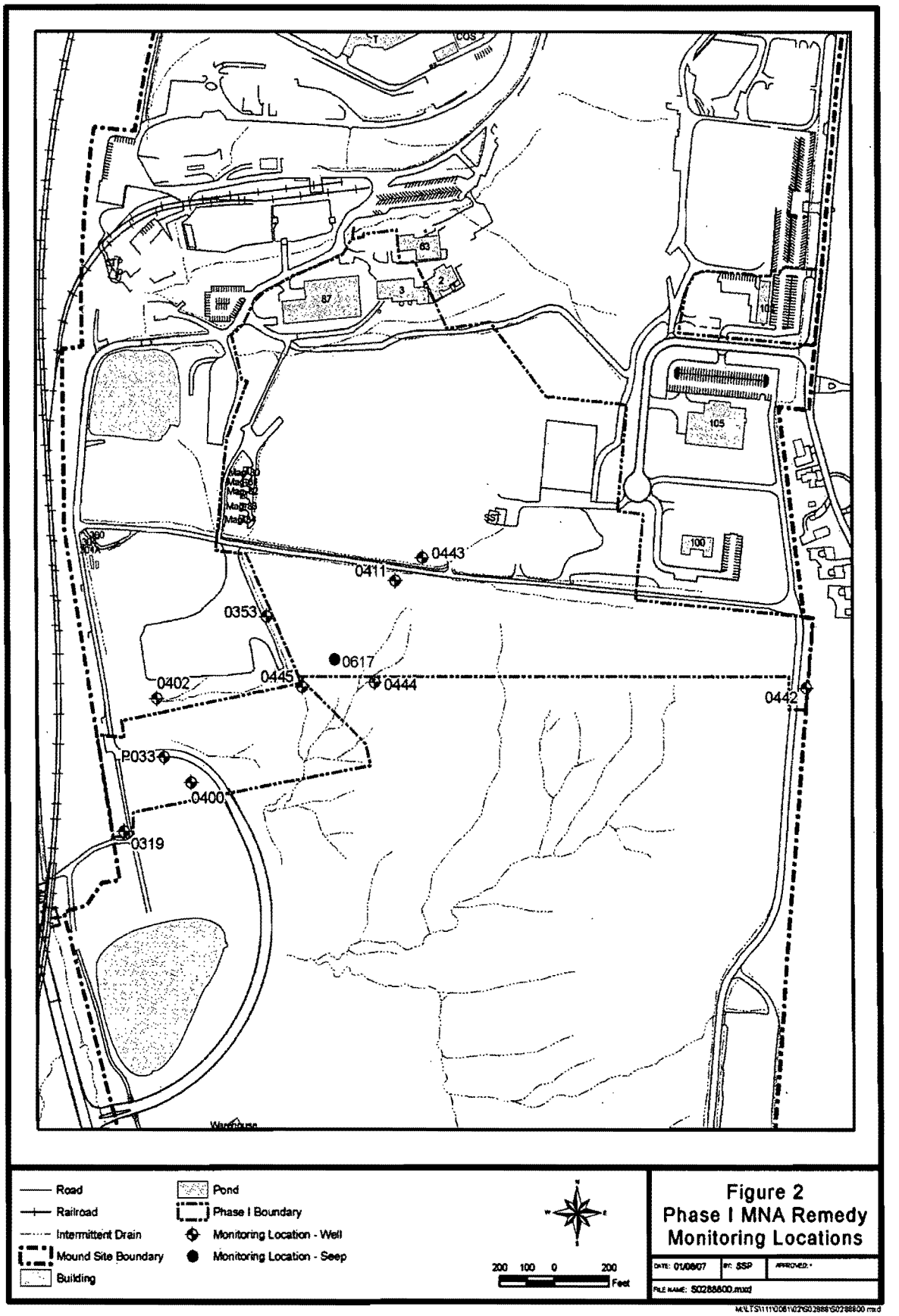

Figure 2–1. Phase I MNA Remedy Monitoring Locations

Table 2–1. Remedy (MNA) Monitoring for Phase I

Monitoring Location	Area	Parameters
Well 0411	Well 0411 area	Trichloroethylene (TCE) Dichloroethylene (DCE) Vinyl chloride (VC)
Well 0443		
Well 0353	Downgradient bedrock monitoring	
Well 0444		
Well 0445		
Seep 0617		
Well 0400	Downgradient BVA monitoring	
Well 0402		
Well P033		

All locations are sampled semiannually

2.2 Confirmatory Sampling for Radium, Barium, Chromium, and Nickel

The confirmatory sampling program was modified in 2007. Confirmatory samples to evaluate the presence of elevated the barium and combined radium 226/228 (Ra-226/228) are collected semiannually for selected wells as outlined in Table 2–2. Sodium and chloride are also analyzed in these wells, as salt is considered the mechanism that has mobilized naturally occurring radium and barium in the bedrock groundwater. Confirmatory samples to evaluate the presence of elevated chromium and nickel in select stainless-steel wells are collected quarterly. This program has been limited to one well that was sampled under the original confirmatory monitoring program and an additional well and seep.

Table 2–2. Confirmatory Monitoring for Phase I

Barium, Ra-226/228, Chloride, and Sodium[a]	Chromium and Nickel[b]
Well 0400 Well 0402 Well 0445 Well P033	Well 0411 Well 0443 Seep 0617

[a]Semiannual sampling frequency
[b]Quarterly sampling frequency

2.3 Triggers

The contaminant data are evaluated against previous data collected at each location to determine if MNA is adequately addressing groundwater impact and to monitor the geochemical conditions in the aquifer. Trigger levels and response actions have been established for each contaminant as presented in the *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan* (DOE 2004). The triggers are summarized in Table 2–3.

Table 2–3. Trigger Levels for Phase I MNA Remedy

Location	TCE (µg/L)	DCE (µg/L)	VC (µg/L)	Ra-226/228 (pCi/L)	Barium (mg/L)	Chromium (µg/L)	Nickel (µg/L)
0353	5	70	2				
0400	5	70	2	5	1	100	100
0402	5	70	2	5	1		
0411	30	70	2				
0443	30	70	2			100	100
0444	5	70	2				
0445	5	70	2	75	15		
P033	5	70	2	5	1		
0617 (seep)	16	70	2				

µg/L = micrograms per liter
pCi/L = picocuries per liter
mg/L = milligrams per liter

The U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency must be notified if trigger levels are exceeded. After notification, the Core Team (U.S. Environmental Protection Agency, Ohio Environmental Protection Agency, and DOE) will determine an appropriate course of action.

2.4 Groundwater Flow

Static water level measurements are collected prior to sampling at each well location. Since these measurements are made within a short timeframe, the data were used to depict the general groundwater flow in the area (Figure 2–2). Two groundwater regimes are present at the site: groundwater in the bedrock and groundwater in the BVA. Groundwater flow in the bedrock typically mimics the topography, with groundwater discharging to the BVA or at seeps from the upper bedrock. Groundwater flow in the BVA flows south, following the downstream course of the Great Miami River.

2.5 Deviations from the Sampling Plan

All required locations were sampled in 2009. The only deviation from the sampling plan is that the low-flow sampling method is being used on those wells that typically were bailed dry. These locations are now sampled at a low flow rate instead of being pumped dry, allowed to recharge, and sampled at a later time.

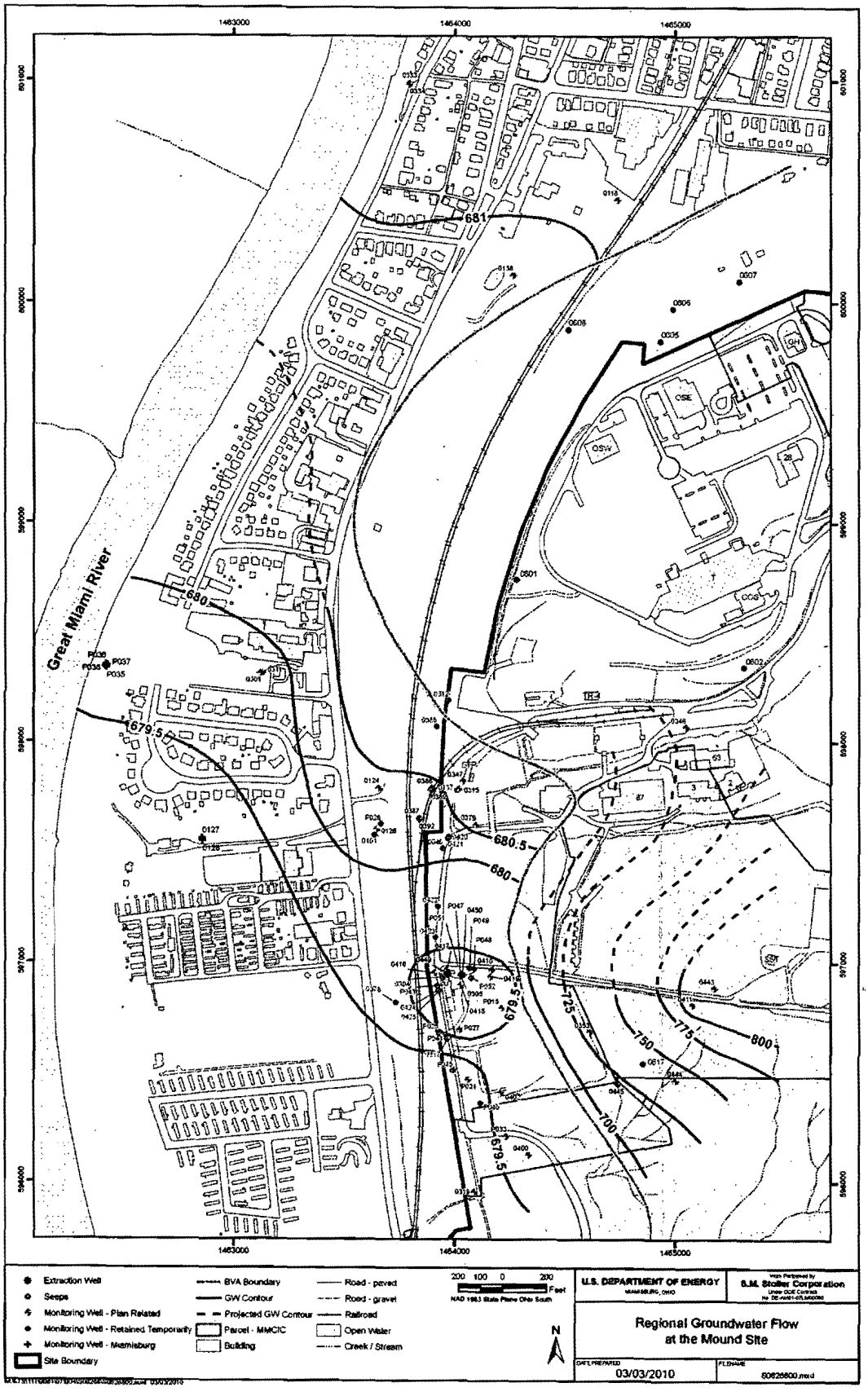

Figure 2–2. Regional Groundwater Flow at the Mound Site

This page intentionally left blank

3.0 Phase I MNA Remedy

3.1 Monitoring Results

Monitoring results for 2009 (Table 3–1) continue to show low-level TCE and *cis*-1,2-dichloroethylene (DCE) detections in wells 0411 and 0443 and in seep 0617. All VOC concentrations were below the applicable trigger levels (Table 2–3). Concentrations of TCE in wells 0411 and 0443 and seep 0617 exceed the MCL of 5 µg/L. No detectable concentrations of *trans*-1,2-DCE or vinyl chloride were reported at these three monitoring locations. Estimated concentrations less than the detection limit of 1 µg/L were reported in well 0402 in the BVA. No detectable concentrations of TCE, *cis*-1,2-DCE, *trans*-1,2-DCE, or vinyl chloride were reported in the remainder of the downgradient wells.

Table 3–1. Summary of VOC Monitoring Results in Phase I for 2009

Well ID	Location	Parameter	S1	S2
Source Area Wells				
0411	0411 Area	TCE (µg/L)	**12.7**	**11.2**
		cis-1,2-DCE (µg/L)	3.4	3.0
		VC (µg/L)	< 1	< 1
0443	0411 Area	TCE (µg/L)	**8.4**	4.0
		cis-1,2-DCE (µg/L)	0.76 (J)	0.32 (J)
		VC (µg/L)	< 1	< 1
0617	Seep/Bedrock	TCE (µg/L)	4.5	**8.2**
		cis-1,2-DCE (µg/L)	1.3	2.1
		VC (µg/L)	< 1	< 1
Downgradient Wells				
0353	Bedrock	TCE (µg/L)	< 1	< 1
		cis-1,2-DCE (µg/L)	< 1	< 1
		VC (µg/L)	< 1	< 1
0444	Bedrock	TCE (µg/L)	< 1	< 1
		cis-1,2-DCE (µg/L)	< 1	< 1
		VC (µg/L)	< 1	< 1
0445	Bedrock	TCE (µg/L)	< 1	< 1
		cis-1,2-DCE (µg/L)	< 1	< 1
		VC (µg/L)	< 1	< 1
0400	BVA	TCE (µg/L)	< 1	< 1
		cis-1,2-DCE (µg/L)	< 1	< 1
		VC (µg/L)	< 1	< 1
0402	BVA	TCE (µg/L)	0.87 (J)	0.55 (J)
		cis-1,2-DCE (µg/L)	< 1	< 1
		VC (µg/L)	< 1	< 1
P033	BVA	TCE (µg/L)	< 1	< 1
		cis-1,2-DCE (µg/L)	< 1	< 1
		VC (µg/L)	< 1	< 1

J = Estimated value less than the reporting limit
VC = vinyl chloride
Values in **bold** exceed the MCL for TCE

TCE concentrations in well 0411 (Figure 3–1) have decreased since monitoring began in 1999; however, concentrations appear to have leveled off near 12 µg/L over the past few years. The time-concentration plots for well 0443 and seep 0617 indicate that concentrations are variable and typically less than those in well 0411.

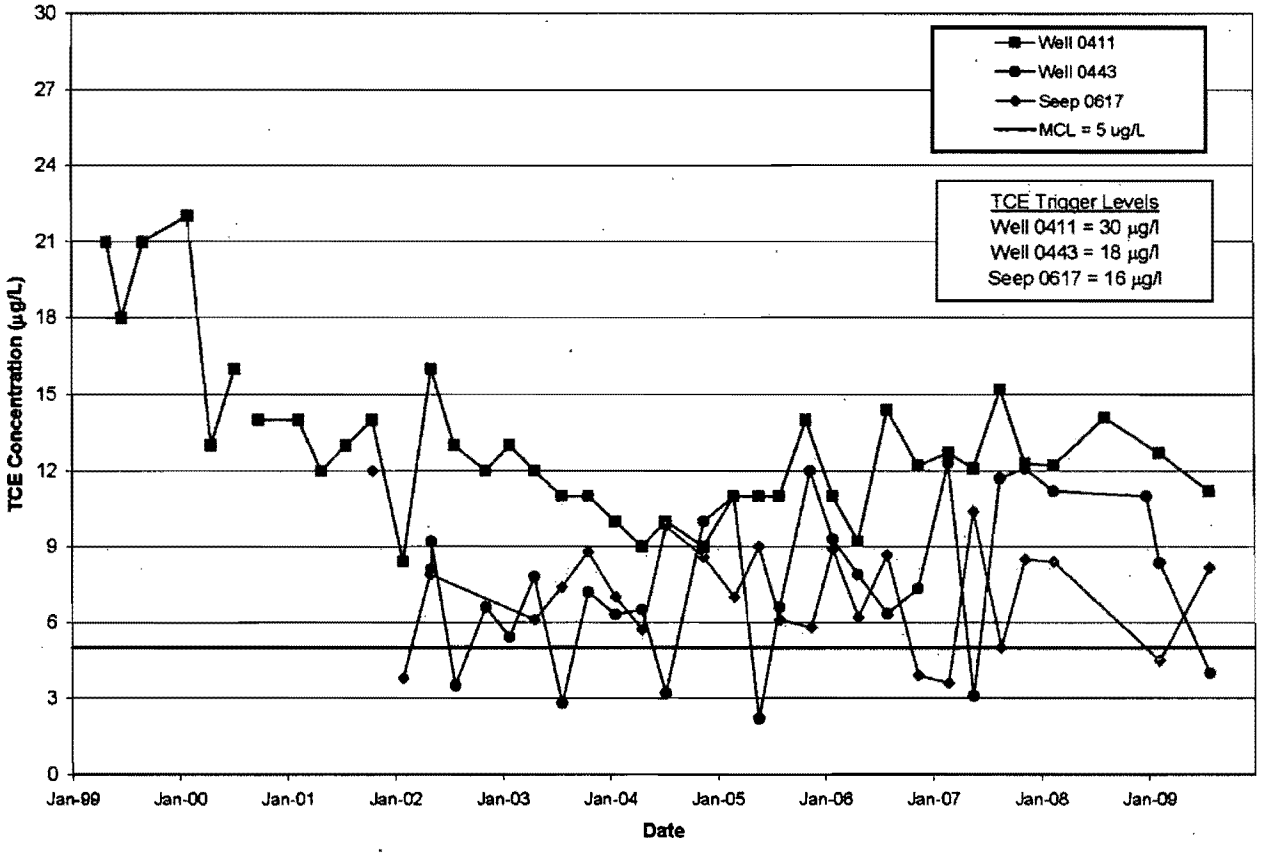

Figure 3–1. TCE Concentrations over Time—1999 through 2009

Estimated concentrations less than the detection limit of 1 µg/L were reported in well 0402 for both sampling events. Estimated concentrations have been reported in previous years and as recently as 2007. The TCE reported for this location is not suspected to result from TCE migration from the 0411/0443 area. No detectable concentrations were reported for wells 0353 and 0445, which lie between 0402 and the TCE source area wells. The source of TCE in well 0402 is likely groundwater from the adjacent and upgradient Operable Unit (OU)-1 area. Nearby wells P027 and P031, which were sampled under the OU-1 monitoring program, had TCE estimated concentrations ranging from 0.17 µg/L to 0.55 µg/L during 2009.

The concentration of *cis*-1,2-DCE in groundwater (Figure 3–2) has been less variable over time than TCE. Concentrations in well 0411 and seep 0617 are within the same range of concentrations. Concentrations in well 0443 are generally lower than those measured in well 0411 and seep 0617. None of the locations exceed the MCL of 70 µg/L for *cis*-1,2-DCE.

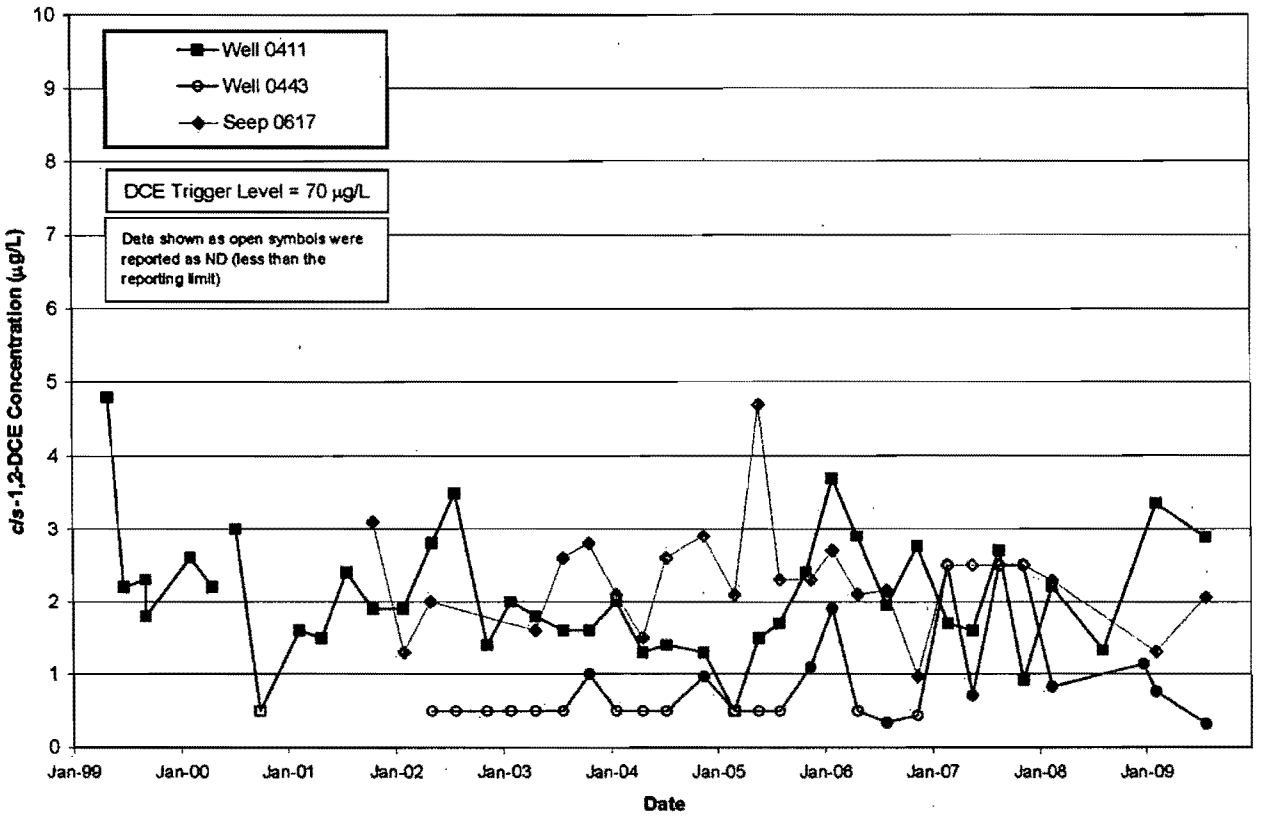

Figure 3–2. cis-1,2-DCE Concentrations—1999 through 2009

The distributions of TCE and DCE in groundwater (Figure 3–3) indicate that impact is localized in the bedrock groundwater near wells 0411 and 0443 and seep 0617. Wells screened in the bedrock and BVA that are downgradient of the area of VOC impact do not have detectable concentrations of TCE or DCE. Figure A–1 depicts the annual averages of TCE and DCE in the monitoring network.

3.2 Trend Analysis

Trend analysis was performed on VOC data using the non-parametric Mann-Kendall test. This test is used for temporal trend identification, because it does not require the data to conform to a particular distribution (such as a normal or log-normal distribution). This type of long-term trend analysis can be used to confirm trends in contaminant concentrations over time.

Trend analysis for TCE data collected since 1999 continues to indicate a downward trend in well 0411. No trend was determined for TCE in well 0443 and seep 0617. Trend analysis also did not indicate any trend in *cis*-1,2-DCE in wells or seep. A summary of the trend results for TCE is presented in Table 3–2.

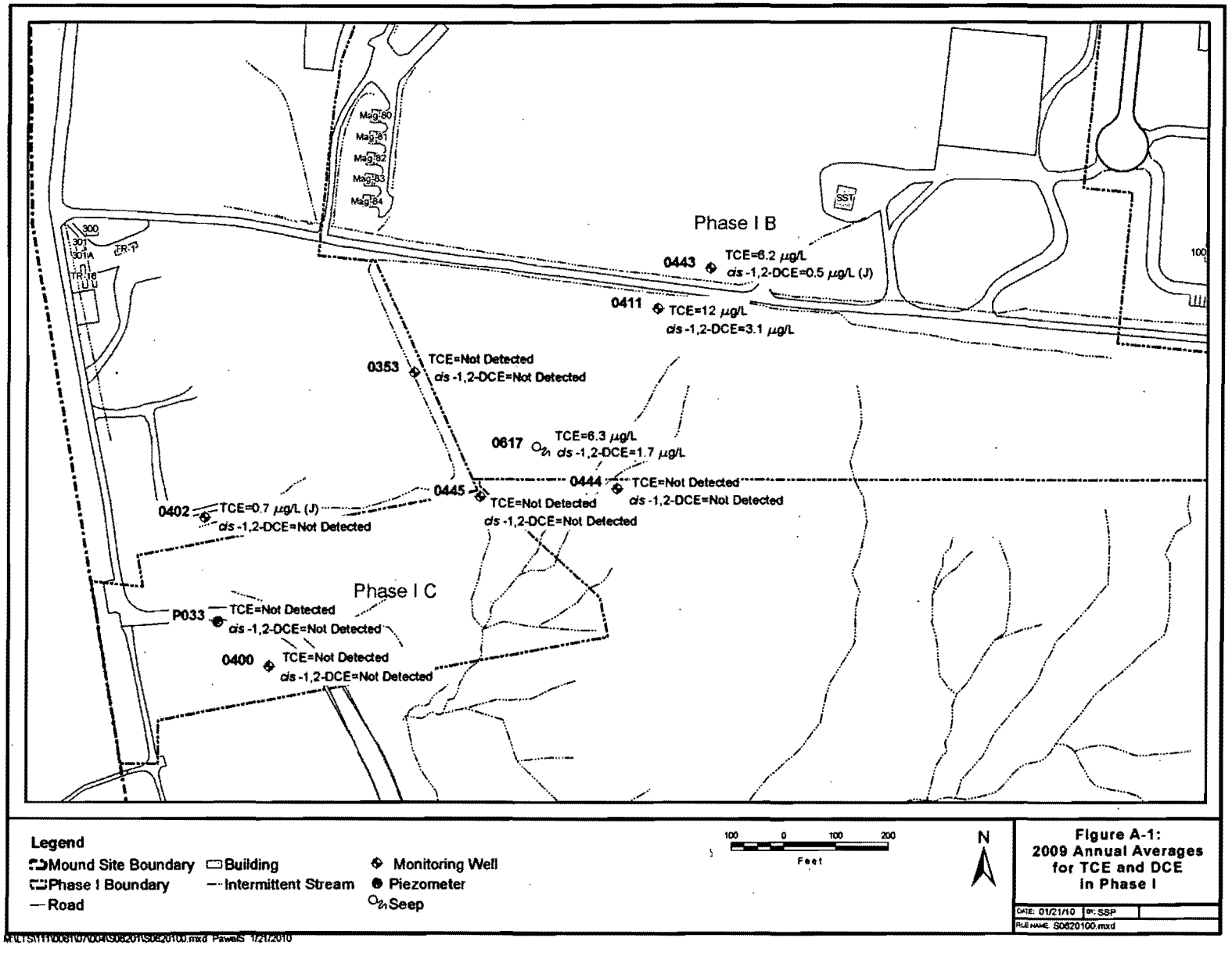

Figure 3–3. Distribution of TCE and DCE in Phase I Groundwater

Table 3–2. Summary of Trend Analysis Results for TCE in Phase I for 2009

Location	Analyte	No. of Samples	Trend	Slope (µg/L/year)	Confidence Interval (µg/L/yr)	
					Lower	Upper
0411	TCE	39	**Down**	- 0.38	-0.77	0
0443		27	None	0.51	- 0.08	1.2
0617		26	None	- 0.17	- 0.53	0.22
0411	*cis*-1,2-DCE	39	None	- 0.02	- 0.11	0.08
0443		27	None	0	0	0.11
0617		25	None	- 0.01	- 0.15	0.10

The data were evaluated for seasonality. Trends show that the data do not differ by season. Two sets of seasons were evaluated in an attempt to capture seasonal variations in precipitation. One set consisted of data from October through March and April through September. The other set consisted of data from November through February, March through June, and July through October.

Evaluation of the slope of the downward trend in TCE concentrations in well 0411 may give an indication on the timeframe when concentrations may approach the MCL of 5 µg/L. Using the non-parametric slope calculated in the trend analysis estimates that the MCL may be reached by 2023. Linear regression provides an estimate that the MCL may be reached by 2019; however, the correlation of the data was low (R = -0.48). Through the use of an exponential curve fit, an estimate shows that the MCL may be reached by 2031. The non-parametric analysis and the exponential curve fit typically may better represent the decrease of contaminants in groundwater over time.

3.3 Recommendations

No changes to the Phase I MNA sampling program are warranted based on data from 2009. Trend analysis continues to show that TCE concentrations have decreased in source well 0411 since sampling started in 1999, and in recent years concentrations have stabilized near 12 µg/L. Concentrations of TCE have been variable in source well 0443 and seep 0617 but are generally less than those measured in well 0411. On the basis of no upward trends in TCE concentrations and TCE concentrations being considerably less than the trigger levels, monitoring frequency is recommended to remain semiannual for 2010. Sampling will continue to be performed during the first and third quarters of the year in an effort to bracket possible seasonal variations.

This page intentionally left blank

4.0 Phase I Confirmatory Sampling

4.1 Barium and Radium

Data collected from well 0445 have shown elevated barium concentrations and total combined radium levels in excess of the MCLs. The groundwater chemistry in this well is not observed in any other bedrock or BVA well located in this area and is likely due to the interaction of salt stored at the site and the underlying bedrock. Data are being collected to monitor for changes in the groundwater quality and to better understand the mechanisms for the increased mobility of barium and radium in this discrete portion of the bedrock aquifer.

4.1.1 Monitoring Results

Monitoring results for 2009 (Table 4–1) show elevated combined Ra-226/228 levels greater than the MCL of 5 picocuries per liter (pCi/L) and greater than the level of concern (LOC) of 75 pCi/L in well 0445 (Table 2–3). The concentrations of barium in 0445 exceeded the MCL of 2,000 µg/L in 2009 but were less than the LOC of 15 mg/L. Combined Ra-226/228 and barium levels remain low in the downgradient BVA wells.

Table 4–1. Summary of 2009 Confirmatory Monitoring Results for Barium and Radium

Well ID	Location	Parameter	S1	S2
Source Area Well				
0445	0445 Area	Combined Ra-226/228 (pCi/L)	66.4	93.1
		Barium (µg/L)	14,400	9,080
Downgradient Wells				
0400	BVA	Combined Ra-226/228 (pCi/L)	< 1.0	< 0.7
		Barium (µg/L)	102	113
0402	BVA	Combined Ra-226/228 (pCi/L)	1.7 (J)	0.57 (J)
		Barium (µg/L)	68.7	75.7
P033	BVA	Combined Ra-226/228 (pCi/L)	1.2 (J)	2.6 (J)
		Barium (µg/L)	90.2	105

Combined Ra-226/228 reported as "<" when both isotopes were reported as less than method detection limit.
J = one of the isotopes was reported as an estimated value less than the reporting limit

Barium concentrations vary in well 0445 (Figure 4–1), which is screened within the bedrock. The concentrations of barium in this well indicate a general decline starting in 2004; however, concentrations in 2009 were higher than previous years. This general decrease coincides with removal of the salt from the storage area (SST building on Figure 2–1) in 2003. The higher concentrations reported at the end of 2008 and in 2009 may be the result of changing sampling methods. Until the second half of 2008, well 0445 was typically bailed or pumped dry and then sampled the next day. During 2008, dedicated bladder pumps capable of sampling low flows (100 mL per minute) were installed in the Phase I monitoring wells. The samples collected since the second half of 2008 have been sampled using the low-flow method instead of being pumped dry, allowed to recharge, and sampled at a later time.

Barium concentrations in well P033 (BVA well) have been variable and exhibit similar fluctuations in concentrations as those observed in well 0445. Barium concentrations have been relatively stable in wells 0400 and 0402; both BVA wells are located downgradient of well 0445. These two wells do not indicate similar fluctuations in concentrations as compared to wells 0445 and P033. The levels of barium in wells 0400, 0402, and P033 are similar to background (310 µg/L). Background values were obtained from the *Phase I Residual Risk Evaluation* (DOE 2003b).

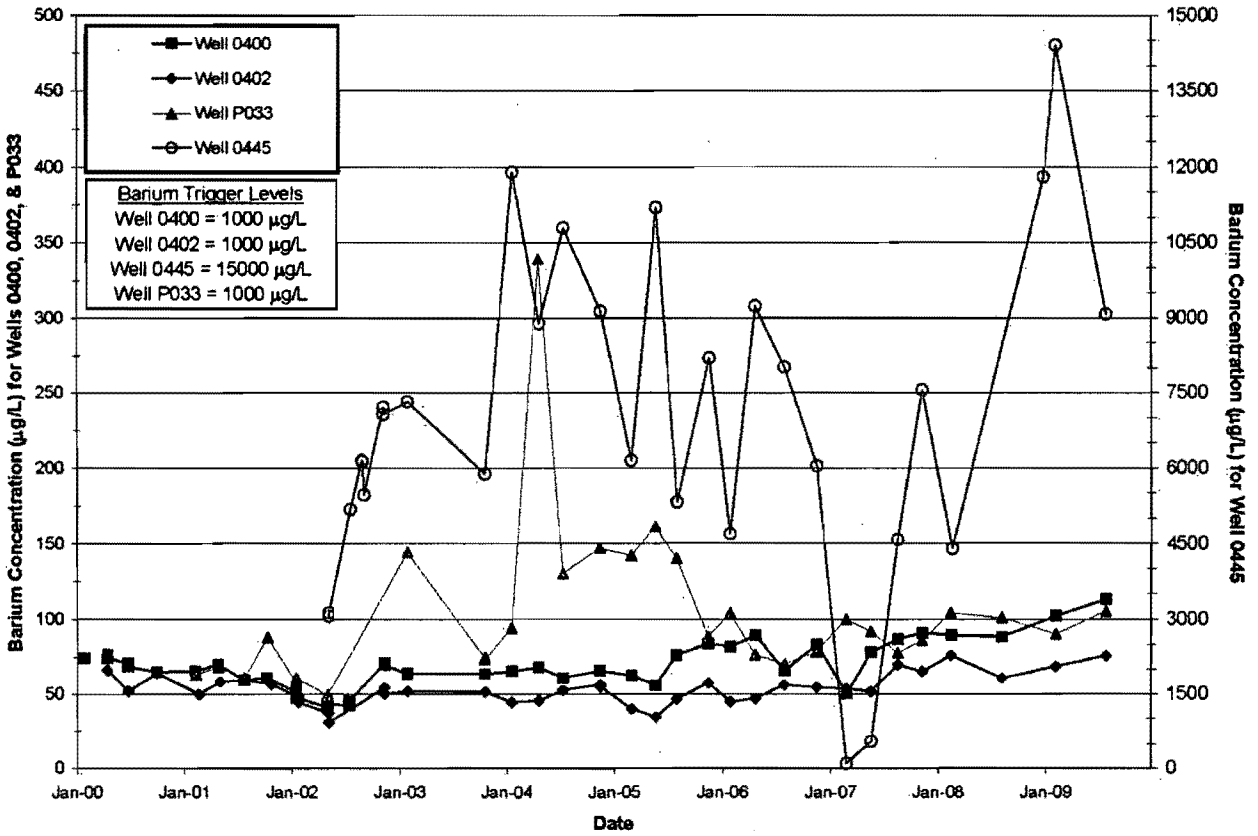

Figure 4–1. Barium Concentrations—2000 through 2009

Radium levels vary over time in all of the wells (Figure 4–2), but the largest fluctuations occur in well 0445. The levels of combined Ra-226/228 at this location consistently exceed the MCL of 5 pCi/L and have exceeded the 75 pCi/L LOC. Radium levels have been less variable over time in wells 0400, 0402, and P033, which are BVA wells downgradient of well 0445. Well P033 has slightly higher radium levels than the other two BVA wells and exhibits a similar pattern in variability when compared to well 0445.

The levels of Ra-226 in the BVA wells (0400 and 0402) are similar to background (0.996 pCi/L for Ra-226). Background values were obtained from the *Phase I Residual Risk Evaluation* (DOE 2003b).

The distribution of barium and radium in groundwater (Figure 4–3) indicates the impact is associated with well 0445. Barium and radium levels are similar to background in the downgradient BVA wells. Figure 4–3 depicts the annual averages of barium and radium in the monitoring network.

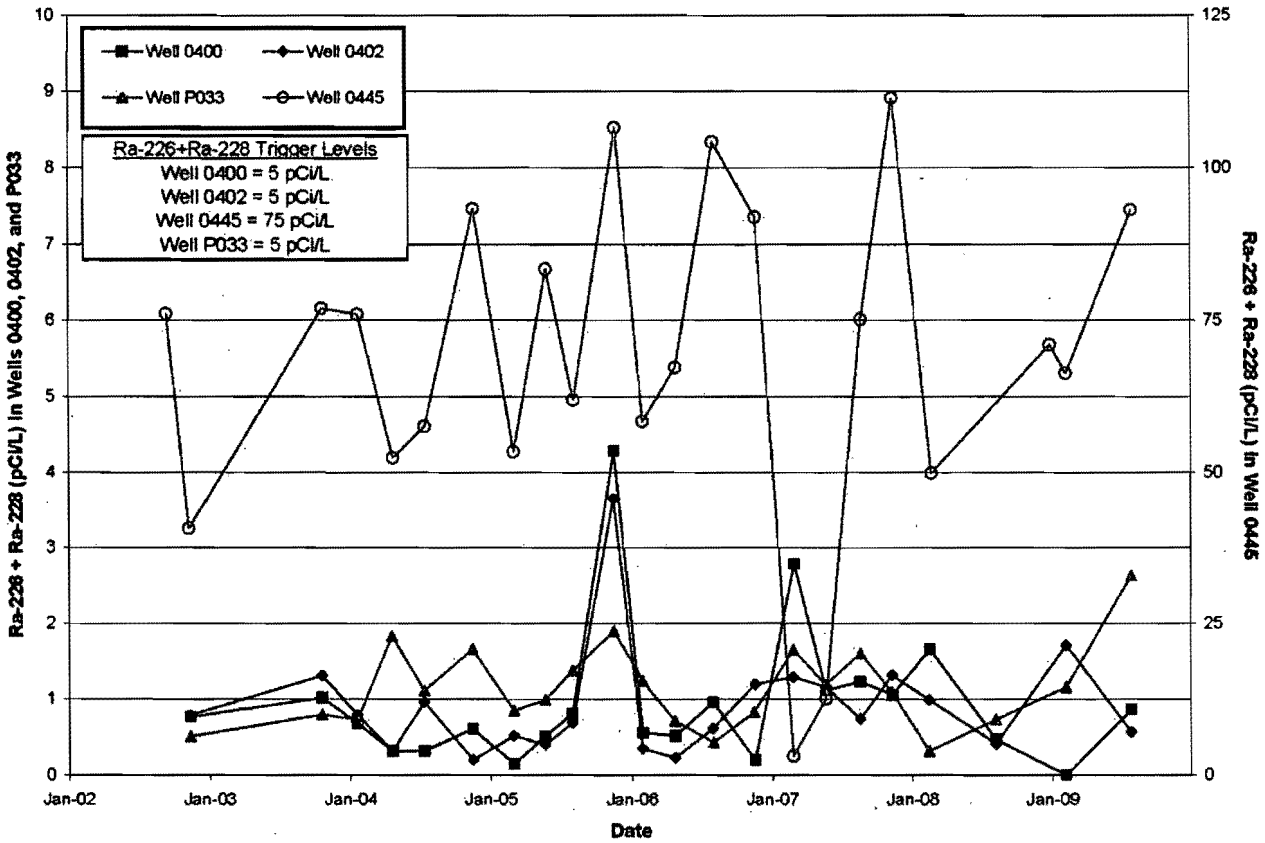

Figure 4–2. Ra-226/228 Levels—2002 through 2009

Sodium and chloride are monitored in conjunction with radium and barium, because salt is considered the mechanism that has caused elevated radium and barium levels in the bedrock groundwater system. Salt was no longer stored in the SST building after 2003. Sodium and chloride monitoring results (Table 4–2) indicate that the highest concentrations occur in well 0445, which is where elevated radium and barium levels are detected. Sodium and chloride concentrations have been stable in BVA wells 0400 and 0402.

Table 4–2. Summary of 2009 Confirmatory Monitoring Results for Sodium and Chloride

Well ID	Location	Parameter	S1	S2
Source Area Well				
0445	0445 Area	Chloride (mg/L)	13,100	12,500
		Sodium (mg/L)	6,730	4,680
Downgradient Wells				
0400	BVA	Chloride (mg/L)	93.5	98.6
		Sodium (mg/L)	54.6	49.6
0402	BVA	Chloride (mg/L)	109	113
		Sodium (mg/L)	67.5	79.3
P033	BVA	Chloride (mg/L)	150	125
		Sodium (mg/L)	89.1	77.9

mg/L = milligrams per liter

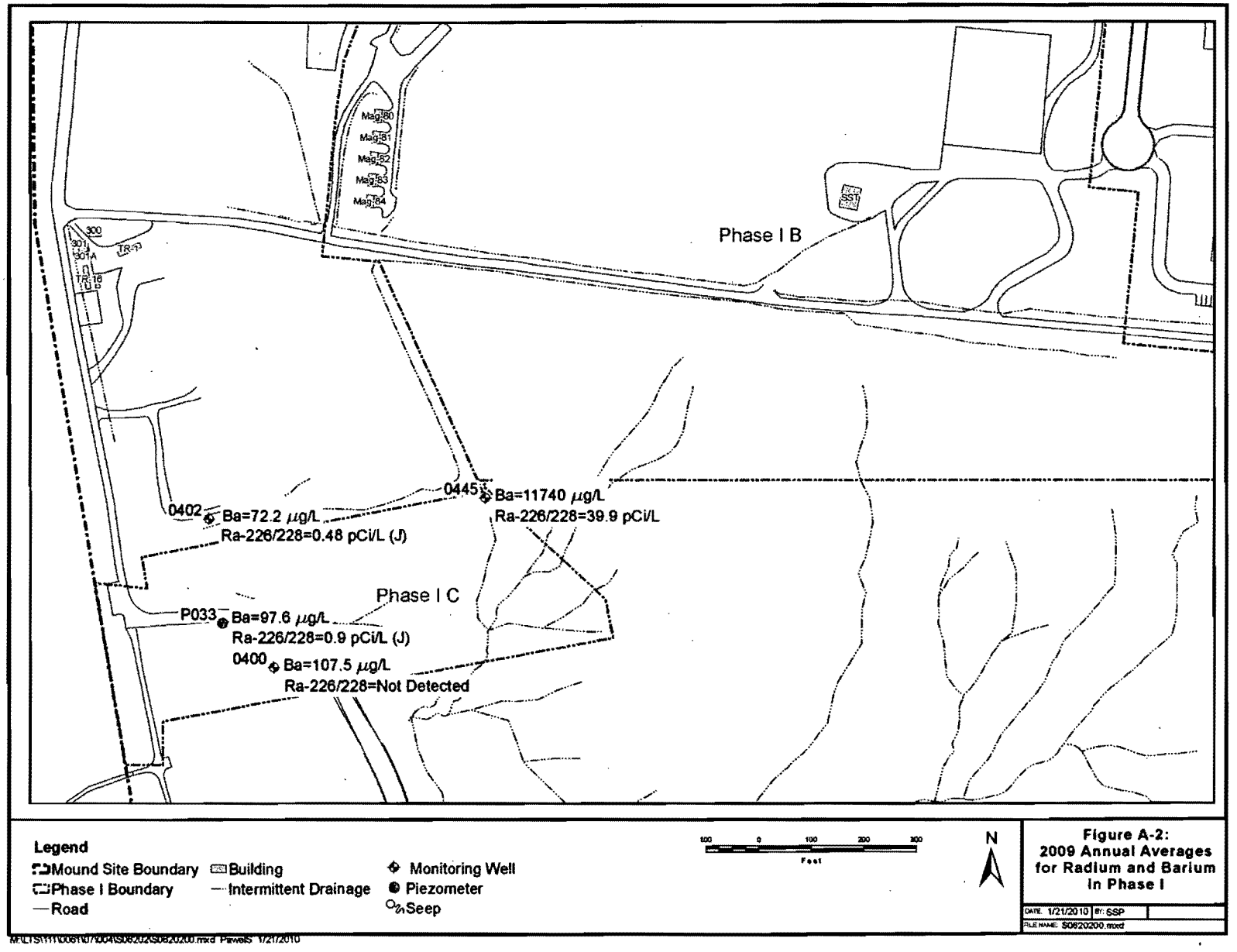

Figure 4–3. Distribution of Radium and Barium in Phase I Groundwater

Extremely high concentrations of sodium and chloride have been reported in well 0445 (Figure 4–4 and Figure 4–5), which also has had increased radium and barium levels; however, levels show substantial variation over time. Downgradient BVA well P033 shows elevated concentrations of sodium and chloride, which vary in a similar pattern to those observed in well 0445. Substantial decreases in sodium and chloride concentrations were reported in BVA well P033 and are similar to the changes observed in barium and radium levels at this location. Sodium and chloride levels in wells 0400 and 0402 are slightly higher than in previous years.

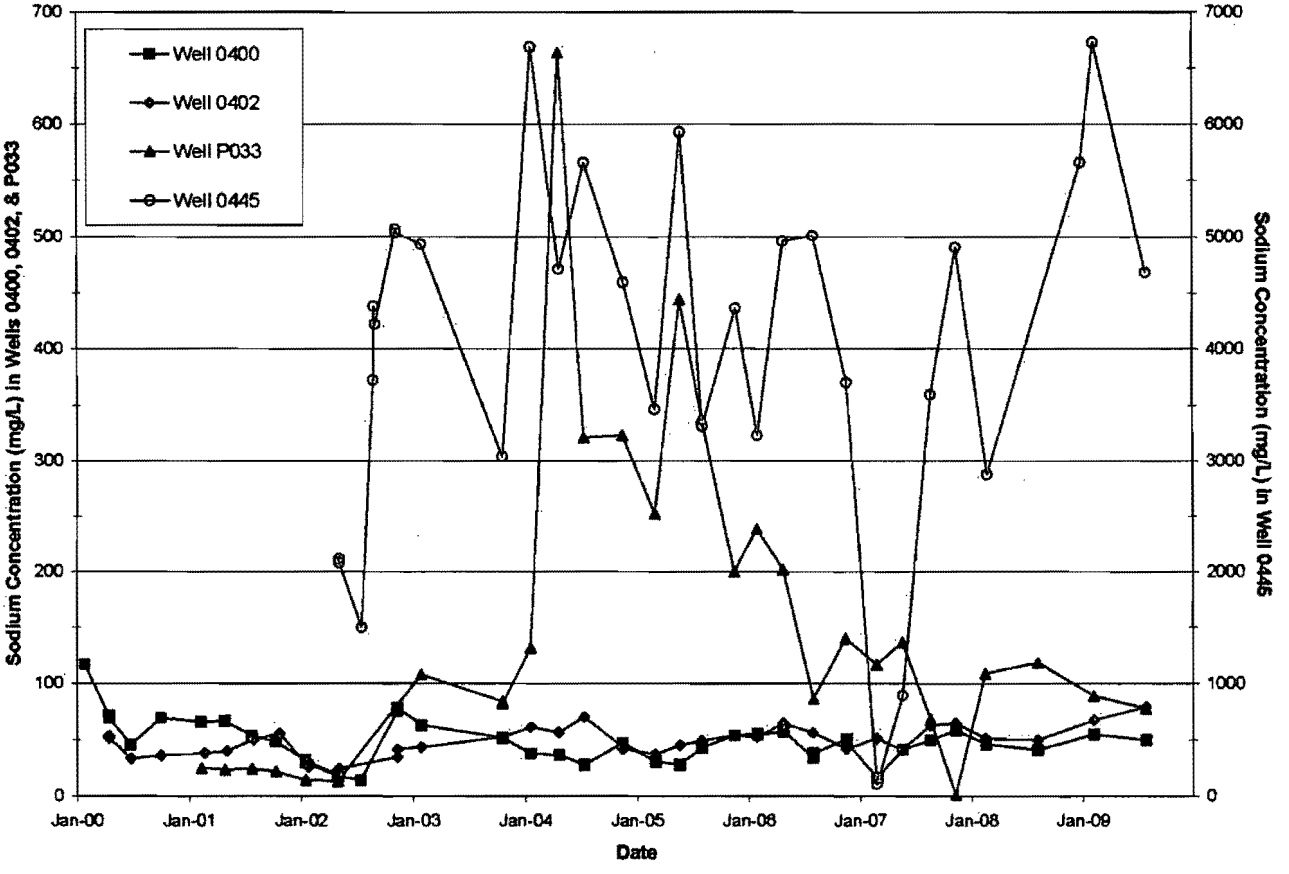

Figure 4–4. Sodium Concentrations—2000 through 2009

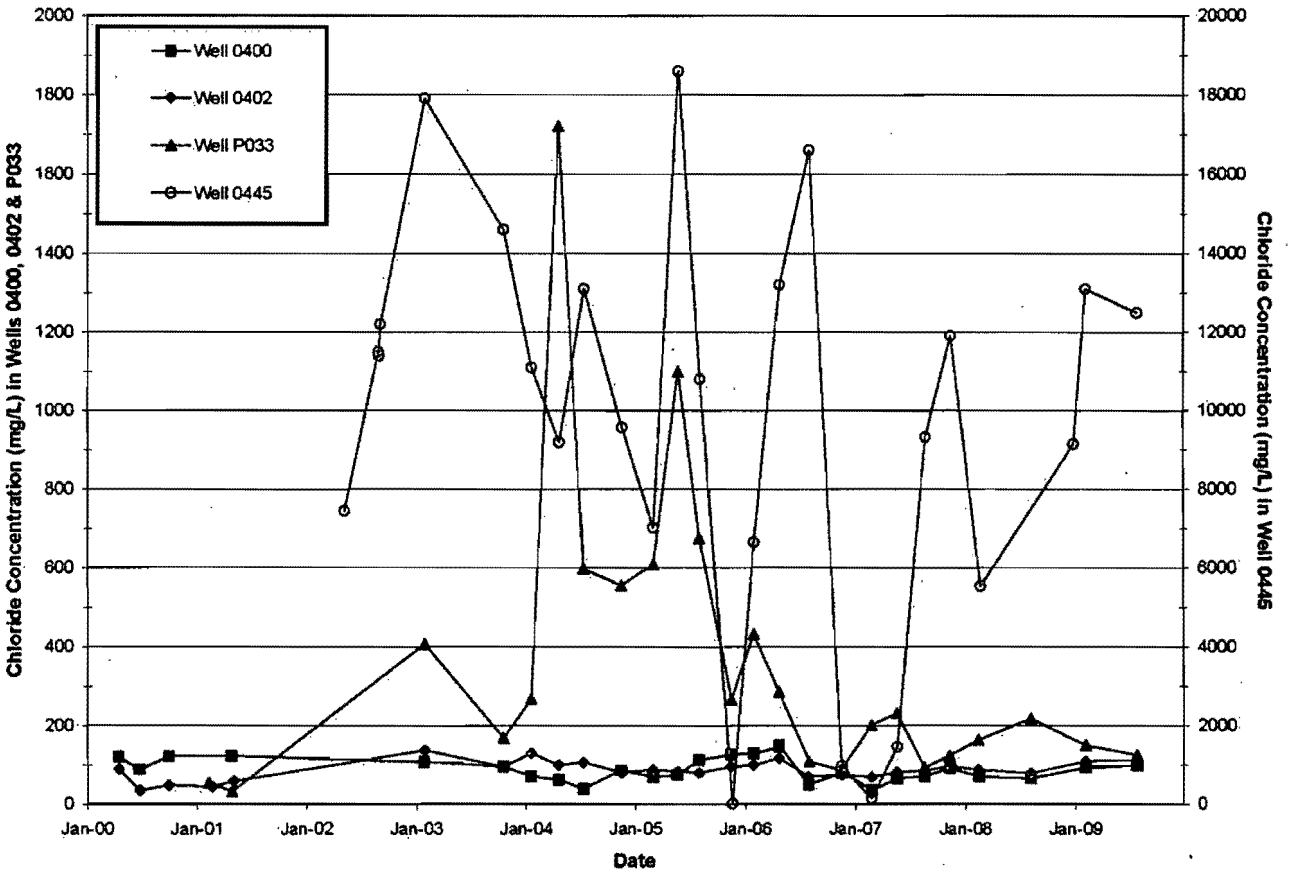

Figure 4–5. Chloride Concentrations—2000 through 2009

Review of the sodium and chloride data indicates that well P033 continues to show a delayed and lower concentration response to the elevated levels observed in well 0445. This observation is illustrated more prominently in the sodium data than the chloride data. The response between wells 0445 and P033 indicates connectivity and suggests that well P033 is a good downgradient monitoring point for impact in well 0445. It is apparent that groundwater affected by salt is stored in the lower permeable bedrock near well 0445, resulting in greater contact time with the shale, and is the source of barium and radium. This well can support only very low-flow sampling methods with purge rates on the order of 100 mL/minute. Naturally occurring barium and radium are leached from the bedrock, put into solution in this discrete portion of the saturated bedrock, and slowly released through the bedrock groundwater system into the downgradient BVA near well P033.

4.1.2 Trend Analysis

Trend analysis was performed on barium, radium, sodium, and chloride data using the non-parametric Mann-Kendall test. This test is used for temporal trend identification, because it does not require the data to conform to a particular distribution (such as a normal or log-normal distribution). This type of long-term trend analysis can be used to confirm trends in contaminant concentrations over time.

Trending was performed using data from 2004 through 2009, as this set of data reflects possible influence from the removal of salt from the SST building. Trend analysis for barium indicates a very small upward trend in wells 0400 and 0402. Analysis of data from well P033 indicated a presence of trends, which were downward, in sodium and chloride. The trends in sodium and chloride concentrations are consistent with those reported in previous years. In 2008, no trends were reported for barium in wells 0400 and 0402, and downward trends in barium were reported for wells 0445 and P033. Concentrations of barium were higher during 2009 than in previous year and have impacted the trends in these wells. A summary of the trend results for barium, sodium, and chloride is presented in Table 4–3.

Table 4–3. Summary of Trend Analysis Results for Barium, Sodium, and Chloride in Phase I for 2009

Location	Parameter	No. of Samples	Trend	Slope (mg/L/yr)	Confidence Interval (mg/L/yr)	
					Lower	Upper
0400	Barium	20	Up	0.007	0.005	0.010
0402	Barium	20	Up	0.005	0.003	0.008
P033	Sodium	20	Down	-52	-89	-18
	Chloride	20	Down	-92	-160	-22

The data were evaluated for seasonality. It was determined that trends in the data do not differ by season. Two sets of seasons were evaluated. One set consisted of data from October through March and April through September. The other set consisted of data from November through February, March through June, and July through October.

4.1.3 Recommendations

No changes to the Phase I confirmatory sampling program for barium and radium are warranted based on the data from 2009. It is recommended that the sampling frequency remain at semiannually for 2010. The levels of combined Ra-226/228 and concentrations of barium in well 0445 have been variable over time and have consistently been greater than the LOC but have not shown an increasing trend over time. Trends in sodium and chloride concentrations over time have been determined to be downward in well P033 indicating that the discharge of salt from the bedrock aquifer system may be diminishing since removal of the salt from the SST building.

4.2 Chromium and Nickel

Starting in the second quarter of 2008, the confirmatory monitoring program was modified to address the elevated chromium and nickel results in well 0443 reported at the end of 2007. Sampling at other monitoring locations under this confirmatory program was discontinued, as the data supported the conclusion that the source of groundwater impact was the stainless-steel well materials.

Well 0443 is comprised of polyvinyl chloride (PVC) and was installed immediately upgradient of well 0411 to monitor the groundwater quality unaffected by well 0411. Well 0411 was constructed from stainless-steel materials and has historically exhibited elevated metals results. Data were collected from wells 0411 and 0443 and seep 0617 to evaluate the increased values

observed in 2007. Collection of samples from these locations continued in 2009 as a limited data set was collected because of dry conditions in the wells and seep during the second half of 2008.

4.2.1 Monitoring Results

Monitoring results (Table 4–4) indicate low levels of chromium and nickel in well 0443. Data from well 0411, which is the source well constructed from stainless-steel materials, indicate that elevated chromium and nickel are still present in groundwater. Elevated chromium and nickel concentrations were reported in samples from seep 0617 during the second half of 2009. It is possible that groundwater that is impacted by the stainless-steel materials in well 0411 is migrating within the bedrock fracture system and discharging at seep 0617. Results from well 0443 support that the elevated concentrations measured in well 0411 do not represent the overall groundwater quality in the bedrock groundwater system but rather a discrete zone of groundwater impact originating from well 0411.

Table 4–4. Summary of Confirmatory Monitoring Results for Chromium and Nickel for 2009

Well ID	Material	Parameter	Q1	Q2	Q3	Q4
0411	Stainless Steel	Chromium (µg/L)	541	4.8	6.4	16.7
		Nickel (µg/L)	36.4	2.4 (J)	< 1.5	5.3 (J)
0443	PVC	Chromium (µg/L)	ND (< 2)	ND (< 2)	1.3 (J)	ND (< 1)
		Nickel (µg/L)	< 1	1.3 (J)	< 1.5	2.0 (J)
0617	Seep	Chromium (µg/L)	5.1	3.0 (J)	12.3	5.8
		Nickel (µg/L)	3.8 (J)	1.2 (J)	20.0	19.4

J = Estimated value less than the reporting limit.
LOC for chromium and nickel in well 0443 = 100 µg/L.

Chromium and nickel concentrations (Figure 4–6) have fluctuated over time in well 0443 but have not exceeded the 100 µg/L LOC for both metals since routine monitoring started in 2005. Until the end of 2007, the chromium and nickel concentrations in the bedrock well 0443 were low and similar to background concentrations. A cause for the increase in well 0443 during 2007 could not be identified. During 2008, chromium and nickel concentrations in well 0443 and seep 0617 returned to background concentrations (6.1 µg/L and 35 µg/L, respectively) and remained low in 2009. Background values were obtained from the *Phase I Residual Risk Evaluation* (DOE 2003b).

The distribution of chromium and nickel in groundwater (Figure 4–7) indicates that the presence of these constituents in high concentrations is associated with stainless-steel well 0411. Increased concentrations are also measured in downgradient seep 0617. Figure 4–7 depicts the annual average concentrations of chromium and nickel in the wells and seep sampled in 2009.

4.2.2 Trend Analysis

Trend analysis was performed on chromium and nickel data collected since 2002 using the non-parametric Mann-Kendall test. This test is used for temporal trend identification, because it does not require the data to conform to a particular distribution (such as a normal or log-normal distribution). This type of long-term trend analysis can be used to confirm downward trends in

contaminant concentrations over time. Trend analysis does not indicate a trend in chromium or nickel data from well 0443. Insufficient data are available to trend these metals in seep 0617.

The data were evaluated for seasonality. It was determined that trends in the data do not differ by season. Two sets of seasons were evaluated. One set consisted of data from October through March and April through September. The other set consisted of data from November through February, March through June, and July through October.

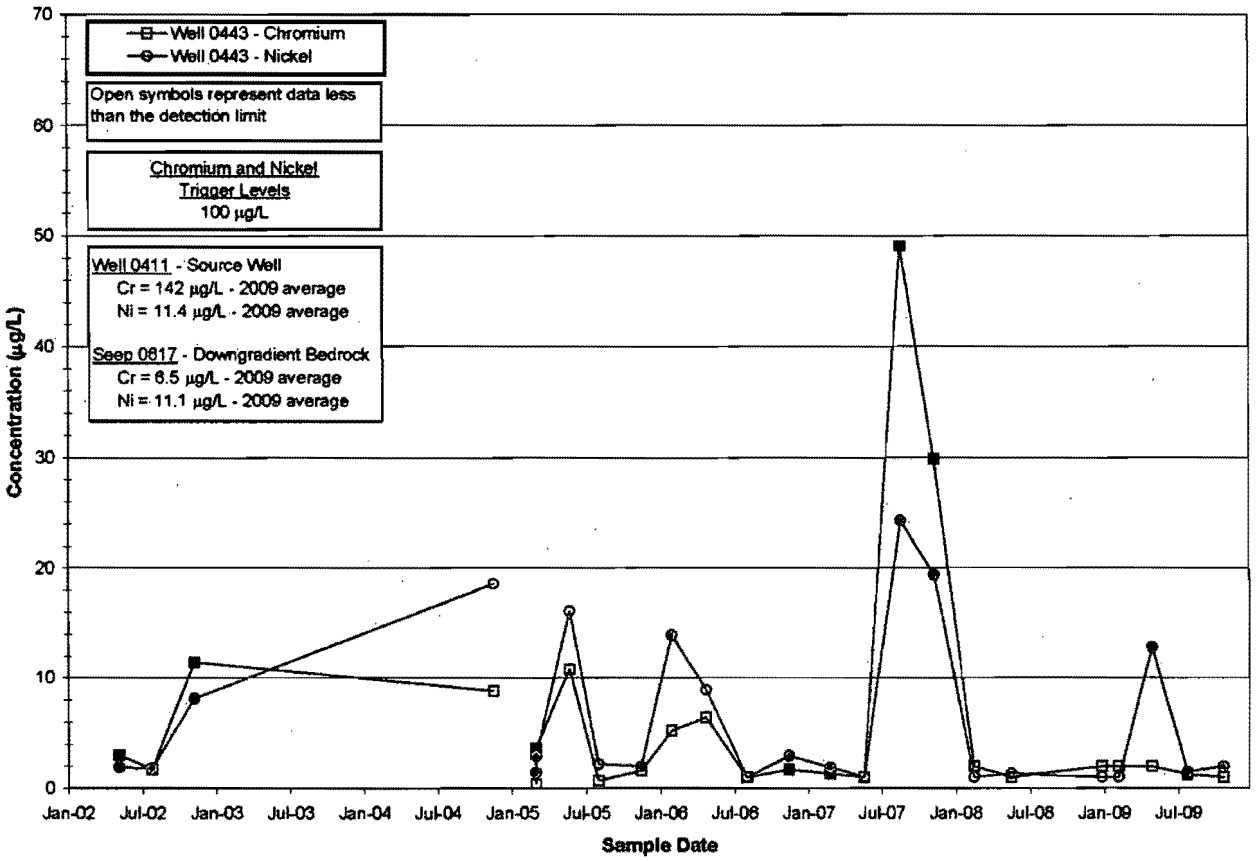

Figure 4–6. Chromium and Nickel Concentrations in Well 0443—2000 through 2009

4.2.3 Recommendations

Concentrations of both chromium and nickel have also been less than 100 µg/L in bedrock well 0443, which was installed to monitor ambient groundwater quality in the vicinity of well 0411. No upward trends in chromium or nickel concentrations have been identified in well 0443. It is recommended to discontinue confirmatory sampling at well 0443, because the concentrations of these two metals have been less than the LOC for more than 2 years. Data from wells 0411 and 0443 support that chromium and nickel impact in this portion of the bedrock aquifer is the result of corrosion of the stainless-steel well materials.

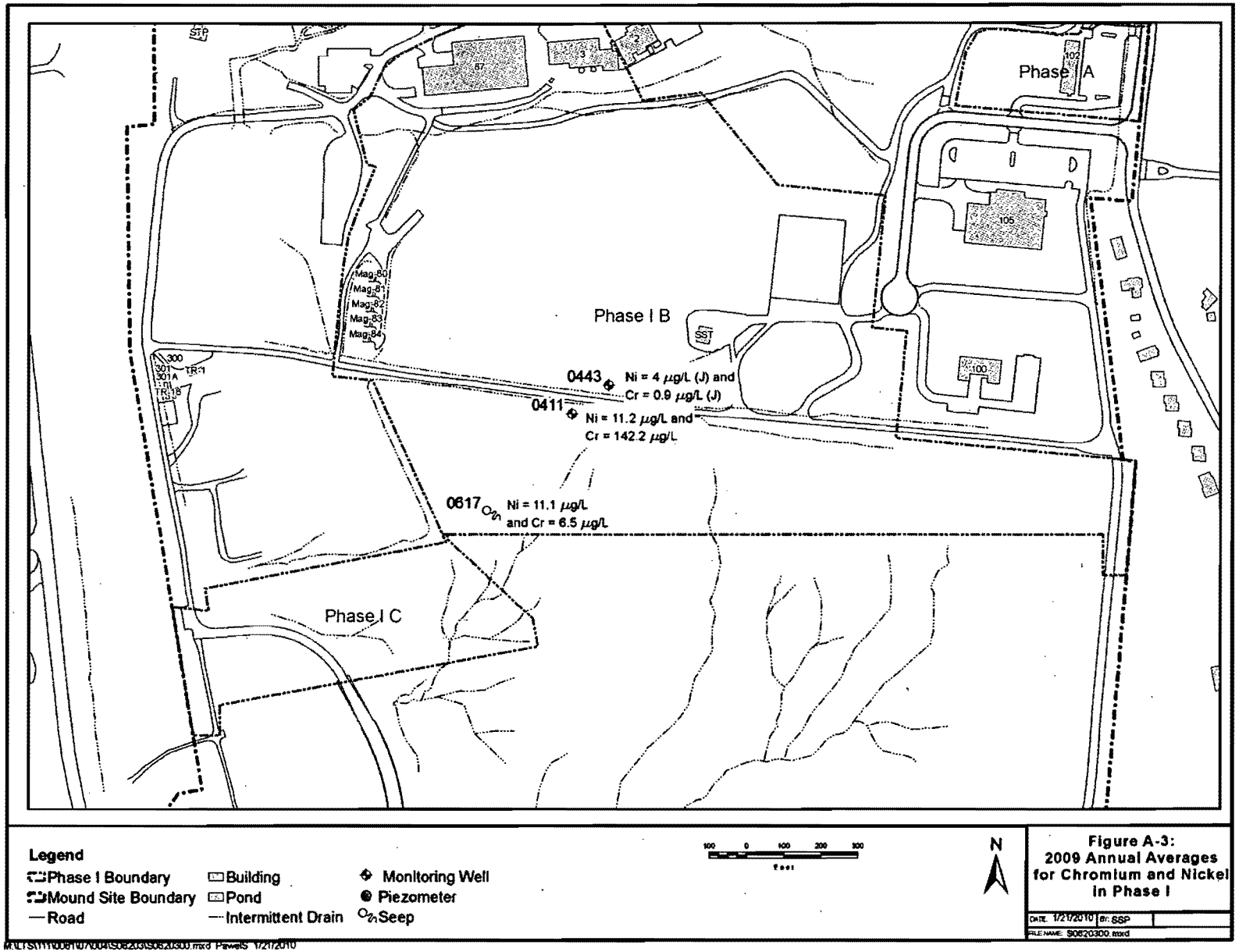

Figure 4–7. Distribution of Chromium and Nickel in Phase I Groundwater

5.0 Inspection of the Monitoring System

A routine maintenance program has been established for the long-term groundwater monitoring locations at the Mound Site. This program includes periodic inspections focusing on the integrity of each well and the condition of the protective casing and surface pad, the surrounding area, and the route of access. These inspections are usually performed during each sampling event. If these wells were neglected, the surface seals could fail, and contamination could migrate from surface sources to the subsurface.

The primary deficiency identified in 2008 was ponded water around well 0353. This well is located along the eastern side of the clean soil stockpile for the OU-1 excavation subcontractor. When the stockpile was removed and the area regraded, adequate drainage was present. However, this area was utilized again during 2009 as a clean soil stockpile, and drainage around this well was poor.

Other deficiencies identified during 2009 were general maintenance issues, such as drainage and vegetation. Also, ants were reported in the well casing of well 0443 during the third quarter sampling event. It appears that the presence of the ants may have slight impact on the groundwater chemistry as the Eh values were slower and turbidity increased in the third and fourth quarters of 2009 due to the presence of the biological material. These changes have not affected the data results for 2009.

This page intentionally left blank

6.0 Data Validation

Each quarter's data were validated in accordance with procedures specified in the *Environmental Procedures Catalog*, LMS/POL/S04325, "Standard Practice for Validation of Laboratory Data." This procedure also fulfills the requirements of applicable procedures in the *Mound Methods Compendium* (MD 80045). Data validation was documented in quarterly reports prepared within 90 days of the end of each quarter (DOE 2009b, 2009c, 2009d, and 2010). All 2009 data, including data validation qualifiers, are summarized in Appendix B.

Under both programs, laboratory performance is assessed by reviewing and evaluating the following quality indicators:

- Sample shipping and receiving practices
- Chain of custody
- Laboratory blanks
- Preparation blanks
- Laboratory replicates
- Serial dilutions
- Detection limits
- Peak integrations
- Matrix spikes and matrix spike duplicates
- Holding times
- Instrument calibrations
- Interference check samples
- Radiochemical uncertainty
- Laboratory control samples
- Sample dilutions
- Surrogate recoveries
- Confirmation analyses
- Electronic data

This page intentionally left blank

7.0 Summary

This *Groundwater Monitoring Report* documents the groundwater sampling results for the Phase I MNA remedy sampling in 2009. Additionally, results associated with confirmatory monitoring for radium, barium, chromium, and nickel in Phase I are included.

7.1 MNA Remedy

The objective of the MNA monitoring is to protect the BVA by verifying that the concentrations of TCE in the vicinity of well 0411, well 0443, and seep 0617 are decreasing to levels below the MCL. Also, monitoring provides evidence that TCE is not adversely impacting the BVA.

The distribution of TCE and *cis*-1,2-DCE in groundwater indicates that VOC impact is still associated with wells 0411 and 0443 and downgradient seep 0617. TCE levels in well 0411 have decreased since monitoring began in 1999, and concentrations have leveled off over the past few years. Low levels of the TCE breakdown product *cis*-1,2-DCE continue to be present at all three locations. Trend analysis indicates a downward trend in TCE concentrations in well 0411. Data from well 0443 and seep 0617 do not indicate any trend in the concentrations at either location. Concentrations at these three monitoring locations exceed the MCL of 5 µg/L. Trend analysis suggests that the MCL of 5 mg/L for TCE may be reached by 2023. Estimated detects of TCE were reported at one location in the BVA; however, the source of TCE is not the 0411/0443 area. TCE remains undetected in the remainder of the BVA wells. TCE data support that the downgradient BVA is not affected by the localized TCE impact in the bedrock groundwater.

Monitoring associated with the MNA remedy will continue. The evaluation of the 2009 data does not suggest the monitoring program should be changed at this time. Semiannual sampling will continue in 2010.

7.2 Radium and Barium

Groundwater monitoring for barium and radium is performed to provide assurance that the understanding of the barium and radium in groundwater is correct. Sodium and chloride are monitored in conjunction with radium and barium, because the salt is considered the mechanism that has resulted in elevated radium and barium in the bedrock groundwater system. If monitoring indicates that the concentrations of barium and combined Ra-226/228 are not decreasing below the MCL within a reasonable timeframe, changes to the monitoring program may be considered.

Monitoring results for 2009 show elevated combined Ra-226/228 and barium concentrations greater than the MCLs in well 0445. Barium concentrations were below the LOC; however, combined Ra-226/228 levels exceeded the LOC. The levels of barium and radium in the bedrock groundwater have been extremely variable. The concentrations of barium in well 0445 were decreasing since 2004 but increase significantly in 2009. Combined Ra-226/228 levels were slightly increased compared to previous years. It is possible that a change in sampling methods in late 2008 has resulted in the shift in data.

Combined Ra-226/228 and barium levels remain within background levels in the downgradient BVA wells. Levels of radium and barium are slightly higher in well P033 than the other two BVA wells. Trend analysis indicates a slight upward trend in barium concentrations in wells 0400 and 0402.

Sodium and chloride monitoring results indicate that the highest concentrations occur in well 0445, where elevated radium and barium are also detected. Slightly elevated concentrations of sodium and chloride are also reported in well P033, which also has slightly higher radium and barium levels, as compared to the other BVA wells. Sodium and chloride concentrations have exhibited a downward trend over time in well P033. Evaluation of the sodium and chloride data with respect to the concentrations of barium and radium supports that the presence of elevated salt in the groundwater results in increased barium and radium.

Monitoring associated with the confirmatory sampling for barium and combined Ra-226/228 will continue in 2010. The evaluation of the 2009 data does not suggest the monitoring program should be changed at this time. The slight upward trend in barium concentrations in BVA wells 0400 and 0402 will continue to be evaluated.

7.3 Chromium and Nickel

Nickel and chromium concentrations in stainless-steel well 0411, which is screened in the bedrock, is likely the result of corrosion of the well casing and not the result of plant operations (DOE 2002). Monitoring is performed to obtain a more comprehensive set of data to support this conclusion. When nickel and chromium concentrations remain below the MCL for 2 years, monitoring for these constituents can be discontinued.

Starting in 2008, this program was modified to address the elevated chromium and nickel results in well 0443 reported at the end of 2007. Well 0411, which is the stainless-steel well that has historically had elevated metals results, and seep 0617 were added to the monitoring program to determine if concentrations had significantly changed in the bedrock aquifer and if chromium and nickel were migrating downgradient. Monitoring results from well 0443 indicate low levels of chromium and nickel that are similar to background. Elevated levels of chromium and nickel are measured in groundwater samples from well 0411. Seep 0617 has shown some minor impact from groundwater migrating from upgradient, likely near well 0411.

Results from these three monitoring locations support that the elevated concentrations of metal in well 0411 do not represent the overall groundwater quality in the bedrock groundwater system. This discrete zone of impact has had an impact on the water quality in downgradient seep 0617. It is recommended to discontinue confirmatory sampling at well 0443 in 2010.

8.0 References

DOE (U.S. Department of Energy), 2002. *Sampling Investigation to Determine the Nature of Elevated Chromium and Nickel Levels in Two Stainless Steel Monitoring Wells at Mound,* prepared by BWXT of Ohio, Inc. for the U.S. Department of Energy, Ohio Field Office, October.

DOE (U.S. Department of Energy), 2003a. *Phase I Record of Decision, Miamisburg Closure Project* (Final), prepared by the Miamisburg Closure Project, for the U.S. Department of Energy, Ohio Field Office, July.

DOE (U.S. Department of Energy), 2003b. *Phase I Residual Risk Evaluation, Miamisburg Closure Project* (Final), prepared by the Miamisburg Closure Project, for the U.S. Department of Energy, Ohio Field Office, March.

DOE (U.S. Department of Energy), 2004. *Phase I Remedy (Monitored Natural Attenuation) Groundwater Monitoring Plan* (Final), prepared by CH2M Hill - Miamisburg Closure Project, for the U.S. Department of Energy, Ohio Field Office, September.

DOE (U.S. Department of Energy), 2008. *Phase I Groundwater Monitoring Report Calendar Year 2007*, prepared by S.M. Stoller Corporation for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado, March.

DOE (U.S. Department of Energy), 2009a. *Phase I Groundwater Monitoring Report Calendar Year 2008*, prepared by S.M. Stoller Corporation for the U.S. Department of Energy Office of Legacy Management, March.

DOE (U.S. Department of Energy), 2009b. *Data Validation Package – January, February, March 2008, Mound, Ohio*, prepared by S.M. Stoller Corporation for the U.S. Department of Energy Office of Legacy Management, June.

DOE (U.S. Department of Energy), 2009c. *Data Validation Package – April, May, June 2008, Mound, Ohio,* prepared by S.M. Stoller Corporation for the U.S. Department of Energy Office of Legacy Management, September.

DOE (U.S. Department of Energy), 2009d. *Data Validation Package – July, August, September 2008, Mound, Ohio*, prepared by S.M. Stoller Corporation for the U.S. Department of Energy Office of Legacy Management, December.

DOE (U.S. Department of Energy), 2010. *Data Validation Package – October, November, December 2008, Mound, Ohio*, prepared by S.M. Stoller Corporation for the U.S. Department of Energy Office of Legacy Management, January.

Environmental Procedures Catalog, LMS/POL/S04325, continually updated, prepared by S.M. Stoller Corporation for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado.

MD-80045 – *Mound Methods Compendium*, Issue 2, prepared by BWXT of Ohio, Inc.

This page intentionally left blank

Appendix A

2009 Phase I MNA and Confirmatory Sampling Data

This page intentionally left blank

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0353	MNA Remedy	cis-1,2-Dichloroethene	2/10/2009	0.1	0.1	ug/L	U	
0353	MNA Remedy	cis-1,2-Dichloroethene	7/29/2009	0.1	0.1	ug/L	U	
0353	Field Parameters	Dissolved Oxygen	2/10/2009	0.58		mg/L		
0353	Field Parameters	Dissolved Oxygen	7/29/2009	1.03		mg/L		
0353	Field Parameters	Oxidation Reduction Potential	2/10/2009	-76		mV		
0353	Field Parameters	Oxidation Reduction Potential	7/29/2009	-164.4		mV		
0353	Field Parameters	pH	2/10/2009	7.01		s.u.		
0353	Field Parameters	pH	7/29/2009	7.51		s.u.		
0353	Field Parameters	Specific Conductance	2/10/2009	1387		umhos/cm		
0353	Field Parameters	Specific Conductance	7/29/2009	1392		umhos/cm		
0353	Field Parameters	Temperature	2/10/2009	11.15		C		
0353	Field Parameters	Temperature	7/29/2009	16.17		C		
0353	MNA Remedy	Tetrachloroethene	2/10/2009	0.2	0.2	ug/L	U	
0353	MNA Remedy	Tetrachloroethene	7/29/2009	0.2	0.2	ug/L	U	
0353	MNA Remedy	trans-1,2-Dichloroethene	2/10/2009	0.2	0.2	ug/L	U	
0353	MNA Remedy	trans-1,2-Dichloroethene	7/29/2009	0.2	0.2	ug/L	U	
0353	MNA Remedy	Trichloroethene	2/10/2009	0.11	0.11	ug/L	U	
0353	MNA Remedy	Trichloroethene	7/29/2009	0.11	0.11	ug/L	U	
0353	Field Parameters	Turbidity	2/10/2009	5		NTU		
0353	Field Parameters	Turbidity	7/29/2009	3.9		NTU		
0353	MNA Remedy	Vinyl chloride	2/10/2009	0.2	0.2	ug/L	U	
0353	MNA Remedy	Vinyl chloride	7/29/2009	0.2	0.2	ug/L	U	
0400	Confirmatory Monitoring	Barium	2/10/2009	0.102	0.001	mg/L		
0400	Confirmatory Monitoring	Barium	7/30/2009	0.113	0.001	mg/L		
0400	Confirmatory Monitoring	Chloride	2/10/2009	93.5	0.66	mg/L		
0400	Confirmatory Monitoring	Chloride	7/30/2009	98.6	0.66	mg/L		
0400	MNA Remedy	cis-1,2-Dichloroethene	2/10/2009	0.1	0.1	ug/L	U	
0400	MNA Remedy	cis-1,2-Dichloroethene	7/30/2009	0.1	0.1	ug/L	U	
0400	Field Parameters	Dissolved Oxygen	2/10/2009	4.1		mg/L		
0400	Field Parameters	Dissolved Oxygen	7/30/2009	2.7		mg/L		
0400	Field Parameters	Oxidation Reduction Potential	2/10/2009	79.8		mV		
0400	Field Parameters	Oxidation Reduction Potential	7/30/2009	20.9		mV		
0400	Field Parameters	pH	2/10/2009	6.94		s.u.		
0400	Field Parameters	pH	7/30/2009	7.24		s.u.		
0400	Confirmatory Monitoring	Radium-226	2/10/2009	0.113	0.465	pCi/L	U	
0400	Confirmatory Monitoring	Radium-226	7/30/2009	0.42	0.452	pCi/L	U	

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0400	Confirmatory Monitoring	Radium-228	2/10/2009	-1.37	1.07	pCi/L	U	
0400	Confirmatory Monitoring	Radium-228	7/30/2009	0.45	0.699	pCi/L	U	
0400	Confirmatory Monitoring	Sodium	2/10/2009	54.6	0.045	mg/L		
0400	Confirmatory Monitoring	Sodium	7/30/2009	49.6	0.1	mg/L		
0400	Field Parameters	Specific Conductance	2/10/2009	1159		umhos/cm		
0400	Field Parameters	Specific Conductance	7/30/2009	1280		umhos/cm		
0400	Field Parameters	Temperature	2/10/2009	12.43		C		
0400	Field Parameters	Temperature	7/30/2009	13.33		C		
0400	MNA Remedy	Tetrachloroethene	2/10/2009	0.2	0.2	ug/L	U	
0400	MNA Remedy	Tetrachloroethene	7/30/2009	0.2	0.2	ug/L	U	
0400	MNA Remedy	trans-1,2-Dichloroethene	2/10/2009	0.2	0.2	ug/L	U	
0400	MNA Remedy	trans-1,2-Dichloroethene	7/30/2009	0.2	0.2	ug/L	U	
0400	MNA Remedy	Trichloroethene	2/10/2009	0.11	0.11	ug/L	U	
0400	MNA Remedy	Trichloroethene	7/30/2009	0.11	0.11	ug/L	U	
0400	Field Parameters	Turbidity	2/10/2009	34		NTU		
0400	Field Parameters	Turbidity	7/30/2009	48		NTU		
0400	MNA Remedy	Vinyl chloride	2/10/2009	0.2	0.2	ug/L	U	
0400	MNA Remedy	Vinyl chloride	7/30/2009	0.2	0.2	ug/L	U	
0402	Confirmatory Monitoring	Barium	2/10/2009	0.0687	0.001	mg/L		
0402	Confirmatory Monitoring	Barium	7/29/2009	0.0757	0.001	mg/L		
0402	Confirmatory Monitoring	Chloride	2/10/2009	109	0.66	mg/L		J
0402	Confirmatory Monitoring	Chloride	7/29/2009	113	0.66	mg/L		
0402	MNA Remedy	cis-1,2-Dichloroethene	2/10/2009	0.1	0.1	ug/L	U	
0402	MNA Remedy	cis-1,2-Dichloroethene	7/29/2009	0.1	0.1	ug/L	U	
0402	Field Parameters	Dissolved Oxygen	2/10/2009	3.21		mg/L		
0402	Field Parameters	Dissolved Oxygen	7/29/2009	3.99		mg/L		
0402	Field Parameters	Oxidation Reduction Potential	2/10/2009	118.2		mV		
0402	Field Parameters	Oxidation Reduction Potential	7/29/2009	-26		mV		
0402	Field Parameters	pH	2/10/2009	6.83		s.u.		
0402	Field Parameters	pH	7/29/2009	7.22		s.u.		
0402	Confirmatory Monitoring	Radium-226	2/10/2009	0.411	0.664	pCi/L	U	
0402	Confirmatory Monitoring	Radium-226	7/29/2009	0.286	0.146	pCi/L		J
0402	Confirmatory Monitoring	Radium-228	2/10/2009	1.3	0.646	pCi/L		J
0402	Confirmatory Monitoring	Radium-228	7/29/2009	0.281	0.985	pCi/L	U	
0402	Confirmatory Monitoring	Sodium	2/10/2009	67.5	0.045	mg/L		
0402	Confirmatory Monitoring	Sodium	7/29/2009	79.3	0.1	mg/L		

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0402	Field Parameters	Specific Conductance	2/10/2009	1225		umhos/cm		
0402	Field Parameters	Specific Conductance	7/29/2009	1332		umhos/cm		
0402	Field Parameters	Temperature	2/10/2009	12.44		C		
0402	Field Parameters	Temperature	7/29/2009	13.57		C		
0402	MNA Remedy	Tetrachloroethene	2/10/2009	0.649	0.2	ug/L	J	
0402	MNA Remedy	Tetrachloroethene	7/29/2009	0.352	0.2	ug/L	J	
0402	MNA Remedy	trans-1,2-Dichloroethene	2/10/2009	0.2	0.2	ug/L	U	
0402	MNA Remedy	trans-1,2-Dichloroethene	7/29/2009	0.2	0.2	ug/L	U	
0402	MNA Remedy	Trichloroethene	2/10/2009	0.867	0.11	ug/L	J	
0402	MNA Remedy	Trichloroethene	7/29/2009	0.548	0.11	ug/L	J	
0402	Field Parameters	Turbidity	2/10/2009	5		NTU		
0402	Field Parameters	Turbidity	7/29/2009	5.6		NTU		
0402	MNA Remedy	Vinyl chloride	2/10/2009	0.2	0.2	ug/L	U	
0402	MNA Remedy	Vinyl chloride	7/29/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	cis-1,2-Dichloroethene	1/5/2009	13	0.17	ug/L		
0410	MNA Remedy	cis-1,2-Dichloroethene	2/2/2009	2.7	0.17	ug/L		
0410	MNA Remedy	cis-1,2-Dichloroethene	3/9/2009	1.25	0.1	ug/L		
0410	MNA Remedy	cis-1,2-Dichloroethene	4/8/2009	0.233	0.1	ug/L	J	
0410	MNA Remedy	cis-1,2-Dichloroethene	5/5/2009	1.5	0.17	ug/L		
0410	MNA Remedy	cis-1,2-Dichloroethene	6/3/2009	0.1	0.1	ug/L	U	
0410	MNA Remedy	cis-1,2-Dichloroethene	7/6/2009	0.1	0.1	ug/L	U	
0410	MNA Remedy	cis-1,2-Dichloroethene	8/3/2009	0.47	0.1	ug/L	J	
0410	MNA Remedy	cis-1,2-Dichloroethene	9/1/2009	5.18	0.1	ug/L		J
0410	MNA Remedy	cis-1,2-Dichloroethene	10/5/2009	0.49	0.1	ug/L	J	
0410	MNA Remedy	cis-1,2-Dichloroethene	11/2/2009	0.1	0.1	ug/L	U	
0410	MNA Remedy	cis-1,2-Dichloroethene	12/1/2009	0.301	0.1	ug/L	J	
0410	Field Parameters	Dissolved Oxygen	1/5/2009	0.93		mg/L		
0410	Field Parameters	Dissolved Oxygen	2/2/2009	3.51		mg/L		
0410	Field Parameters	Dissolved Oxygen	3/9/2009	2.13		mg/L		
0410	Field Parameters	Dissolved Oxygen	4/8/2009	5.41		mg/L		
0410	Field Parameters	Dissolved Oxygen	5/5/2009	4.45		mg/L		
0410	Field Parameters	Dissolved Oxygen	6/3/2009	6.12		mg/L		
0410	Field Parameters	Dissolved Oxygen	7/6/2009	4.02		mg/L		
0410	Field Parameters	Dissolved Oxygen	8/3/2009	1.42		mg/L		
0410	Field Parameters	Dissolved Oxygen	9/1/2009	3.76		mg/L		
0410	Field Parameters	Dissolved Oxygen	10/5/2009	3.01		mg/L		

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0410	Field Parameters	Dissolved Oxygen	11/2/2009	4.16		mg/L		
0410	Field Parameters	Dissolved Oxygen	12/1/2009	4.02		mg/L		
0410	Field Parameters	Oxidation Reduction Potential	1/5/2009	-59.4		mV		
0410	Field Parameters	Oxidation Reduction Potential	2/2/2009	72.1		mV		
0410	Field Parameters	Oxidation Reduction Potential	3/9/2009	96.5		mV		
0410	Field Parameters	Oxidation Reduction Potential	4/8/2009	42.9		mV		
0410	Field Parameters	Oxidation Reduction Potential	5/5/2009	88.4		mV		
0410	Field Parameters	Oxidation Reduction Potential	6/3/2009	88.1		mV		
0410	Field Parameters	Oxidation Reduction Potential	7/6/2009	83.6		mV		
0410	Field Parameters	Oxidation Reduction Potential	8/3/2009	84.7		mV		
0410	Field Parameters	Oxidation Reduction Potential	9/1/2009	181.9		mV		
0410	Field Parameters	Oxidation Reduction Potential	10/5/2009	70.3		mV		
0410	Field Parameters	Oxidation Reduction Potential	11/2/2009	89.6		mV		
0410	Field Parameters	Oxidation Reduction Potential	12/1/2009	140.9		mV		
0410	Field Parameters	pH	1/5/2009	6.96		s.u.		
0410	Field Parameters	pH	2/2/2009	7.21		s.u.		
0410	Field Parameters	pH	3/9/2009	7.03		s.u.		
0410	Field Parameters	pH	4/8/2009	6.99		s.u.		
0410	Field Parameters	pH	5/5/2009	7.12		s.u.		
0410	Field Parameters	pH	6/3/2009	7.27		s.u.		
0410	Field Parameters	pH	7/6/2009	6.86		s.u.		
0410	Field Parameters	pH	8/3/2009	7.25		s.u.		
0410	Field Parameters	pH	9/1/2009	6.99		s.u.		
0410	Field Parameters	pH	10/5/2009	7.08		s.u.		
0410	Field Parameters	pH	11/2/2009	7.03		s.u.		
0410	Field Parameters	pH	12/1/2009	7.15		s.u.		
0410	Field Parameters	Specific Conductance	1/5/2009	1491		umhos/cm		
0410	Field Parameters	Specific Conductance	2/2/2009	1656		umhos/cm		
0410	Field Parameters	Specific Conductance	3/9/2009	1645		umhos/cm		
0410	Field Parameters	Specific Conductance	4/8/2009	1554		umhos/cm		
0410	Field Parameters	Specific Conductance	5/5/2009	1534		umhos/cm		
0410	Field Parameters	Specific Conductance	6/3/2009	1285		umhos/cm		
0410	Field Parameters	Specific Conductance	7/6/2009	1121		umhos/cm		
0410	Field Parameters	Specific Conductance	8/3/2009	1582		umhos/cm		
0410	Field Parameters	Specific Conductance	9/1/2009	1772		umhos/cm		
0410	Field Parameters	Specific Conductance	10/5/2009	1615		umhos/cm		

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0410	Field Parameters	Specific Conductance	11/2/2009	1550		umhos/cm		
0410	Field Parameters	Specific Conductance	12/1/2009	1410		umhos/cm		
0410	Field Parameters	Temperature	1/5/2009	13.09		C		
0410	Field Parameters	Temperature	2/2/2009	13.22		C		
0410	Field Parameters	Temperature	3/9/2009	13.31		C		
0410	Field Parameters	Temperature	4/8/2009	12.79		C		
0410	Field Parameters	Temperature	5/5/2009	13.67		C		
0410	Field Parameters	Temperature	6/3/2009	14.03		C		
0410	Field Parameters	Temperature	7/6/2009	15.32		C		
0410	Field Parameters	Temperature	8/3/2009	14.86		C		
0410	Field Parameters	Temperature	9/1/2009	14.03		C		
0410	Field Parameters	Temperature	10/5/2009	13.44		C		
0410	Field Parameters	Temperature	11/2/2009	13.64		C		
0410	Field Parameters	Temperature	12/1/2009	13.42		C		
0410	MNA Remedy	Tetrachloroethene	1/5/2009	1.8	0.17	ug/L		
0410	MNA Remedy	Tetrachloroethene	2/2/2009	1.3	0.17	ug/L		
0410	MNA Remedy	Tetrachloroethene	3/9/2009	1.08	0.2	ug/L		
0410	MNA Remedy	Tetrachloroethene	4/8/2009	1.27	0.2	ug/L		
0410	MNA Remedy	Tetrachloroethene	5/5/2009	1.1	0.17	ug/L		
0410	MNA Remedy	Tetrachloroethene	6/3/2009	0.841	0.2	ug/L	J	
0410	MNA Remedy	Tetrachloroethene	7/6/2009	0.937	0.2	ug/L	J	
0410	MNA Remedy	Tetrachloroethene	8/3/2009	1.24	0.2	ug/L		
0410	MNA Remedy	Tetrachloroethene	9/1/2009	1.32	0.2	ug/L		
0410	MNA Remedy	Tetrachloroethene	10/5/2009	0.211	0.2	ug/L	J	
0410	MNA Remedy	Tetrachloroethene	11/2/2009	1.03	0.2	ug/L		
0410	MNA Remedy	Tetrachloroethene	12/1/2009	1.04	0.2	ug/L		
0410	MNA Remedy	trans-1,2-Dichloroethene	1/5/2009	0.33	0.17	ug/L	J	
0410	MNA Remedy	trans-1,2-Dichloroethene	2/2/2009	0.17	0.17	ug/L	U	
0410	MNA Remedy	trans-1,2-Dichloroethene	3/9/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	trans-1,2-Dichloroethene	4/8/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	trans-1,2-Dichloroethene	5/5/2009	0.17	0.17	ug/L	U	
0410	MNA Remedy	trans-1,2-Dichloroethene	6/3/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	trans-1,2-Dichloroethene	7/6/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	trans-1,2-Dichloroethene	8/3/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	trans-1,2-Dichloroethene	9/1/2009	0.21	0.2	ug/L	J	
0410	MNA Remedy	trans-1,2-Dichloroethene	10/5/2009	0.2	0.2	ug/L	U	

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0410	MNA Remedy	trans-1,2-Dichloroethene	11/2/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	trans-1,2-Dichloroethene	12/1/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	Trichloroethene	1/5/2009	10	0.17	ug/L		
0410	MNA Remedy	Trichloroethene	2/2/2009	2.8	0.17	ug/L		
0410	MNA Remedy	Trichloroethene	3/9/2009	2.28	0.11	ug/L		
0410	MNA Remedy	Trichloroethene	4/8/2009	0.817	0.11	ug/L	J	
0410	MNA Remedy	Trichloroethene	5/5/2009	2.9	0.17	ug/L		
0410	MNA Remedy	Trichloroethene	6/3/2009	0.435	0.11	ug/L	J	
0410	MNA Remedy	Trichloroethene	7/6/2009	0.489	0.11	ug/L	J	
0410	MNA Remedy	Trichloroethene	8/3/2009	2.84	0.11	ug/L		
0410	MNA Remedy	Trichloroethene	9/1/2009	5.12	0.11	ug/L		J
0410	MNA Remedy	Trichloroethene	10/5/2009	0.436	0.11	ug/L	J	
0410	MNA Remedy	Trichloroethene	11/2/2009	0.479	0.11	ug/L	J	
0410	MNA Remedy	Trichloroethene	12/1/2009	0.61	0.11	ug/L	J	
0410	Field Parameters	Turbidity	1/5/2009	114		NTU		
0410	Field Parameters	Turbidity	2/2/2009	19		NTU		
0410	Field Parameters	Turbidity	3/9/2009	48		NTU		
0410	Field Parameters	Turbidity	4/8/2009	126		NTU		
0410	Field Parameters	Turbidity	5/5/2009	69.1		NTU		
0410	Field Parameters	Turbidity	6/3/2009	108		NTU		
0410	Field Parameters	Turbidity	7/6/2009	171		NTU		
0410	Field Parameters	Turbidity	8/3/2009	4.9		NTU		
0410	Field Parameters	Turbidity	9/1/2009	2.23		NTU		
0410	Field Parameters	Turbidity	10/5/2009	0.95		NTU		
0410	Field Parameters	Turbidity	11/2/2009	1.97		NTU		
0410	MNA Remedy	Vinyl chloride	1/5/2009	0.37	0.17	ug/L	J	
0410	MNA Remedy	Vinyl chloride	2/2/2009	0.17	0.17	ug/L	U	
0410	MNA Remedy	Vinyl chloride	3/9/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	Vinyl chloride	4/8/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	Vinyl chloride	5/5/2009	0.17	0.17	ug/L	U	
0410	MNA Remedy	Vinyl chloride	6/3/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	Vinyl chloride	7/6/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	Vinyl chloride	8/3/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	Vinyl chloride	9/1/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	Vinyl chloride	10/5/2009	0.2	0.2	ug/L	U	
0410	MNA Remedy	Vinyl chloride	11/2/2009	0.2	0.2	ug/L	U	

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0410	MNA Remedy	Vinyl chloride	12/1/2009	0.2	0.2	ug/L	U	
0443	Confirmatory Monitoring	Chromium	2/10/2009	0.002	0.002	mg/L	U	
0443	Confirmatory Monitoring	Chromium	5/4/2009	0.002	0.002	mg/L	U	
0443	Confirmatory Monitoring	Chromium	7/30/2009	0.00126	0.001	mg/L	J	
0443	Confirmatory Monitoring	Chromium	10/27/2009	0.001	0.001	mg/L	U	
0443	MNA Remedy	cis-1,2-Dichloroethene	2/10/2009	0.762	0.1	ug/L	J	
0443	MNA Remedy	cis-1,2-Dichloroethene	7/30/2009	0.32	0.1	ug/L	J	
0443	Field Parameters	Dissolved Oxygen	2/10/2009	6.42		mg/L		
0443	Field Parameters	Dissolved Oxygen	5/4/2009	2.91		mg/L		
0443	Field Parameters	Dissolved Oxygen	7/30/2009	7.91		mg/L		
0443	Field Parameters	Dissolved Oxygen	10/27/2009	6.24		mg/L		
0443	Confirmatory Monitoring	Nickel	2/10/2009	0.001	0.001	mg/L	U	
0443	Confirmatory Monitoring	Nickel	5/4/2009	0.0128	0.001	mg/L	J	
0443	Confirmatory Monitoring	Nickel	7/30/2009	0.0015	0.0015	mg/L	U	
0443	Confirmatory Monitoring	Nickel	10/27/2009	0.00197	0.0015	mg/L	J	
0443	Field Parameters	Oxidation Reduction Potential	2/10/2009	228.6		mV		
0443	Field Parameters	Oxidation Reduction Potential	5/4/2009	138.9		mV		
0443	Field Parameters	Oxidation Reduction Potential	7/30/2009	28.5		mV		
0443	Field Parameters	Oxidation Reduction Potential	10/27/2009	44.1		mV		
0443	Field Parameters	pH	2/10/2009	6.8		s.u.		
0443	Field Parameters	pH	5/4/2009	7.16		s.u.		
0443	Field Parameters	pH	7/30/2009	7.21		s.u.		
0443	Field Parameters	pH	10/27/2009	6.96		s.u.		
0443	Field Parameters	Specific Conductance	2/10/2009	1513		umhos/cm		
0443	Field Parameters	Specific Conductance	5/4/2009	1403		umhos/cm		
0443	Field Parameters	Specific Conductance	7/30/2009	1654		umhos/cm		
0443	Field Parameters	Specific Conductance	10/27/2009	1603		umhos/cm		
0443	Field Parameters	Temperature	2/10/2009	12.86		C		
0443	Field Parameters	Temperature	5/4/2009	14.97		C		
0443	Field Parameters	Temperature	7/30/2009	15.2		C		
0443	Field Parameters	Temperature	10/27/2009	13.05		C		
0443	MNA Remedy	Tetrachloroethene	2/10/2009	0.2	0.2	ug/L	U	
0443	MNA Remedy	Tetrachloroethene	7/30/2009	0.2	0.2	ug/L	U	
0443	MNA Remedy	trans-1,2-Dichloroethene	2/10/2009	0.2	0.2	ug/L	U	
0443	MNA Remedy	trans-1,2-Dichloroethene	7/30/2009	0.2	0.2	ug/L	U	
0443	MNA Remedy	Trichloroethene	2/10/2009	8.36	0.11	ug/L		

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0443	MNA Remedy	Trichloroethene	7/30/2009	3.99	0.11	ug/L		
0443	Field Parameters	Turbidity	2/10/2009	4.67		NTU		
0443	Field Parameters	Turbidity	5/4/2009	2.75		NTU		
0443	Field Parameters	Turbidity	7/30/2009	72		NTU		
0443	Field Parameters	Turbidity	10/27/2009	36.7		NTU		
0443	MNA Remedy	Vinyl chloride	2/10/2009	0.2	0.2	ug/L	U	
0443	MNA Remedy	Vinyl chloride	7/30/2009	0.2	0.2	ug/L	U	
0444	MNA Remedy	cis-1,2-Dichloroethene	2/10/2009	0.1	0.1	ug/L	U	
0444	MNA Remedy	cis-1,2-Dichloroethene	7/29/2009	0.1	0.1	ug/L	U	
0444	Field Parameters	Dissolved Oxygen	2/10/2009	1.25		mg/L		
0444	Field Parameters	Dissolved Oxygen	7/29/2009	4.58		mg/L		
0444	Field Parameters	Oxidation Reduction Potential	2/10/2009	221.4		mV		
0444	Field Parameters	Oxidation Reduction Potential	7/29/2009	56.7		mV		
0444	Field Parameters	pH	2/10/2009	7.2		s.u.		
0444	Field Parameters	pH	7/29/2009	7.1		s.u.		
0444	Field Parameters	Specific Conductance	2/10/2009	1155		umhos/cm		
0444	Field Parameters	Specific Conductance	7/29/2009	1244		umhos/cm		
0444	Field Parameters	Temperature	2/10/2009	12.84		C		
0444	Field Parameters	Temperature	7/29/2009	17.22		C		
0444	MNA Remedy	Tetrachloroethene	2/10/2009	0.2	0.2	ug/L	U	
0444	MNA Remedy	Tetrachloroethene	7/29/2009	0.2	0.2	ug/L	U	
0444	MNA Remedy	trans-1,2-Dichloroethene	2/10/2009	0.2	0.2	ug/L	U	
0444	MNA Remedy	trans-1,2-Dichloroethene	7/29/2009	0.2	0.2	ug/L	U	
0444	MNA Remedy	Trichloroethene	2/10/2009	0.11	0.11	ug/L	U	
0444	MNA Remedy	Trichloroethene	7/29/2009	0.11	0.11	ug/L	U	
0444	Field Parameters	Turbidity	2/10/2009	1.79		NTU		
0444	Field Parameters	Turbidity	7/29/2009	33.4		NTU		
0444	MNA Remedy	Vinyl chloride	2/10/2009	0.2	0.2	ug/L	U	
0444	MNA Remedy	Vinyl chloride	7/29/2009	0.2	0.2	ug/L	U	
0445	Confirmatory Monitoring	Barium	2/10/2009	14.4	0.01	mg/L		
0445	Confirmatory Monitoring	Barium	7/30/2009	9.08	0.001	mg/L		
0445	Confirmatory Monitoring	Chloride	2/10/2009	13100	66	mg/L		
0445	Confirmatory Monitoring	Chloride	7/30/2009	12500	330	mg/L		
0445	MNA Remedy	cis-1,2-Dichloroethene	2/10/2009	0.1	0.1	ug/L	U	
0445	MNA Remedy	cis-1,2-Dichloroethene	7/30/2009	0.1	0.1	ug/L	U	
0445	Field Parameters	Dissolved Oxygen	2/10/2009	2.28		mg/L		

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0445	Field Parameters	Dissolved Oxygen	7/30/2009	3.26		mg/L		
0445	Field Parameters	Oxidation Reduction Potential	2/10/2009	-50		mV		
0445	Field Parameters	Oxidation Reduction Potential	7/30/2009	-156		mV		
0445	Field Parameters	pH	2/10/2009	6.64		s.u.		
0445	Field Parameters	pH	7/30/2009	7.1		s.u.		
0445	Confirmatory Monitoring	Radium-226	2/10/2009	62.2	0.464	pCi/L		
0445	Confirmatory Monitoring	Radium-226	7/30/2009	47.8	0.297	pCi/L		
0445	Confirmatory Monitoring	Radium-228	2/10/2009	4.17	1.27	pCi/L		
0445	Confirmatory Monitoring	Radium-228	7/30/2009	45.3	0.913	pCi/L		
0445	Confirmatory Monitoring	Sodium	2/10/2009	6730	2.25	mg/L		
0445	Confirmatory Monitoring	Sodium	7/30/2009	4680	2	mg/L		
0445	Field Parameters	Specific Conductance	2/10/2009	37430		umhos/cm		
0445	Field Parameters	Specific Conductance	7/30/2009	25460		umhos/cm		
0445	Field Parameters	Temperature	2/10/2009	12.4		C		
0445	Field Parameters	Temperature	7/30/2009	14.26		C		
0445	MNA Remedy	Tetrachloroethene	2/10/2009	0.2	0.2	ug/L	U	
0445	MNA Remedy	Tetrachloroethene	7/30/2009	0.2	0.2	ug/L	U	
0445	MNA Remedy	trans-1,2-Dichloroethene	2/10/2009	0.2	0.2	ug/L	U	
0445	MNA Remedy	trans-1,2-Dichloroethene	7/30/2009	0.2	0.2	ug/L	U	
0445	MNA Remedy	Trichloroethene	2/10/2009	0.11	0.11	ug/L	U	
0445	MNA Remedy	Trichloroethene	7/30/2009	0.11	0.11	ug/L	U	
0445	Field Parameters	Turbidity	2/10/2009	2.53		NTU		
0445	Field Parameters	Turbidity	7/30/2009	5.44		NTU		
0445	MNA Remedy	Vinyl chloride	2/10/2009	0.2	0.2	ug/L	U	
0445	MNA Remedy	Vinyl chloride	7/30/2009	0.2	0.2	ug/L	U	
0617	Confirmatory Monitoring	Chromium	2/9/2009	0.00511	0.002	mg/L		
0617	Confirmatory Monitoring	Chromium	5/5/2009	0.00298	0.002	mg/L	J	
0617	Confirmatory Monitoring	Chromium	7/29/2009	0.0123	0.001	mg/L		
0617	Confirmatory Monitoring	Chromium	10/26/2009	0.00576	0.001	mg/L		
0617	MNA Remedy	cis-1,2-Dichloroethene	2/9/2009	1.31	0.1	ug/L		
0617	MNA Remedy	cis-1,2-Dichloroethene	7/29/2009	2.06	0.1	ug/L		
0617	Field Parameters	Dissolved Oxygen	2/9/2009	9.19		mg/L		
0617	Field Parameters	Dissolved Oxygen	5/5/2009	5.78		mg/L		
0617	Field Parameters	Dissolved Oxygen	7/29/2009	5.65		mg/L		
0617	Field Parameters	Dissolved Oxygen	10/26/2009	7.36		mg/L		
0617	Confirmatory Monitoring	Nickel	2/9/2009	0.00383	0.001	mg/L	J	

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
0617	Confirmatory Monitoring	Nickel	5/5/2009	0.00124	0.001	mg/L	J	
0617	Confirmatory Monitoring	Nickel	7/29/2009	0.02	0.0015	mg/L	J	
0617	Confirmatory Monitoring	Nickel	10/26/2009	0.0194	0.0015	mg/L	J	
0617	Field Parameters	Oxidation Reduction Potential	2/9/2009	156		mV		
0617	Field Parameters	Oxidation Reduction Potential	5/5/2009	210.3		mV		
0617	Field Parameters	Oxidation Reduction Potential	7/29/2009	-13.5		mV		
0617	Field Parameters	Oxidation Reduction Potential	10/26/2009	-16.2		mV		
0617	Field Parameters	pH	2/9/2009	7.03		s.u.		
0617	Field Parameters	pH	5/5/2009	7.04		s.u.		
0617	Field Parameters	pH	7/29/2009	6.82		s.u.		
0617	Field Parameters	pH	10/26/2009	7.19		s.u.		
0617	Field Parameters	Specific Conductance	2/9/2009	1019		umhos/cm		
0617	Field Parameters	Specific Conductance	5/5/2009	1735		umhos/cm		
0617	Field Parameters	Specific Conductance	7/29/2009	1907		umhos/cm		
0617	Field Parameters	Specific Conductance	10/26/2009	1809		umhos/cm		
0617	Field Parameters	Temperature	2/9/2009	6.76		C		
0617	Field Parameters	Temperature	5/5/2009	12.06		C		
0617	Field Parameters	Temperature	7/29/2009	17.81		C		
0617	Field Parameters	Temperature	10/26/2009	12.67		C		
0617	MNA Remedy	Tetrachloroethene	2/9/2009	0.2	0.2	ug/L	U	
0617	MNA Remedy	Tetrachloroethene	7/29/2009	0.2	0.2	ug/L	U	
0617	MNA Remedy	trans-1,2-Dichloroethene	2/9/2009	0.2	0.2	ug/L	U	
0617	MNA Remedy	trans-1,2-Dichloroethene	7/29/2009	0.2	0.2	ug/L	U	
0617	MNA Remedy	Trichloroethene	2/9/2009	4.48	0.11	ug/L		
0617	MNA Remedy	Trichloroethene	7/29/2009	8.17	0.11	ug/L		
0617	Field Parameters	Turbidity	2/9/2009	76.6		NTU		
0617	Field Parameters	Turbidity	5/5/2009	21.4		NTU		
0617	Field Parameters	Turbidity	7/29/2009	83.2		NTU		
0617	Field Parameters	Turbidity	10/26/2009	1000		NTU	>	
0617	MNA Remedy	Vinyl chloride	2/9/2009	0.2	0.2	ug/L	U	
0617	MNA Remedy	Vinyl chloride	7/29/2009	0.2	0.2	ug/L	U	
P033	Confirmatory Monitoring	Barium	2/10/2009	0.0902	0.001	mg/L		
P033	Confirmatory Monitoring	Barium	7/29/2009	0.105	0.001	mg/L		
P033	Confirmatory Monitoring	Chloride	2/10/2009	150	0.66	mg/L		
P033	Confirmatory Monitoring	Chloride	7/29/2009	125	0.66	mg/L		
P033	MNA Remedy	cis-1,2-Dichloroethene	2/10/2009	0.1	0.1	ug/L	U	

Location ID	Program	Analyte	Sample Date	Result	DL	Units	Lab Qualifier	Validation Qualifier
P033	MNA Remedy	cis-1,2-Dichloroethene	7/29/2009	0.1	0.1	ug/L	U	
P033	Field Parameters	Dissolved Oxygen	2/10/2009	2.3		mg/L		
P033	Field Parameters	Dissolved Oxygen	7/29/2009	1.65		mg/L		
P033	Field Parameters	Oxidation Reduction Potential	2/10/2009	94.1		mV		
P033	Field Parameters	Oxidation Reduction Potential	7/29/2009	1.7		mV		
P033	Field Parameters	pH	2/10/2009	6.95		s.u.		
P033	Field Parameters	pH	7/29/2009	7.08		s.u.		
P033	Confirmatory Monitoring	Radium-226	2/10/2009	0.839	0.645	pCi/L		J
P033	Confirmatory Monitoring	Radium-226	7/29/2009	0.967	0.264	pCi/L		
P033	Confirmatory Monitoring	Radium-228	2/10/2009	0.322	0.625	pCi/L	U	
P033	Confirmatory Monitoring	Radium-228	7/29/2009	1.66	1.24	pCi/L		J
P033	Confirmatory Monitoring	Sodium	2/10/2009	89.1	0.045	mg/L		
P033	Confirmatory Monitoring	Sodium	7/29/2009	77.9	0.1	mg/L		
P033	Field Parameters	Specific Conductance	2/10/2009	1346		umhos/cm		
P033	Field Parameters	Specific Conductance	7/29/2009	1418		umhos/cm		
P033	Field Parameters	Temperature	2/10/2009	13.19		C		
P033	Field Parameters	Temperature	7/29/2009	14.57		C		
P033	MNA Remedy	Tetrachloroethene	2/10/2009	0.2	0.2	ug/L	U	
P033	MNA Remedy	Tetrachloroethene	7/29/2009	0.2	0.2	ug/L	U	
P033	MNA Remedy	trans-1,2-Dichloroethene	2/10/2009	0.2	0.2	ug/L	U	
P033	MNA Remedy	trans-1,2-Dichloroethene	7/29/2009	0.2	0.2	ug/L	U	
P033	MNA Remedy	Trichloroethene	2/10/2009	0.11	0.11	ug/L	U	
P033	MNA Remedy	Trichloroethene	7/29/2009	0.11	0.11	ug/L	U	
P033	Field Parameters	Turbidity	2/10/2009	5		NTU		
P033	Field Parameters	Turbidity	7/29/2009	19.3		NTU		
P033	MNA Remedy	Vinyl chloride	2/10/2009	0.2	0.2	ug/L	U	
P033	MNA Remedy	Vinyl chloride	7/29/2009	0.2	0.2	ug/L	U	

This page intentionally left blank