

### 4.1.3 Seep Well Field Area

The original three recovery wells in the Seep well field went on-line in August 2002. In February 2003, five additional wells (PC117 to PC121), and in December 2004, one additional well (PC133), were completed in the Seep well field (see Plate 1). At present, the Seep well field consists of ten extraction wells – two of which (PC-99R2 and -99R3) are connected and operate as one – positioned over the deepest part of the alluvium channel that contains the highest concentrations of perchlorate. The well field is located about 600 feet upgradient of the seep surface-flow capture sump. Tronox has proposed to install three additional monitoring wells at the well field if and when an access agreement is obtained. However, it is not anticipated that any additional wells will be installed in the Seep well field in 2010 due to access issues.

Plate 5, the *West-East Hydrogeologic Cross Section C - C' Seep Well Field*, shows the perchlorate concentrations in the wells as of May 2010; Figures 26, Figure 27, and 27A present the perchlorate section and trend graphs for the Seep well field. As shown on Figure 27A, perchlorate concentrations in the Seep wells have slightly increased over the last five quarters. However, as shown in Figure 27, the perchlorate concentrations in Seep wells are still dramatically lower than they were in July 2002 when pumping began. TDS concentrations for the last five quarters are plotted on Figure 28, the *Seep Well Field Total Dissolved Solids Section Graph*. This figure shows that the highest TDS concentration (5000 mg/L) is currently measured in well PC-99R2/R3, which also contains the highest perchlorate concentration for the well field (13 mg/L in May 2010).

The monthly perchlorate concentration, as shown on Figure 29, *Seep Area Average Perchlorate Concentration and Mass Removed*, currently averages about 4.9 mg/L. Also shown on this graph is the monthly average perchlorate mass removed, which was estimated to be 1,602 pounds in June 2010.

The May 2010 SNWA sampling of four vegetation irrigation wells (plotted on Plate 7) completed in the Las Vegas Wash show that these wells all contain less than 1.3 mg/L perchlorate. Well WMW-6.15S, which contained 45.6 mg/L in June 2002, contained only 1.3 mg/L in May 2010, a 97% decrease. These results provide evidence that the in-place recovery systems are functioning well to reduce concentrations of perchlorate in the Las Vegas Wash. As plotted on Plate 7, the 1 mg/L groundwater perchlorate contour is only about 700 feet downgradient of the Pabco structure.



## 4.2 On-Site Perchlorate Groundwater Treatment System and Remediation

Throughout the reporting period, groundwater was collected and treated in both the Groundwater Treatment Plant (GWTP, for on-site water containing hexavalent chromium) and the biological treatment plant (FBRs, for on-Site, Athens Road, and Seep Area collection systems, to remove nitrate, chlorate and perchlorate). Effluent from the biological treatment process was discharged into Las Vegas Wash and, with few exceptions, stayed within the limits specified in the NPDES NV0023060 discharge permit. As shown on Table 7, since July 2009 the perchlorate influent to the FBRs has ranged from 170 mg/L to 447 mg/L; whereas the effluent discharged to Las Vegas Wash was mostly non-detect at <0.005 or < 0.010 mg/L perchlorate. Three out of 53 effluent samples contained perchlorate above the laboratory method reporting limit at concentrations ranging from 0.01 mg/L to 0.058 mg/L. During the reporting period, the effluent has not exceeded the NPDES discharge limit (0.018 mg/L for 30-day average). Routine maintenance is completed as needed at the GWTP and FBRs.

Transfers of perchlorate from the AP-5 pond continued throughout the period. A total of 1,217 tons of perchlorate have been removed from AP-5 through July 31, 2010.

