

Discussion of First, Third, and Fourth Quarter 1996 Results

3.1 Comparison of Water Levels

Water levels were measured at each RI monitoring well sampled during each quarterly sampling event. A comparison of depth to water below ground surface (bgs) and groundwater elevations at the time of the first, third, and fourth quarter sampling is provided for the RI monitoring wells in Table 2-1. Additionally, these measurements are incorporated into the GIS database, converted to elevations above mean sea level (MSL), and presented as hydrographs (Figure 3-1).

Fluctuations from pumping of production wells are evident in the hydrographs as well as in the general drop in water levels during 1996. Generally, water levels throughout 1996 remained fairly constant (Pollock and Verdugo Areas) or exhibited decreases (North Hollywood and Crystal Springs Areas). In the Crystal Springs area, drops in water levels on the order of 1 to 3 feet were evident. However, in the North Hollywood area, water levels dropped as much as 24 feet at NH-C03-580 between the first and fourth quarter sampling.

3.2 Comparison of Quarterly Analytical Results

Concentration data from the first, third, and fourth quarter sampling events are provided for TCE in Tables 3-1, 3-2, and 3-3; and for PCE in Tables 3-4, 3-5 and 3-6. Flags used in the "Current Value" columns indicate: (1) samples that contain reported TCE or PCE concentrations greater than the MCL of 5 µg/L or (2) samples that exhibit a marked change in concentration during the current quarter from the previous quarter sampling. A "marked change" in concentration is considered a change in concentration between the following categories:

- to 5 µg/L
- > 5 to 50 µg/L
- > 50 to 100 µg/L
- > 100 to 500 µg/L
- > 500 to 1,000 µg/L
- > 1,000 to 5,000 µg/L
- > 5,000 µg/L

For example, if a sample had a reported concentration of 550 µg/L TCE for the current quarter, but a reported concentration of 60 µg/L during the previous quarter, a flag of +2 would be present in the "Current Value" column of Tables 3-1 through 3-6. If the reported sample concentration had decreased to the next lower category, the flag would read-1. These concentration categories are the same as those used during preparation of basinwide TCE and PCE contaminant concentration maps.

Nitrate data for RI monitoring wells sampled during the first, third, and fourth quarters of 1996 are provided in Tables 3-7, 3-8, and 3-9, respectively. Flags within the "Current Value" column of Tables 3-7 through 3-9 indicate: (1) samples that contain reported concentrations of NO₃ greater than the MCL of 45 mg/L (as NO₃) and (2) samples that exhibit a marked change in reported NO₃ concentration from the current quarter to the previous quarter. A marked change in NO₃ concentration (as NO₃) is herein defined as a change in concentration between the following categories:

- to 20 mg/L
- > 20 to 45 mg/L

- > 45 to 65 mg/L
- > 65 mg/L

Numerical flags in the "Current Value" column of Tables 3-7 through 3-9 follow the same logic as described above: a reported NO₃ concentration increase of one category relative to the previous quarter's sample will read +1; a decrease of two categories will read -2.

3.2.1 TCE Concentrations

Reported TCE concentrations at 43 of the 52 RI monitoring wells sampled during the first quarter of 1996 are typically not markedly changed relative to the previous values for these wells (Table 3-1). The number of RI monitoring wells exhibiting concentrations of TCE greater than the MCL of 5 µg/L increased from 34 to 35 wells. Data from the first quarter show that three wells, NH-C05-160, NH-C01-325, and PO-VPB-07, exhibited decreases of one category (140 to 90 µg/L, 7 to 1 µg/L, and 54 to 40 µg/L, respectively). Five wells had a marked increase in TCE concentration, including one well (CS-VPB-05), which increased two categories. This monitoring well appears to be anomalous with historic concentrations and may be resultant from sampling or laboratory errors.

Comparison of the TCE data for the first quarter with data from the third quarter shows that the values are usually not markedly changed for the wells included in the quarterly program (Table 3-2). The number of RI monitoring wells exhibiting concentrations of TCE greater than the MCL of 5 µg/L increased by three to 37 wells monitoring wells. However, there was significant fluctuation between the reported concentration categories. Five monitoring wells in the quarterly program (CS-C05-160, NH-C01-325, NH-VPB-06, NH-VPB-07, and NH-VPB-08) did exhibit an increase of TCE concentration of one category (90 µg/L to 100 µg/L, 1 µg/L to 10 µg/L, 1 to 13 µg/L, 1 to 11 µg/L, and 4 to 18 µg/L, respectively). Eight monitoring wells (CS-C02-62, CS-C02-180, CS-C03-100, CS-VPB-08, NH-C02-220, NH-C02-520, NH-C06-160, and NH-VPB-14) exhibited a decrease of one or more categories (58 to 33 µg/L; 130 to 83 µg/L; 5,300 to 3,100 µg/L; 130 to 75 µg/L; 23 to 4 µg/L; 8 to 3 µg/L; 54 to 10 µg/L; and 620 to 130 µg/L, respectively).

Comparison of the third quarter and fourth quarter TCE data shows that the number of RI monitoring wells, which exhibited concentrations of TCE greater than the MCL of 5 µg/L, decreased to 35 wells. Otherwise, values are not markedly changed from the previous quarter (Table 3-3). Three monitoring wells (NH-C02-520, NH-VPB-06, and NH-VPB-14) did exhibit an increase of TCE concentration of one category (3 to 14 µg/L, 13 to 66 µg/L, and 130 to 530 µg/L, respectively). Two monitoring wells, CS-C05-160 and NH-C03-380, exhibited a decrease of one or more categories (110 to 100 µg/L and 12 to 3 µg/L, respectively).

Historic concentration data acquired to date for TCE samples obtained for the RI wells are presented in Figure 3-2. The historic concentration data include the TCE data reported below laboratory detection limits. Concentrations that are reported below laboratory detection limits are plotted and indicated as "nondetected" concentrations in Figure 3-2. Data used to construct these historic graphs were obtained during sampling conducted by CH2M HILL beginning in 1992 and sampling conducted by LADWP and James M. Montgomery, Inc. (JMM) between July 1989 and March 1991.

3.2.2 PCE Concentrations

PCE data exhibited no marked changes in the first quarter of 1996 compared to previous values (Table 3-4). The number of wells with PCE concentrations greater than the MCL of 5 µg/L increased by one well, from 25 to 26 wells. At two wells, a marked decrease (55 to 49 µg/L at CS-C02-180 and 10 to 5 µg/L at NH-VPB-07) was observed. Two wells (CS-C05-290 and CS-VPB-05) exhibited an increase to greater than the MCL (ND to 7 µg/L and 2 to 7 µg/L, respectively).

The number of RI monitoring wells exceeding the MCL for PCE during the third quarter of 1996 decreased from 26 to 25 wells (Table 3-5). Comparison of PCE concentrations for the first and third quarter 1996 sample events shows that two wells (NH-C01-325 and NH-VPB-07) exhibited an increase of one category (14 to 71 µg/L and 5 to 36 µg/L, respectively). A decrease of one category was also observed at two wells (NH-C02-325, 13 to 5 µg/L, and NH-VPB-14, 76 to 3 µg/L). The decrease in PCE concentration observed at NH-VPB-14 corresponds to the decrease observed in TCE concentration during this quarter. As stated above, this decrease appears to be caused by either laboratory or sampling errors.

The number of sampled RI monitoring wells exceeding the MCL for PCE during the fourth quarter of 1996 remained consistent at 25 wells (Table 3-6). Comparison of PCE concentrations for the third and fourth quarter 1996 sample events shows that three wells (CS-C02-250, CS-VPB-06, and NH-C01-325) exhibited a decrease of one category (110 to 94 µg/L, 6 to 5 µg/L, and 71 to 40 µg/L, respectively). Two wells (NH-C02-325 and NH-VPB-14) that had exhibited decreases during the previous quarter were observed to have increases this quarter (5 to 12 µg/L and 3 to 140 µg/L, respectively).

Historic data obtained by CH2M HILL and JMM to date for PCE concentrations in the RI wells are presented in Figure 3-3. Concentrations of PCE that are reported below laboratory detection limits are plotted and indicated as "nondetected" concentrations in Figure 3-3.

3.2.3 Nitrate

Of the 52 RI monitoring wells sampled during the first quarter of 1996, 15 exhibited concentrations exceeding the NO₃ MCL of 45 mg/L (as NO₃) compared to 19 the previous quarter (Table 3-7). Two wells (CS-VPB-04 and PO-VPB-07) exhibited a decrease in reported NO₃ concentration to below the MCL from the previous sampling. An increase was observed at one well, PO-C02-053 from 22.7 to 53.4 mg/L.

During the third quarter, NO₃ concentrations greater than the MCL were observed at 18 of the 52 monitoring wells sampled (Table 3-8). However, comparison of the values of NO₃ for the first quarter with values from the third quarter shows that the values are markedly changed at nine wells, with five wells showing increases of one category and four wells showing decreases of one category. RI monitoring wells CS-VPB-04, CS-VPB-08, NH-C01-325, NH-C02-220, and NH-VPB-08 were observed to have increases. One RI monitoring well (VD-VPB-02) exhibited an increase of one category. Two RI monitoring wells (NH-VPB-08 and PO-C02-53) exhibited a decrease of one category.

During the fourth quarter, NO₃ concentrations greater than the MCL were observed at 19 of the 80 monitoring wells sampled (Table 3-9). However, comparison of the values of NO₃ for the third quarter with values from the fourth quarter shows that the values are typically not markedly changed, with the exception of three wells (NH-C05-320, NH-VPB-03, and NH-VPB-04), which are in the annual sampling program. One RI monitoring well (VD-VPB-02) exhibited an increase of one category. Two RI monitoring wells (NH-VPB-08 and PO-C02-53) exhibited a decrease of one category.

Figure 3-4 presents the historic data obtained for NO₃ concentrations for the RI wells. Concentrations of NO₃ that are reported below laboratory detection limits are plotted and indicated as "nondetected" concentrations in Figure 3-4.

3.2.4 Other VOCs

During the first quarter event, eight wells (CS-C03-100, CS-VPB-04, CS-VPB-05, CS-VPB-06, CS-VPB-07, PO-VPB-02, PO-VPB-08, and NH-VPB-05) exceeded the MCL for VOCs other than TCE and PCE (Table 3-10). Compounds detected in these wells include: carbon tetrachloride, 1,1-dichloroethene, and 1,1-dichloroethane at CS-C03-100 and CS-VPB-07; carbon tetrachloride and 1,1-dichloroethene at CS-VPB-05 and CS-VPB-04; 1,2-dichloroethane at NH-VPB-05; and 1,1-dichloroethene at PO-VPB-02, PO-VPB-08, and CS-VPB-06.

During the third quarter event, seven wells (CS-C03-100, CS-VPB-04, CS-VPB-05, CS-VPB-06, CS-VPB-07, PO-VPB-02, and PO-VPB-08) exceeded the MCL for VOCs other than TCE and PCE (Table 3-11). Compounds detected in these wells include: carbon tetrachloride, 1,1-dichloroethene, and 1,1-dichloroethane at CS-C03-100, CS-VPB-04, and CS-VPB-07; and 1,1-dichloroethene at PO-VPB-02, PO-VPB-08, CS-VPB-05, and CS-VPB-06.

During the fourth quarter event, seven wells (CS-C03-100, CS-VPB-04, CS-VPB-05, CS-VPB-06, CS-VPB-07, PO-VPB-02, and PO-VPB-08) exceeded the MCL for VOCs other than TCE and PCE (Table 3-12). Compounds detected in these wells include: 1,1-dichloroethane, 1,1-dichloroethene, and carbon tetrachloride at CS-C03-100 and CS-VPB-07; 1,1-dichloroethene and carbon tetrachloride at CS-VPB-04; and 1,1-dichloroethene at CS-VPB-05, CS-VPB-06, PO-VPB-02, and PO-VPB-08.

3.3 Concentration Contour Maps

TCE and PCE are common and widespread contaminants in the San Fernando Valley Basin and may at least roughly reflect the distribution of other contaminants. To evaluate the lateral and vertical distribution of TCE, PCE, and NO_3 in the SFV, depth-specific concentration contour maps were created using current data from CH2M HILL's GIS database (Figure 3-5). This database includes water quality and water level data for the RI wells and also data from local facilities in the SFV, transmitted by the California RWQCB and LASC. Data from local groundwater purveyors (LADWP, the cities of Glendale and Burbank, and Crescenta Valley County Water District) were also incorporated into the GIS database.

3.3.1 Interval Selection

The depth intervals for the concentration contour maps are based on the following: (1) water level data from RI monitoring wells, facility wells, and production wells; (2) screened intervals in monitoring wells, facility wells, and production wells; and (3) concentration values for TCE, PCE, and NO_3 from the most recent 1996 sampling event for each RI well. Wells included in the tri-annual sampling program will be represented by values obtained during the tri-annual event in the fall of 1995. The relationship of these parameters is shown in Figures 3-6 through 3-8. In these figures, the distance between the top of the well screen and the fall 1996 water table is shown for each well sampled during the fourth quarter sampling event. A positive value indicates that the top of the screened interval extends above the fall 1996 water table; negative values indicate the screened interval is below the water table.

As indicated by these figures, the concentration of TCE, PCE, and NO_3 is typically greater in wells with screens at or near the water table, with groundwater contamination apparently attenuating with depth. Based on these data, two sets of depth-specific concentration contour maps were developed based upon wells that are screened: (1) within 50 feet of the water table and (2) more than 50 feet below the water table.

Data from production wells, facility wells, and landfill monitoring wells are categorized in the same manner as the RI monitoring wells. Production wells with the top of their screened interval within 50 feet of the water table are in the upper interval, and wells with the top of their screen greater than 50 feet below the water table are in the lower zone. Production well data are posted on the concentration contour maps; however, the concentration of the contaminant within the well is considered only as an indicator on the upper zone maps because the contaminants may be diluted with production of water from deeper, cleaner intervals.

3.3.2 Estimated Areal Extent

The depth-specific concentration contour maps combine available water quality data with professional judgment to present a simplified, "smoothed" depiction of TCE, PCE, and NO_3 contaminations in the eastern SFV (Figures 3-9 through 3-14). However, due to lack of available data, areas outside the colored zones may also be contaminated. The figures were prepared by hand contouring the relative concentration contours onto GIS-generated maps depicting available TCE, PCE, and NO_3 values. Several assumptions and simplifications were made in preparation of the figures.

For EPA RI monitoring wells, facility wells, and production wells incorporated in the SFV GIS, the areas of contamination are based on time-specific rationale for selection of the representative data. This rationale incorporates all available data while eliminating "old" data that may not be representative of current conditions. The criteria for this rationale are presented in Appendix B.

The figures do not show the maximum contaminant concentrations known to have occurred at the wells. Using the most recent value, not the maximum or average value, does not significantly affect the interpretations shown in the concentration contour maps. This method, however, could potentially affect the locations of contours in areas where contaminant concentrations are near one of the dividing levels between concentrations.

Because the data incorporated into the GIS are obtained from various sources with varying schedules of sampling, the figures are not a "snapshot in time," but rather a representation of the most recently available contamination data observed at each location over several months.

The estimated direction and magnitude of groundwater flow are used to assist in estimating the shape and size of the downgradient extent of individual zones of contamination. These parameters are also used for approximating the

lateral boundaries, although these boundaries are more readily determined from reported concentration values. Although groundwater flow directions are fairly well understood, the downgradient margins of contamination are the least well known.

TCE and PCE contaminant data from production wells in the LADWP North Hollywood Wellfield were reviewed to estimate the western extent of the "area of detectable concentration" (JMM, 1992).

3.3.3 Upper Interval

Concentration contours throughout the shallow interval are based on available TCE, PCE, and NO₃ data (Figures 3-9 through 3-11). The 5-μg/L concentration contour for both TCE and PCE is similar to previous maps. Additional data have allowed refinement of the 5-μg/L concentration contour in the South Glendale area as well as the northern and eastern portions of the contours in the vicinity of the Burbank Airport. This area within the 5μg/L contour covers the eastern and southern portions of the North Hollywood NPL site and the majority of the Crystal Springs and Pollock NPL sites. Based on available data, an estimate of the concentration contour enclosing an area above the laboratory detection limit of 2 μg/L for TCE and PCE is drawn. This detection limit contour generally conforms to the shape of the 5 μg/L concentration contour line. A larger portion of the North Hollywood NPL site is included within this contour line in addition to an elongated northwest-southeast area directly north of the North Hollywood NPL site.

The apparent highest concentrations of TCE and PCE in the upper interval occur in:

- An elongate area extending in a southeasterly direction beginning East of the Burbank Airport. For TCE, this elongate area is approximately 2 miles long and 1-1/2 miles wide; while for PCE, it is approximately 3 miles long and 1 mile wide. Within this area, TCE concentrations as high as 5,230 μg/L and PCE concentrations as high as 8,700 μg/L are observed in LASC monitoring wells.
- For TCE, a southeasterly trending area, approximately 1-1/2 miles long by 1/2 mile wide beginning north of the North Glendale Operable Unit (OU). This area consists of several isolated areas of higher concentrations. TCE concentrations as high as 11,000 μg/L in facility monitoring wells are reported in this area. Smaller areas of TCE contamination above 500 μg/L, lie between this area and the elongate area extending from Burbank Airport. Similar areas exist for PCE contamination. In the North Glendale OU, isolated areas in the vicinity of facility wells exceed 100 μg/L.
- Two small areas, the first approximately 1/2 mile long and 1/4 mile wide, and the second approximately 2 miles long and 1/4 mile wide, extend south from within the South Glendale OU. TCE concentrations over 1,700 and 11,000 μg/L, respectively for the first and second areas and PCE concentrations in excess of 1,300 μg/L are reported in the second area.
- Two areas in the vicinity of LADWP's Pollock production wells and the Taylor Yard south of the Pollock OU indicated TCE and PCE in excess of the MCLs. One area in the vicinity of LADWP's Pollock well is approximately 1/2 mile long and 3/4 mile wide. The second area, located in the Taylor Yard, contains small isolated areas with PCE concentrations as high as 780 μg/L and TCE as high as 60 μg/L.

Additional details of the shallow interval TCE and PCE concentration contour maps are located in Appendixes G and H, respectively. These appendixes present each concentration contour map with well locations, shown with a grid network imposed over the area within the 2-μg/L contour line. Each grid square is presented as a separate plate showing greater detail of the larger TCE and PCE concentration contour maps.

In the central portion of the Verdugo NPL site, recent production well data and RI monitoring well data indicate an elongate area exceeding the detection limit however below the MCL for PCE. TCE is reported below the MCL in all wells in this area.

The upper interval concentration contour map of NO₃ contamination exceeding the MCL of 45 mg/L is based on available NO₃ data (as NO₃). Similar to previous maps, a large elongate area covering most of the North Hollywood NPL site extends through the Crystal Springs NPL site and approaches the Pollock NPL site. An elongate area of NO₃ contamination in excess of the MCL, extending in a southerly direction from the Verdugo NPL site, is also present.

3.3.4 Lower Interval

As discussed above, the concentrations of TCE and PCE appear to attenuate with depth. However, data for TCE, PCE, and NO_3 from the lower interval, although more limited, are presented in Figures 3-12 through 3-14. The area in the lower interval exceeding the 5- $\mu\text{g}/\text{L}$ concentration contour for both TCE and PCE generally underlies the area of contamination in the upper interval; however, it is less widespread than the contaminated area in the upper interval. A concentration contour for the 2- $\mu\text{g}/\text{L}$ laboratory detection limit is also shown for the lower interval.

The area of TCE concentration exceeding the 5- $\mu\text{g}/\text{L}$ concentration contour in the lower interval extends from south of the Burbank Airport to the southeast, with the highest concentrations located in an approximately 1-1/2-mile by 1/2-mile area located in the central portion of the North Hollywood NPL site and in an approximately 1-1/2-mile by 3/4-mile area located in the eastern portion of the Crystal Springs NPL site. Two smaller areas of TCE in the lower interval are located in the northern and central areas of the Pollock NPL site. The 2- $\mu\text{g}/\text{L}$ concentration contour conforms to the shape of the 5- $\mu\text{g}/\text{L}$ contour, encompassing the area to the north of Burbank Airport.

An area beginning at the Burbank Airport and extending southeasterly into the Crystal Springs NPL site is contained within the 5- $\mu\text{g}/\text{L}$ concentration contour for PCE in the lower interval. The apparent highest concentrations extend south-southeast of the Burbank Airport. An additional area exceeding the MCL for PCE in the lower interval is located between the Glendale South OU and the Pollock OU. The area within the 2- $\mu\text{g}/\text{L}$ concentration contour extends from north of the Burbank Airport, includes most of the North Hollywood and Crystal Springs NPL sites, and ends in the southern portion of the Crystal Springs NPL site.

NO_3 contamination in the lower interval is less extensive than observed in the upper interval. Two small areas exceeding the MCL are located in the North Hollywood and the northern portion of the Crystal Springs NPL sites. These areas are located below the contaminated portion of the upper interval.

Figure

