

2000 Quarterly Sampling Events

2.1 Description of Activities

Field sampling procedures followed the revised project Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) (EPA, 1999a and 1999b, respectively). During these sampling events, field sampling procedures for the additional parameters described below were included with Addendum No. 2 to the QAPP (CH2M HILL, November 1999) and Addendum No. 3 to the SAP (CH2M HILL, November 1999). Water levels were measured in each well immediately after accessing the well and prior to sampling. The value for the observed depth-to-water (DTW) and groundwater elevation in feet above mean sea level (msl) are presented for each well sampled in Table 2-1.

Well purging consisted of removing between three and five well volumes of water at a flow rate between 5 and 12 gallons per minute (gpm) using dedicated electric pumps. During purging, pH, temperature, electrical conductivity, and turbidity of the groundwater were measured over time (Table 2-2) to ensure that these parameters stabilized prior to sampling. Following purging, flow rates were lowered to approximately 1 gpm to minimize aeration prior to sampling. Purge water from monitoring wells known to have VOC concentrations above the MCLs was collected in a stainless steel vacuum truck certified "clean" and site-dedicated by Haz Mat Transportation Corp. Once collected, the purge water was transported for disposal at DK Environmental. Purge water from monitoring wells known to have VOC concentrations below the MCLs was diverted into the nearest storm drain.

During the first, second, and third quarter 2000 sample events, analytical parameters consisted of VOCs including methyl tertiary butyl ethylene (MTBE), nitrate/nitrite, and hexavalent chromium. Samples were collected in appropriate containers from polyethylene tubing attached to an adjustable sampling valve. Samples for VOCs and nitrate/nitrite were stored in coolers packed with ice and were shipped the day of sampling by overnight carrier to laboratories designated by EPA's Contract Laboratory Program (CLP). Samples collected for hexavalent chromium were delivered daily by courier to Montgomery Watson Laboratory in Pasadena.

During the fourth quarter (annual) 2000 sample event, analytical parameters consisted of VOCs including MTBE, Semivolatile Organic Compounds (SVOC), perchlorate, nitrate/nitrite, dissolved metals, hexavalent chromium, total alkalinity, total dissolved solids (TDS), total organic carbon (TOC) and additional general water chemistry parameters (chloride, sulfate, hardness). Samples collected during the fourth quarter 2000 were preserved (if required) according to the methodology presented in the QAPP and Addendum No. 2 to the QAPP, stored in coolers packed with ice and were shipped the day of sampling by overnight carrier to laboratories designated by EPA's CLP. Samples collected for hexavalent chromium were delivered daily by courier to Montgomery Watson Laboratory in Pasadena.

State of California and federal MCLs are listed in Table 2-3; Table 2-4 specifies the methods by which the parameters were analyzed and their respective target detection limits. Chain-of-custody procedures and sample documentation were conducted as outlined in the SAP and QAPP. Copies of chain-of-custody documentation for the four quarterly sample events are provided in Appendix D.

2.1.1 First Quarter

The first quarter 2000 sample event was designated as a quarterly event. During this event, 46 monitoring wells (23 VPBs and 23 cluster wells) were sampled. An additional seven monitoring wells scheduled for sampling during this event were either dry (NH-VPB-06) or had inoperable pumps (CS-C02-62, CS-VPB-07, PO-VPB-02, PO-VPB-07, and VD-VPB-07). A total of 57 samples was collected and analyzed, including samples representing quality control (QC) samples (field blanks, laboratory blanks, and field duplicates). Samples collected by CH2M HILL were analyzed for VOCs including MTBE, nitrate, and nitrite through CLP laboratories, and samples collected for hexavalent chromium were analyzed through an independently procured laboratory.

Purge water at each monitoring well location where historic VOC concentration exceeded the MCL was collected in a vacuum truck and transported to a federally approved disposal facility.

2.1.2 Second Quarter

The second quarter 2000 sample event was designated as a quarterly event. During this event, 45 monitoring wells (23 VPBs and 22 cluster wells) were sampled. An additional seven monitoring wells scheduled for sampling during this event were either dry (NH-VPB-06) or had inoperable pumps (CS-C02-62, CS-VPB-07, PO-VPB-02, PO-VPB-07, and VD-VPB-07). A total of 56 samples was collected and analyzed, including samples representing QC samples (field blanks, laboratory blanks, and field duplicates). Samples collected by CH2M HILL were analyzed for VOCs including MTBE, nitrate, and nitrite through CLP laboratories, and samples collected for hexavalent chromium were analyzed through an independently procured laboratory.

Purge water at each monitoring well location where historic VOC concentration exceeded the MCL was collected in a vacuum truck and transported to a federally approved disposal facility.

2.1.3 Third Quarter

The third quarter 2000 sample event was a quarterly event during which, 52 monitoring wells (28 VPBs and 24 cluster wells) were sampled. A total of 67 samples was collected and analyzed, including QC samples (field blanks, laboratory blanks, and field duplicates).

2.1.4 Fourth Quarter

The fourth quarter 2000 sample event was an annual event during which 75 RI monitoring wells (32 VPBs and 43 cluster wells) were sampled. A total of 96 samples was collected and analyzed, including QC samples (field blanks, laboratory blanks, and field duplicates). An additional eight monitoring wells scheduled for sampling during this event were either dry

(NH-VPB-06, NH-VPB-07, NH-VPB-10, NH-VPB-11, NH-VPB-13, and NH-VPB-14) or were inaccessible due to vehicles parked on the well covers (PO-VPB-01 and PO-VPB-10).

2.2 Analytical Results

2.2.1 First Quarter

Reported concentrations of TCE at RI monitoring wells ranged from not detected to a high of 640 micrograms per liter ($\mu\text{g}/\text{L}$) during the first quarter. Twenty-seven of the 46 RI monitoring wells exhibited sample concentrations of TCE exceeding the MCL of 5 $\mu\text{g}/\text{L}$. Eight of the wells had TCE concentrations greater than 100 $\mu\text{g}/\text{L}$, including one well (CS-VPB-04) with a concentration over 500 $\mu\text{g}/\text{L}$ (640 $\mu\text{g}/\text{L}$). Non-detectable (ND) concentrations of TCE were observed in two of the monitoring wells, with the remaining 17 monitoring wells exhibiting concentrations between the contract required quantification limit (CRQL) and the MCL.

Concentrations of PCE during the first quarter sampling event ranged from not detected to a high of 160 $\mu\text{g}/\text{L}$ (CS-C01-285). Of the 46 RI monitoring wells sampled, 21 had concentrations exceeding the MCL of 5 $\mu\text{g}/\text{L}$, 2 had ND concentrations, and the remaining 23 had concentrations between the CRQL and the MCL.

During this sampling event, MTBE concentrations between 1 and 34 $\mu\text{g}/\text{L}$ were detected at seven monitoring wells: CS-VPB-06 with 3 $\mu\text{g}/\text{L}$, CS-VPB-04 with 5 $\mu\text{g}/\text{L}$, CS-VPB-05 with 12 $\mu\text{g}/\text{L}$, CS-C01-185 with 17 $\mu\text{g}/\text{L}$, CS-C02-180 with 17 $\mu\text{g}/\text{L}$, NH-VPB-01 with 34 $\mu\text{g}/\text{L}$, and PO-VPB-08 with 1 $\mu\text{g}/\text{L}$.

Nitrate (as NO_3) ranged from 4.0 mg/L at CS-C03-465 to 97.9 milligrams per liter (mg/L) at NH-VPB-05. Sixteen of the 46 RI monitoring wells sampled during the first quarter exceeded the nitrate MCL of 45 mg/L (as NO_3).

Table 2-5 presents a summary of TCE, PCE, and nitrate data from the first quarter sampling event. Additional VOCs exceeding the MCL at RI monitoring wells are reported in Section 3. A complete listing of these data, as well as other VOCs for the first quarter sampling event, are located in Appendix E. Results of analyses of duplicates and field blanks for this sampling event are found in Appendix F.

Hexavalent chromium concentrations exceeding the method detection limit (MDL) of 0.2 $\mu\text{g}/\text{L}$ were observed in 35 RI monitoring wells during the first quarter of 2000 (Table 2-11). Concentrations above 5 $\mu\text{g}/\text{L}$ were observed in seven RI monitoring wells: CS-VPB-05 with 11.0 $\mu\text{g}/\text{L}$, CS-VPB-06 with 9.9 $\mu\text{g}/\text{L}$, CS-VPB-08 with 5.7 $\mu\text{g}/\text{L}$, NH-C02-520 with 5.6 $\mu\text{g}/\text{L}$, NH-C04-240 with 6.9 $\mu\text{g}/\text{L}$, NH-C06-160 with 7.6 $\mu\text{g}/\text{L}$, and NH-VPB-01 with 6.2 $\mu\text{g}/\text{L}$. The maximum concentration observed was at CS-VPB-04 with 1000 $\mu\text{g}/\text{L}$.

2.2.2 Second Quarter

Reported concentrations of TCE at RI monitoring wells ranged from 0.7 $\mu\text{g}/\text{L}$ to a high of 990 $\mu\text{g}/\text{L}$ during the second quarter. Twenty-six of the 45 RI monitoring wells exhibited sample concentrations of TCE exceeding the MCL of 5 $\mu\text{g}/\text{L}$. Eight of the wells had TCE concentrations greater than 100 $\mu\text{g}/\text{L}$, including two wells (CS-VPB-04 and CS-C03-100)

with concentrations over 500 µg/L (740 µg/L and 990 µg/L, respectively). Nine of the monitoring wells were flagged as ND, with the remaining ten monitoring wells exhibiting concentrations between the CRQL and the MCL.

Concentrations of PCE during the second quarter sampling event ranged from 0.3 µg/L to a high of 140 µg/L (CS-VPB-01). Of the 45 RI monitoring wells sampled, 20 had concentrations exceeding the MCL of 5 µg/L, including two wells (CS-VPB-01 and CS-C02-325) with concentrations over 100 (140 µg/L and 120 µg/L, respectively). Five monitoring wells were flagged as ND and the remaining 20 had concentrations between the CRQL and the MCL.

During this sampling event, MTBE concentrations between 1 and 33 µg/L were detected at four monitoring wells: CS-VPB-11 with 4 µg/L, CS-C01-185 with 8 µg/L, NH-VPB-01 with 33 µg/L, and PO-C03-235 with 6 µg/L.

Nitrate (as NO₃) ranged from 6.2 mg/L at CS-C03-465 to 97.9 mg/L at NH-VPB-05. Eighteen of the 45 RI monitoring wells sampled during the second quarter exceeded the nitrate MCL of 45 mg/L (as NO₃).

Table 2-6 presents a summary of TCE, PCE, and nitrate data from the second quarter sampling event. Additional VOCs exceeding the MCL at RI monitoring wells are reported in Section 3. A complete listing of these data, as well as other VOCs for the second quarter sampling event, are located in Appendix E. Results of analyses of duplicates and field blanks for this sampling event are found in Appendix F.

Hexavalent chromium concentrations exceeding the MDL of 0.2 µg/L were observed in 36 RI monitoring wells during the second quarter of 2000 (Table 2-11). Concentrations above 5 µg/L were observed in 11 RI monitoring wells: CS-VPB-05 with 12.0 µg/L, CS-VPB-06 with 12.0 µg/L, CS-VPB-08 with 6.5 µg/L, CS-C01-105 with 5.4 µg/L, CS-C02-250 with 8.0 µg/L, CS-C03-100 with 22.0 µg/L, NH-C02-520 with 5.5 µg/L, NH-C04-240 with 5.7 µg/L, NH-C06-160 with 8.2 µg/L, and NH-VPB-01 with 5.3 µg/L. The maximum concentration observed was at CS-VPB-04 with 890 µg/L.

2.2.3 Third Quarter

In the 52 RI monitoring wells sampled during the third quarter sampling event, TCE concentrations ranged from not detected to 3,200 µg/L at CS-VPB-07. Thirty-three of the wells had reported concentrations of TCE exceeding 5 µg/L including 13 with concentrations over 100 µg/L. Of these monitoring wells, three were 1,000 µg/L or above (CS-VPB-07 with 3,200 µg/L, CS-C03-100 with 1,200 µg/L, and CS-VPB-04 with 1,000 µg/L).

Reported concentrations of PCE ranged from between the detection limit and the MCL at 22 monitoring wells, to a high of 320 µg/L at CS-C02-335. Concentrations of PCE above the MCL of 5 µg/L were reported in 23 of the 52 monitoring wells sampled during the third quarter event. Three of these wells (CS-C01-285, CS-C02-335, and CS-VPB-01) had PCE concentrations above 100 µg/L. All of the monitoring wells exceeding the MCL for PCE also exceed the MCL for TCE with the exception of CS-VPB-11.

MTBE concentrations between 1 and 33 µg/L were detected at seven monitoring wells during the third quarter of 2000: CS-C01-105 with 6 µg/L, CS-VPB-06 with 3 µg/L, CS-VPB-

11 with 4 µg/L, NH-VPB-01 with 33 µg/L, PO-C03-235 with 6 µg/L, PO-VPB-08 with 1 µg/L, and PO-VPB-08 with 2 µg/L.

During the third quarter, nitrate (as NO₃) concentrations ranged from 2.0 mg/L at PO-VPB-05 to 175.3 mg/L at PO-VPB-07. Twenty-three of the 52 wells sampled during this event exhibited concentrations greater than the MCL of 45 mg/L

TCE, PCE, and nitrate data from the third quarter sample event are presented in Table 2-7. Additional VOCs exceeding the MCL at RI monitoring wells are reported in Section 3. Appendix E summarizes the complete analytical results for the wells sampled during the third quarter. Results of duplicate samples and field blanks for the third quarter sampling event are presented in Appendix F.

Hexavalent chromium concentrations exceeding the MDL of 0.2 µg/L were observed in 36 RI monitoring wells during the second quarter of 2000 (Table 2-11). Concentrations above 5 µg/L were observed in 11 RI monitoring wells: CS-VPB-05 with 12.0 µg/L, CS-VPB-06 with 12.0 µg/L, CS-VPB-08 with 6.5 µg/L, CS-C01-105 with 5.4 µg/L, CS-C02-250 with 8.0 µg/L, CS-C03-100 with 22.0 µg/L, NH-C02-520 with 5.5 µg/L, NH-C04-240 with 5.7 µg/L, NH-C06-160 with 8.2 µg/L, and NH-VPB-01 with 5.3 µg/L. The maximum concentration observed was at CS-VPB-04 with 890 µg/L.

2.2.4 Fourth Quarter

In the 75 RI monitoring wells sampled during the fourth quarter sampling event, TCE concentrations ranged from not detected to 3,600 µg/L at CS-VPB-07. Thirty-five of the wells had reported concentrations of TCE exceeding 5 µg/L including 12 with concentrations over 100 µg/L. Of these monitoring wells, two were 1,000 µg/L or above (CS-VPB-07 with 3,600 µg/L and CS-VPB-04 with 1,500 µg/L).

Reported concentrations of PCE ranged from between the detection limit and the MCL at 27 monitoring wells to a high of 300 µg/L at CS-CPB-01. Concentrations of PCE above the MCL of 5 µg/L were reported in 23 of the 75 monitoring wells sampled during the fourth quarter event. Four of these wells (CS-C01-105, CS-C01-285, CS-C02-250, and CS-VPB-01) had PCE concentrations above 100 µg/L. All of the monitoring wells exceeding the MCL for PCE also exceed the MCL for TCE with the exceptions of CS-VPB-11 and NH-C01-450.

MTBE concentrations between 1 and 30 µg/L were detected at five monitoring wells during the fourth quarter of 2000: CS-C01-105 with 6 µg/L, CS-VPB-11 with 4 µg/L, NH-VPB-01 with 30 µg/L, PO-C03-235 with 6 µg/L, PO-VPB-08 with 1 µg/L and VD-VPB-01 with 4 µg/L.

During the fourth quarter, nitrate (as NO₃) concentrations ranged from 1.5 mg/L at CS-C03-550 to 86.3 mg/L at NH-VPB-05. Twenty-four of the 75 wells sampled during this event exhibited concentrations greater than the MCL of 45 mg/L

Hexavalent chromium concentrations exceeding the MDL of 0.2 µg/L were observed in 49 RI monitoring wells during the fourth quarter of 2000 (Table 2-11). Concentrations above 5 µg/L were observed in 15 RI monitoring wells: CS-VPB-03 with 17 µg/L, CS-VPB-04 with 670 µg/L, CS-VPB-05 with 41.0 µg/L, CS-VPB-06 with 8.3 µg/L, CS-VPB-07 with 50.0 µg/L,

CS-C03-100 with 32.0 µg/L, CS-C02-335 with 5.1 µg/L, NH-VPB-01 with 5.8 µg/L, NH-VPB-03 with 5.3 µg/L, NH-C02-520 with 5.6 µg/L, NH-C04-240 with 6.3 µg/L, NH-C06-160 with 8.1 µg/L, and PO-VPB-02 with 270.0 µg/L. The maximum concentration observed was at CS-VPB-04 with 890 µg/L, consistent with previous quarters.

TCE, PCE, and nitrate data from the fourth quarter sample event are presented in Table 2-8. Additional VOCs, SVOCs, and perchlorate concentrations exceeding the MCL at RI monitoring wells are reported in Section 3. Results of the general water chemistry observed during the annual event of 2000 are presented in Table 2-9; the results of dissolved metals exceeding MCLs are in Table 2-10. Appendix E summarizes the complete analytical results for the wells sampled during the fourth quarter. Results of duplicate samples and field blanks for the fourth quarter sampling event are presented in Appendix F.