3.0 GROUNDWATER SAMPLING ANALYTICAL RESULTS

Upon completion, the extraction wells, extraction well piezometers, and monitoring wells were added to the Newmark Source OU LTMP for semiannual groundwater sampling. Additionally, special groundwater sampling events were conducted at select locations before well construction activities were completed. Special sampling events included depth-discreet sampling at EW-109 and EW-111 and passive-diffusion-bag sampling at EW-110PZA through EW110PZD and EW-111PZA though EW-111PZD.

Groundwater samples collected as part of the LTMP were submitted to an EPA Contract Laboratory Program (CLP) laboratory and analyzed for VOCs by EPA CLP Method OLC03.2. Samples collected during special sampling events were submitted to the EPA Region IX Laboratory and analyzed for VOCs by EPA Method 524.2.

PCE and TCE are the focus of the analytical discussion based on their historical significance as the principle site groundwater contaminants. Table 3-1 summarizes the analytical results for groundwater samples collected from EW-108 through EW-112 and their associated piezometers. The analytical results for samples collected from MW-135 through MW-139 are presented in Table 3-2. Additionally, results from previously installed wells in the Muscoy Plume OU are presented in Table 3-3. No analytical results were available for MW-140 at the time this report was written.

Analytical results for groundwater samples collected in January/February 2004 and November 2005 were utilized in creating concentration isocontour maps for PCE (Figures 3-1 through 3-4) for the southern end of the Muscoy Plume OU in order to better visualize the contamination plume. These maps were developed using maximum concentrations detected within the depth ranges of 0 to 500 feet bgs and 500 to 1,000 feet bgs, separately. Depth was used rather than elevation to provide greater stratigraphic continuity over a large area with sloping topography, dipping layers, and aquifer heterogeneities.

The maximum PCE concentration detected in groundwater samples collected in January/February 2004 was 13 µg/L in a sample collected from MW-137A, which is screened from 330 to 350 feet bgs. Other detected PCE concentrations from January/February 2004 include 12 µg/L in MW-130B (screened 550 to 580 feet bgs approximately 1 mile upgradient from MW-137A), 8.3 µg/L and 8.2 µg/L, collected from 330 feet bgs in EW-109 and 421 feet bgs in EW-110PC, respectively. The maximum PCE concentration detected in groundwater samples collected in November 2005 was 9.7 µg/L in a sample collected from MW-128A, which is screened from 410 to 440 feet bgs and located approximately 0.5 mile upgradient from MW-130B. Other detected concentrations from November 2005 include 9.4 µg/L in EW-110PZB and EW-110PZC (screened 301.5 to 321.5 and 411.5 to 431.5, respectively), and 9.3 µg/L collected from EW-109PZA (screened 310 to 330 feet bgs). The maximum historical PCE concentration detected was 18 µg/L in a sample collected in August 2002 from MW-128A.

The pattern of TCE contamination is similar to that of PCE, but with lower concentrations. This suggests that the TCE is possibly a breakdown product of PCE rather than having a separate source. The maximum TCE concentration detected in groundwater samples collected in January/February 2004 was 4.5 µg/L in a sample collected from MW-130B (screened 550 to 580 feet bgs). The maximum TCE concentration detected in samples collected in November 2005 (3.0 µg/L) was collected from EW-110PZC (screened 411.5 to 431.5 bgs). The maximum historical TCE concentration detected was 7 µg/L in a sample collected in August 2002 from MW-128A (the same sample that contained the maximum historical PCE concentration), screened from 410 to 440 feet bgs and located approximately 0.5 mile upgradient from MW-130B.

TABLE 3-1

Analytical Results for Groundwater Samples Collected at Extraction Well Locations EW-108 through EW-112

Location	Date	PCE (µg/L)	TCE (µg/L)	Screen Interval/Sample Depth (ft bgs)
EW-108	7-May-03	ND	ND	510–590 670–1000
	13-April-05	1	ND	
	16-Nov-05	2.5	0.71	
EW-108A	21-Aug-02	ND	ND	370–390
	7-May-03	4	1	
	17-Feb-04	1.9	2.7	
	13-April-05	ND	ND	
	16-Nov-05	7.8	1.8	
EW-108B	21-Aug-02	ND	ND	740–760
	7-May-03	0.5	0.5	
	17-Feb-04	ND	ND	
	13-April-05	ND	ND	
	16-Nov-05	0.5	0.5	
EW-109	16-Jan-04	ND	0.6	310
	15-Jan-04	8.2	2.1	330
		ND	ND	420
		ND	ND	450
		ND	ND	480
		ND	ND	550
		ND	ND	575
		ND	ND	710
	13-Apr-05	8.3	1.8	260–330 420–500 550–610 710–840
	16-Nov-05	ND	ND	
EW-109PZA	16-Nov-05	9.3	2.3	310-330
EW-109PZB	16-Nov-05	7	1.4	430-450
EW-110	12-Apr-05	9.2	1.6	225–270 305–650 715–855
	16-Nov-05	3.7	0.76	
EW-110PZA	7-Jan-04	1.8	ND	192.5
		2.4	0.5	238.5
	19-Apr-05	1.8	ND	218.5
	15-Nov-05	2.0	ND	
EW-110PZB	7-Jan-04	6.5	1.6	301–321.5
	19-Apr-05	12	2.1	
	15-Nov-05	9.4	1.5	
EW-110PZC	7-Jan-04	8.3	2.4	411–431.5
	19-Apr-05	12	2.9	
	15-Nov-05	9.4	3.0	

TABLE 3-1 (Continued)

Location	Date	PCE (µg/L)	TCE (µg/L)	Screen Interval/Sample Depth (ft bgs)
EW-110PZD	7-Jan-04	0.8	1.2	491–511.5
	19-Apr-05	2.7	1.8	
	15-Nov-05	5.6	2.9	
EW-110PZE	12-Apr-05	ND	ND	830–850
	16-Nov-05	ND	ND	
EW-111	7-May-04	4.1	ND	465
		4.1	ND	590
		6.8	1	700
		7.3	1.1	790
		7.2	1	1,040
	26-Apr-05	6.6	1	235–265 305–660 765–1,250
	16-Nov-05	7.1	0.86	
EW-111PZA	7-Jan-04	2.8	ND	201.6
	7-Jan-04	2.3	ND	247.1
	6-May-04	3	ND	193.5–243.5
	26-Apr-05	2.2	ND	
	15-Nov-05	4.9	ND	
EW-111PZB	7-Jan-04	2.8	1.1	375.5–395.5
	6-May-04	1.3	ND	
	26-Apr-05	7.1	1.5	
	15-Nov-05	1.7	ND	
EW-111PZC	7-Jan-04	1.6	ND	456–576
	6-May-04	ND	ND	
	26-Apr-05	2.1	ND	
	15-Nov-05	2.4	ND	
EW-111PZD	7-May-04	9.1	1.3	780–800
	26-Apr-05	11	1.2	
	16-Nov-05	ND	ND	
EW-112	7-May-03	3	ND	280–740
	26-Apr-05	3.5	ND	
	16-Nov-05	2	ND	
EW-112PA	21-Aug-02	ND	ND	300–320
	7-May-03	3	ND	
	17-Feb-04	2.6	0.54	
	12-Apr-05	3.7	ND	
	16-Nov-05	1.6	ND	

TABLE 3-1 (Continued)

Location	Date	PCE (µg/L)	TCE (µg/L)	Screen Interval/Sample Depth (ft bgs)
EW-112PB	21-Aug-02	ND	ND	660–680
	7-May-03	0.9	ND	
	17-Feb-04	1.4	ND	
	12-Apr-05	ND	ND	
	16-Nov-05	ND	ND	

bgs = below ground surface
ft = feet
ND = not detected
PCE = tetrachloroethene
TCE = trichloroethene
µg/L = micrograms per liter

TABLE 3-2

Analytical Results for Groundwater Samples Collected at Monitoring Well Locations MW-135 through MW-139

Location	Date	PCE (µg/L)	TCE (µg/L)	Screen Interval/Sample Depth (ft bgs)
MW-135A	22-Aug-02	2	0.6	360–380
	13-May-03	1	0.5	
	17-Feb-04	3.1	1.3	
	16-Nov-04	3.1	1.3	
	21-Apr-05	1.3	0.8	
	15-Nov-05	5.1	1.8	
MW-135B	22-Aug-02	ND	ND	620–640
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	15-Nov-05	ND	ND	
MW-135C	22-Aug-02	0.7	ND	850–870
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	15-Nov-05	ND	ND	
MW-136A	22-Aug-02	ND	ND	420–440
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	2.2	1	
	21-Apr-05	ND	ND	
	15-Nov-05	ND	ND	
MW-136B	22-Aug-02	ND	ND	500–520
	13-May-03	ND	ND	
	17-Feb-04	0.8	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	15-Nov-05	ND	ND	
MW-136C	22-Aug-02	ND	ND	730–750
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	15-Nov-05	ND	ND	
MW-137A	22-Aug-02	10	2	330–350
	16-Apr-03	4	2	
	13-May-03	9	3	
	17-Feb-04	13	3	
	16-Nov-04	4.5	1.4	
	21-Apr-05	4.6	1.2	
	14-Nov-05	3.1	1.2	

TABLE 3-2 (Continued)

Location	Date	PCE (µg/L)	TCE (µg/L)	Screen Interval/Sample Depth (ft bgs)
MW-137B	22-Aug-02	ND	ND	520–540
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	14-Nov-05	0.52	ND	
MW-137C	22-Aug-02	ND	ND	790–810
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	14-Nov-05	ND	ND	
MW-138A	22-Aug-02	0.9	ND	320-340
	16-Apr-03	1	ND	
	13-May-03	2	ND	
	17-Feb-04	1.3	ND	
	16-Nov-04	2.6	0.6	
	21-Apr-05	1.4	ND	
	14-Nov-05	2.3	ND	
MW-138B	22-Aug-02	ND	ND	550-570
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	14-Nov-05	ND	ND	
MW-138C	22-Aug-02	ND	ND	960-980
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	14-Nov-05	ND	ND	
MW-139A	22-Aug-02	ND	ND	360-380
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	14-Nov-05	0.51	ND	
MW-139B	22-Aug-02	ND	ND	540-560
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	14-Nov-05	ND	ND	

TABLE 3-2 (Continued)

Location	Date	PCE (µg/L)	TCE (µg/L)	Screen Interval/Sample Depth (ft bgs)
MW-139C	22-Aug-02	ND	ND	795-810
	13-May-03	ND	ND	
	17-Feb-04	ND	ND	
	16-Nov-04	ND	ND	
	21-Apr-05	ND	ND	
	14-Nov-05	ND	ND	

bgs = below ground surface
ft = feet
ND = not detected
PCE = tetrachloroethene
TCE = trichloroethene
µg/L = micrograms per liter

TABLE 3-3

Analytical Results for Groundwater Samples Collected at Previously Installed Muscoy Plume OU Well Locations

Location	Date	PCE (µg/L)	TCE (µg/L)	Screen Interval/Sample Depth (ft bgs)
MW-128A	11-May-00	11	4	410–440
	9-Nov-00	10	3	
	13-Sep-01	5.1	2.1	
	11-Apr-02	12	6	
	22-Aug-02	18	7	
	15-May-03	9	5	
	18-Feb-04	6.9	4.1	
	17–Nov-04	4.7	2.3	
	19-Apr-05	3.6	2.6	
	15-Nov-05	9.7	2.7	
MW-128B	11-May-00	ND	ND	690–720
	11-Apr-02	ND	ND	
	22-Aug-02	ND	ND	
	15-May-03	ND	ND	
	15-May-03	ND	ND	
	18-Feb-04	ND	ND	
	17–Nov-04	ND	ND	
	19-Apr-05	ND	ND	
	15-Nov-05	ND	ND	
MW-128C	11-May-00	ND	ND	860–890
	15-May-03	ND	ND	
	18-Feb-04	ND	ND	
	17–Nov-04	ND	ND	
	19-Apr-05	ND	ND	
	15-Nov-05	ND	ND	
MW-129A	12-May-00	ND	ND	443–473
	9-Nov-00	0.8	ND	
	13-Sep-01	0.78	ND	
	11-Apr-02	ND	ND	
	22-Aug-02	ND	ND	
	15-May-03	ND	ND	
	18-Feb-04	ND	ND	
	17–Nov-04	ND	ND	
	19-Apr-05	ND	ND	
	14-Nov-05	ND	ND	

TABLE 3-3

(Continued)

Location	Date	PCE (ug/L)	TCE (ug/L)	Screen Interval/Sample Depth (ft bgs)
MW-129B	12-May-00	ND	ND	730–760
	9-Nov-00	ND	ND	
	13-Sep-01	ND	ND	
	11-Apr-02	0.7	ND	
	22-Aug-02	1	ND	
	15-May-03	3	ND	
	18-Feb-04	6.9	1.2	
	17–Nov-04	6.1	1.3	
	19–Apr-05	8.1	1.5	
	14-Nov-05	3.3	ND	
MW-129C	12-May-00	ND	ND	851-881
	9-Nov-00	ND	ND	
	13-Sep-01	ND	ND	
	11-Apr-02	ND	ND	
	22-Aug-02	ND	ND	
	15-May-03	ND	ND	
	18-Feb-04	ND	ND	
	17-Nov-04	ND	ND	
	19-Apr-05	ND	ND	
	14-Nov-05	ND	ND	
MW-130A	11-May-00	3	ND	340-370
	9-Nov-00	2	0.5	
	13-Sep-01	3.5	0.84	
	11-Apr-02	3	0.9	
	22-Aug-02	4	1	
	13-May-03	3	1	
	18-Feb-04	4.4	1.2	
	17-Nov-04	3.2	0.8	
	19-Apr-05	1.8	0.6	
	15-Nov-05	2.3	ND	
MW-130B	11-May-00	10	3	550-580
	9-Nov-00	8	3	
	13-Sep-01	0.5	ND	
	11-Apr-02	8	3	
	22-Aug-02	10	4	
	13-May-03	8	4	
	18-Feb-04	12	4.5	
	17-Nov-04	8.9	3.5	
	19-Apr-05	7	2.9	
	15-Nov-05	8.1	2.6	

TABLE 3-3

(Continued)

Location	Date	PCE (µg/L)	TCE (µg/L)	Screen Interval/Sample Depth (ft bgs)
MW-130C	11-May-00	ND	ND	890-920
	9-Nov-00	ND	ND	
	13-Sep-01	ND	ND	
	11-Apr-02	ND	ND	
	22-Aug-02	ND	ND	
	13-May-03	ND	ND	
	18-Feb-04	ND	ND	
	17-Nov-04	ND	ND	
	19-Apr-05	ND	ND	
	15-Nov-05	ND	ND	
MUNI-101	2-May-00	ND	ND	350–1,050
	1-Nov-00	0.5	ND	
	18-Sep-01	0.62	ND	
	3-Apr-02	ND	ND	
	14-Aug-02	ND	ND	
	10-Feb-04	1.4	ND	
	9-Nov-04	0.7	ND	
	13-Apr-05	ND	ND	
	10-Nov-05	1.1	ND	
MUNI-102	1-Nov-00	ND	ND	126–184 224–232 262–304 312–372 468–476 540–560
	18-Sep-01	ND	ND	
	10-Feb-04	ND	ND	
	9-Nov-04	ND	ND	
	13-Apr-05	ND	ND	
MUNI-103	2-May-00	ND	ND	248–345
	30-Oct-00	ND	ND	
	12-Sep-01	ND	ND	
	11-Apr-02	ND	ND	
	22-Aug-02	ND	ND	
	13-May-03	ND	ND	
	17-Nov-04	ND	ND	
	18-Apr-05	ND	ND	
	10-Nov-05	ND	ND	
MUNI-104A	7-May-03	3	ND	150–276 322–356 388–400 470–512 554–563 575–611 646–658

TABLE 3-3

(Continued)

Location	Date	PCE (µg/L)	TCE (µg/L)	Screen Interval/Sample Depth (ft bgs)
MUNI-104B	2-May-00	4	ND	185–355
	1-Nov-00	2	ND	610–655
	18-Sep-01	ND	ND	
	4-Apr-02	5	ND	
	15-Aug-02	5	ND	
	10-Feb-04	8.2	0.77	
	9-Nov-04	3.9	ND	
	13-Apr-05	3.3	ND	
	11-Nov-05	2.8	ND	

bgs = below ground surface
ft = feet
ND = not detected
PCE = tetrachloroethene
TCE = trichloroethene
µg/L = micrograms per liter

Generally, the elevated concentrations of PCE and TCE are in the depth ranges of approximately 300 to 450 feet bgs near the center of the plume-front, and 410 to 760 feet bgs near the center of the Muscoy Plume OU. The plume-front is defined by samples collected from MW-139, MUNI-102, and MUNI-103 that have not historically contained detectable levels of PCE or TCE. The plume-front remains undefined downgradient of MW-136, MW-137, MW-138, and MUNI-101.