

SECTION 3

Discussion of Second, Third and Fourth Quarter 1997 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 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 higher than normal rainfall conditions are evident in the hydrographs. Generally, water levels throughout 1997 remained fairly constant in Crystal Springs (Area 2), Verdugo (Area 2) and Pollock (area 4). In North Hollywood (Area 1), drops in water levels on the order of approximately 5 feet were evident in the vicinity of the North Hollywood Extraction wells and the area adjacent to the Whitnall wellfield.

3.2 Comparison of Quarterly Analytical Results

Concentration data from the second, 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:

- 0 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 second, third, and fourth quarters of 1997 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 nitrate greater than the MCL of 45 mg/L (as NO₃), and (2) samples that exhibit a marked change in reported nitrate concentration from the current quarter to the previous quarter. A marked change in nitrate concentration (as NO₃) is herein defined as a change in concentration between the following categories:

- 0 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 nitrate 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 33 of the 51 RI monitoring wells sampled during the second quarter of 1997 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 decreased from 35 to 33 wells. Data from the second quarter show that three wells, CS-VPB-04, NH-VPB-06, and NH-VPB-14, exhibited decreases of one category (810 to 440 µg/L, 66 to 42 µg/L, and 530 to 150 µg/L, respectively).

Comparison of the TCE data for the second 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 remained constant at 33 monitoring wells. However, there was some fluctuation between the reported concentration categories. Four monitoring wells in the quarterly program, CS-C06-185, CS-VPB-04, NH-C03-380, and NH-C03-580, did exhibit an increase of TCE concentration of at least one category (11 µg/L to 130 µg/L, 440 µg/L to 530 µg/L, 2 to 7 µg/L and 2 to 10 µg/L, respectively). One monitoring well, NH-VPB-07, exhibited a decrease of one category (7 to 5 µg/L).

Comparison of the TCE data for the third quarter with data from the fourth quarter shows that the number of RI monitoring wells exhibiting concentrations of TCE greater than the MCL of 5 µg/L decreased to 31 wells (Table 3-3). However, there was significant fluctuation between the reported concentration categories. Three monitoring wells, CS-C03-465, PO-C03-182 and PO-VPB-01, did exhibit an increase of TCE concentration of one category (5 to 7 µg/L, 5 to 8 µg/L and 4 to 6 µg/L, respectively). Ten monitoring wells (CS-C01-285, CS-C02-180, CS-C05-160, CS-C06-185, CS-VPB-04, CS-VPB-05, CS-VPB-08, NH-C01-325, NH-C04-240 and NH-VPB-05) exhibited a decrease of one or more categories category (200 to 100 µg/L, 110 to 66 µg/L, 140 to 60 µg/L, 130 to 10 µg/L, 530 to 260 µg/L, 140 to 89 µg/L, 85 to 48 µg/L, 6 to 5 µg/L, 8 to 4 µg/L, and 6 to 5 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 little changes in the second quarter of 1997 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 to 26. At two wells, an increase of one category (94 to 120 µg/L at CS-C02-250 and 40 to 63 µg/L at NH-C01-325) was observed. One well (NH-VPB-14) exhibited a decrease from 140 to 6 µg/L. However, this observation is significantly lower than has been historically recorded at this location. This decrease appears to be caused by either laboratory or sampling errors.

The number of RI monitoring wells exceeding the MCL for PCE during the third quarter of 1997 decreased from 26 to 25 wells (Table 3-5). Comparison of PCE concentrations for the second and third quarter 1997 sample events shows that four wells (CS-C02-250, NH-C01-325, NH-VPB-01 and PO-VPB-02) exhibited an decrease of one category (120 to 94 µg/L, 63 to 48 µg/L, 150 to 100 µg/L, and 76 to 45 µg/L, respectively). No wells were observed to have increases between categories. An increase in PCE concentration observed at NH-VPB-14, 6 to 16 µg/L, corroborates the fact that the TCE value reported for this well may be in error.

The number of sampled RI monitoring wells exceeding the MCL for PCE during the fourth quarter of 1997 remained consistent at 25 wells (Table 3-6). Comparison of PCE concentrations for the third and fourth quarter 1997 sample events shows that one well (CS-C01-285) exhibited a decrease of one category (160 to 100 µg/L). Four wells (CS-VPB-06, NH-C03-380, NH-CO3-580, and NH-VPB-14) were observed to have increased this quarter (5 to 6 µg/L, 4 to 6 µg/L, 2 to 6 µg/L, and 16 to 79 µg/L, respectively). Two wells (NH-C03-380 and NH-CO3-580), which were below the MCL for both TCE and PCE during the second quarter, are now exceeding the MCL for both parameters.

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 51 RI monitoring wells sampled during the second quarter of 1997, 14 exhibited concentrations exceeding the nitrate MCL of 45 mg/L (as NO₃) compared to 19 the previous quarter (Table 3-7). Seven wells exhibited a category decrease in reported nitrate concentration from the previous sampling; however, two of those wells still exceeded the MCL.

During the third quarter, nitrate concentrations greater than the MCL were observed at 11 of the 50 monitoring wells sampled (Table 3-8). Comparison of the values of nitrate for the second quarter with values from the third quarter shows that the values are markedly changed at three wells, with two wells (CS-VPB-10 and PO-VPB-02) showing decreases of one category and one well (NH-VPB-05) showing an increase of one category.

During the fourth quarter, nitrate concentrations greater than the MCL were observed at 18 of the 57 monitoring wells sampled (Table 3-9). However, comparison of the values of nitrate for the third quarter with values from the fourth quarter shows changes of one category at seven wells. One RI monitoring well (NH-C01-325) exhibited a decrease of one category. Six RI monitoring wells (CS-VPB-08, CS-VPB-10, NH-C03-580, NH-VPB-07, NH-VPB-08 and NH-VPB-14) exhibited a increase of one category.

Figure 3-4 presents the historic data obtained for nitrate concentrations for the RI wells. Concentrations of nitrate 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 second 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 3-10). Compounds detected in these wells include: carbon tetrachloride, 1,1-dichloroethylene and 1,1-dichloroethane at CS-C03-100 and CS-VPB-07; carbon tetrachloride and 1,1-dichloroethylene at CS-VPB-06 and CS-VPB-04; and, 1,1-dichloroethylene at PO-VPB-02, PO-VPB-08 and CS-VPB-05.

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-dichloroethylene and 1,1-dichloroethane at CS-C03-100 and CS-VPB-07; and 1,1-dichloroethylene at PO-VPB-02, PO-VPB-08, CS-VPB-04, CS-VPB-05 and CS-VPB-06.

MTBE was detected at 2 monitoring wells with a maximum concentration of 7 µg/L. 1,4-dioxane was detected at 6 wells with a maximum concentration of 29 µg/L.

During the fourth quarter event, six wells (CS-C03-100, CS-VPB-04, CS-VPB-05, CS-VPB-06, CS-VPB-07 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-dichloroethylene, 1,2-dichloroethylene, and carbon tetrachloride at CS-VPB-04; 1,1-dichloroethylene and carbon tetrachloride at CS-VPB-06 and CS-VPB-07; and, 1,1-dichloroethylene at CS-C03-100, CS-VPB-05, 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 nitrate 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 1997 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 nitrate from the most recent sampling event. The concentration of TCE, PCE, and nitrate 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 Aerial 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 nitrate contaminants in the eastern SFV (Figures 3-6 through 3-11). 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 nitrate 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. The groundwater flow directions are fairly well understood but the downgradient margins of contamination are not as well understood.

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."

3.3.3 Upper Interval

Concentration contours throughout the shallow interval are based on available TCE and PCE data (Figures 3-6 through 3-8). The 5- $\mu\text{g}/\text{L}$ concentration contour for both TCE and PCE is similar to previous maps. Additional data have allowed refinement of the 5- $\mu\text{g}/\text{L}$ concentration contour in the South Glendale area. This area 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 $\mu\text{g}/\text{L}$ for TCE and PCE is drawn. This contour generally conforms to the shape of the 5- $\mu\text{g}/\text{L}$ 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 elongated area extending in a southeasterly direction beginning east of the Burbank Airport. For TCE, this elongated 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 3,300 µg/L and PCE concentrations as high as 21,400 µg/L are observed in LASC monitoring wells.
- A southeasterly trending area was observed at facility monitoring wells in the vicinity of the North Hollywood Extraction wells with isolated concentrations of TCE as high as 17,000 µg/L. Other areas of TCE concentrations between 50 and 100 µg/L are also evident in this area. Recent sampling also indicated an isolated area of TCE contamination exceeding the MCL in the vicinity of LADWP production well NH-33. For PCE, several small isolated areas exceeding 50 µg/L are observed in the North Hollywood area.
- For TCE, a southeasterly trending area, approximately 1-1/2 miles long by 1/2-mile wide, was observed beginning north of the North Glendale Operable Unit (OU). TCE concentrations over 12,000 µg/L in facility monitoring wells are reported in this area. Also, within this area are several small, isolated areas in the vicinity of facility wells that exceed 100 µg/L. A smaller area of TCE contamination above 1,000 µg/L, less than 1/2-mile long and 1/4-mile wide, was observed slightly south of this area. PCE concentrations exceeding 100 µg/L appear to be isolated in the vicinity of facility monitoring wells in this area.
- Beginning in the South Glendale Operable Unit (OU), a southeasterly trending area of TCE contamination extends approximately 1-1/2 miles. TCE concentrations of 11,000 µg/L in facility monitoring wells are reported in this area. Smaller areas of TCE contamination above 100 µg/L are also observed in this area. Similar areas exist for PCE contamination exceeding 100 µg/L.
- 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 1,600 µg/L and TCE as high as 260 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 elongated areas in the vicinity of one production well exceeding the MCL for PCE. Data from all other wells have detectable concentrations of PCE below the MCL. TCE is reported below the MCL in one well in this area.

The nitrate concentration contour map of the upper interval shows nitrate exceeding the MCL of 45 mg/L based on available nitrate data (as NO₃). Somewhat similar to previous maps, there is a large elongated area, which covers most of the North Hollywood area and extends through the Crystal Springs North OU. In the North Hollywood area are several apparently isolated areas also exceeding the MCL. A separate, elongated area exceeding the MCL begins in the South Glendale OU and extends southward to the Pollock OU. Covering a large portion of the Verdugo area and extending southward is an elongated area of nitrate contamination in excess of the MCL.

3.3.4 Lower Interval

As discussed above, the concentrations of TCE and PCE appear to attenuate with depth (Figures 3-9 and 3-10). However, data for TCE and PCE from the lower interval are more limited. The area in the lower interval exceeding the 5- $\mu\text{g/L}$ 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- $\mu\text{g/L}$ laboratory detection limit is also shown for the lower interval.

The area of TCE concentration exceeding the 5- $\mu\text{g/L}$ 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 OU and in an approximately 1-1/2 mile by 3/4-mile area located in the eastern portion of the North Glendale OU. Two smaller areas of TCE in the lower interval are located in the northern and central areas of the Pollock OU. The 2- $\mu\text{g/L}$ concentration contour conforms to the shape of the 5- $\mu\text{g/L}$ contour, encompassing the area to the north of Burbank Airport.

An area beginning at the Burbank Airport and extending southeasterly into the North Glendale OU is contained within the 5- $\mu\text{g/L}$ 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- $\mu\text{g/L}$ concentration contour extends from north of the Burbank Airport and includes most of the North Hollywood and Glendale OUs.

Nitrate contamination in the lower interval is less extensive than observed in the upper interval (Figure 3-11). Several small, isolated areas exceeding the MCL are located in the North Hollywood OU.