CHAPTER 7.0

Water Quality

7.1 Introduction

This chapter evaluates surface water and groundwater quality related to the Chiquita Canyon Landfill (CCL) Master Plan Revision (Proposed Project).

7.2 Methodology

This evaluation is based on data collected as part of the routine groundwater monitoring program, the stormwater monitoring program, the site Hydrogeologic Investigation (RTF&A, 2012b), the plans for the Proposed Project, compliance with the applicable regulations summarized below, and other applicable information. The three data collection programs are as follows:

Surface Water – Stormwater Monitoring Program (SWMP): Surface water monitoring data are collected and reported pursuant to National Pollutant Discharge Elimination System (NPDES) General Permit requirements issued under State Water Resources Control Board (SWRCB) Order No. 97-03-DWQ, Regional Water Quality Control Board (RWQCB) Order No. R4-2011-0052, and the associated site-specific Stormwater Pollution Prevention Plan (SWPPP) and SWMP. Data are reported in annual and semiannual reports submitted to RWQCB. The current monitoring and reporting program is described in Chapter 6.0, Surface Water Drainage.

Groundwater – Routine Groundwater Monitoring Program: Groundwater monitoring data are collected and reported pursuant to Waste Discharge Requirement (WDR) Order No. 98-086 and Monitoring and Reporting Program (MRP) No. 6231, issued by RWQCB on November 4, 1998. Data are reported in semiannual and annual reports submitted to RWQCB. The current monitoring and reporting program and recent groundwater quality data are summarized in Section 7.6. Recent annual and semiannual reports are listed below; the data and results contained in these reports are summarized in Section 7.6:

- *Semi-Annual Groundwater Monitoring Report, First and Second Quarter 2013* (RTF&A, 2013a)
- *Semi-Annual Groundwater Monitoring Report, Third and Fourth Quarter 2013* (RTF&A, 2013b)
- *2013 Annual Groundwater Monitoring Report* (RTF&A, 2014b)

Groundwater – Site Hydrogeologic Investigation: Hydrogeologic information was collected and reported as part of the site Hydrogeologic Investigation (RTF&A, 2012b). These data are summarized in Chapter 5.0, Geology and Hydrogeology.

7.3 Regulatory Setting

7.3.1 Surface Water

The regulatory setting for surface water quality is summarized in Chapter 6.0, Surface Water Drainage.

7.3.2 Groundwater

Title 27, *California Code of Regulations* (CCR), contains the current regulations of the California Department of Resources Recycling and Recovery (CalRecycle, previously California Integrated Waste Management Board), and SWRCB pertaining to waste disposal on land. Subchapter 3, Water Monitoring, from Chapter 3 (Criteria for all Waste Management Units, Facilities, and Disposal Sites) of Title 27 is relevant to water quality. The relevant sections from Subchapter 3 are summarized below.

Section 20380, SWRCB – Applicability: Subchapter 3 specifies the requirements for water quality monitoring and response programs for detecting, characterizing, and responding to releases to groundwater, surface water, or the unsaturated zone. These requirements apply during the Disposal Unit's active life and closure

period. After closure of the unit, these requirements apply to the post-closure maintenance period of the unit unless (1) the unit has been in compliance with the Water Quality Protection Standard for 3 consecutive years, or (2) the unit is clean-closed.

Section 20385 – Required Programs: Monitoring and response programs are required, as approved by RWQCB, for each Disposal Unit (landfill) as follows in accordance with Section 20385 of Title 27:

- Detection Monitoring Program (Section 20420)
- Evaluation Monitoring Program (Section 20425)
- Corrective Action Program (Section 20430)

RWQCB will specify in facility-specific WDRs the specific type, or types, of monitoring programs required and the specific elements of each monitoring and response program.

Section 20390 – Water Quality Protection Standards (Water Standard): For each Disposal Unit, RWQCB will establish water quality protection standards (Water Standard) in the WDRs. This Water Standard will consist of a list of constituents of concern (COC) (under Section 20395), concentration limits (under Section 20400), and the point of compliance (POC) and all monitoring points (under Section 20405). The Water Standard will apply during the active life of the Disposal Unit, the closure period, and the post-closure maintenance period, and during any compliance period (under Section 20410).

Section 20395 – Constituents of Concern (COC): For each Disposal Unit, RWQCB will specify in the WDRs the COCs to which the Water Standard applies.

Section 20400 – Concentration Limits: For each COC, CCL will propose concentration limits that will be revised by RWQCB. RWQCB will approve, modify, or disapprove each concentration limit. RWQCB will specify the final approved concentration limits in the WDRs.

Section 20405 – Monitoring Points and Point of Compliance (POC): For each Disposal Unit, RWQCB will specify in the WDRs the POC at which the Water Standard applies. The POC is a vertical surface located at the hydraulically downgradient limit of the Disposal Unit that extends through the uppermost aquifer underlying the Disposal Unit. For each Disposal Unit, RWQCB will specify monitoring points along the POC and additional monitoring points at locations at which the Water Standard applies and at which monitoring should be conducted.

Section 20410 – Compliance Period: RWQCB will specify in the WDRs a compliance period for each Disposal Unit. The compliance period is the minimum period of time during which the water quality monitoring will be conducted.

Section 20415 – General Water Quality Monitoring and System Requirements: The discharger will establish a groundwater, surface water, and unsaturated zone monitoring system for each Disposal Unit to determine background conditions, meet general water quality monitoring requirements, and the specific requirements of the specific type, or types, of monitoring programs (Detection Monitoring Program [DMP], Evaluation Monitoring Program [EMP], or Corrective Action Program [CAP]) required in the WDRs.

Section 20420, SWRCB – Detection Monitoring Program (DMP): A DMP shall be established to detect, at the earliest possible time, a release from the Disposal Unit and comply with the applicable provisions of Section 20415.

Section 20425, SWRCB – Evaluation Monitoring Program (EMP): If necessary, an EMP shall be established to assess the nature and extent of a release from the Disposal Unit and to design a CAP meeting the requirements of Section 20430.

Section 20430, SWRCB – Corrective Action Program (CAP): If necessary, a CAP shall be established to remediate releases from the Disposal Unit, and achieve compliance with the Water Standard adopted under Section 20390 and specified by RWQCB for corrective action.

7.4 Regional and Local Setting

The regional and local settings for surface water are described in Chapter 6.0, Surface Water Drainage. The regional and local settings for groundwater are described in Chapter 5.0, Geology and Hydrogeology.

7.5 Surface Water Monitoring at CCL

The current surface water monitoring and reporting program and proposed surface water monitoring locations for the Proposed Project are described in Chapter 6.0, Surface Water Drainage.

7.6 Groundwater Monitoring at CCL

7.6.1 Groundwater Monitoring and Reporting Program

Quarterly monitoring and semi-annual reporting are required by the current WDRs and MRP for the facility, which contain the requirements for groundwater sampling and analysis, and the evaluation of analytical results (WDR Order No. 98-086 and MRP No. 6231, issued by RWQCB on November 4, 1998). The current groundwater monitoring system is summarized in Section 5.6.3. As required, CCL has been conducting a DMP, EMP, and CAP.

Sampling and analytical requirements include quarterly groundwater monitoring for monitoring parameters. Additional monitoring for COCs is conducted at 5-year intervals, for background sampling for new constituents when new wells are installed, or when “triggered” by the release discovery response process. The last 5-year COC scan was conducted in October 2011.

The quarterly groundwater monitoring consists of the following for the DMP:

- Monitoring vadose well SW-1, gas probes GP-9 and GP-10 (the deepest probe is designated VP-1 at GP-10), and lysimeter LP-1
- Measuring groundwater levels in all wells
- Collecting groundwater samples from wells DW-1, DW-3, DW-7, DW-8, DW-12, DW-14, DW-15, DW-16, DW-17, DW-18, DW-20, DW-21, DW-28, and PZ-4, and analyzing for the site monitoring parameters
- Collecting an annual leachate sample (“LC-1”) and analyzing for COCs

Additional sampling and analysis is performed for select wells, as required, for the EMP and CAP being implemented. The combined DMP, EMP, and CAP monitoring and reporting schedule are shown below:

Semiannual Period	Reporting Period	Sampling Months	Report Due
First	January - June	January and April	June 30
Second	July - December	July and October	December 31
Annual	January - December		March 1

7.6.1.1 Vadose Zone Monitoring

Vadose well SW-1 and gas probes GP-9 and GP-10 are checked for the presence of liquids using an electric water-level sounder; no measurable quantities of liquid have been noted. Lysimeter LP-1 is monitored, but no soil moisture has been recovered since monitoring started in January 1991.

7.6.1.2 Water Level Measurements

Static water levels in all monitoring network wells are measured using an electric water-level sounder prior to purging and sampling.

7.6.1.3 Groundwater Sampling and Analysis

Quarterly groundwater samples are typically collected during the months of January, April, July, and October. The low-flow groundwater sampling procedure is used in all wells.

Field parameters monitored and recorded during low-flow purging consist of specific conductance, pH, temperature, dissolved oxygen, and oxygen reduction potential. Groundwater samples are analyzed by a state-certified laboratory for the following monitoring parameters:

- Bicarbonate ($CaCO_3$)
- Boron (total)
- Chemical oxygen demand (COD)
- Chloride
- Nitrate as N
- Nitrite as N
- Sodium (total)
- Sulfate
- Total dissolved solids (TDS)
- Total hardness as $CaCO_3$
- Volatile organic compounds (VOC)

In 2013, East Canyon well DW-23 sampled and analyzed for a partial COC to develop a background water quality data (RTF&A, 2014b).

7.6.1.4 Groundwater Quality Monitoring Results

Historical results related to the EMP and CAP are summarized below, followed by the recent results for 2013 for the DMP, EMP, and CAP.

7.6.1.4.1 Historical Results for EMP and CAP

Evaluation Monitoring Program – DW-16

In 2004, fourth quarter retest samples from well DW-16 contained two VOCs, trichloroethene (TCE) and tetrachloroethene (PCE), at “trace” concentrations (greater than or equal to the method detection limit [MDL] and less than the practical quantitation limit [PQL]), so a release was reported on December 10, 2004 (RTF&A, 2004c). In response to the determination of a release, an Amended Joint Technical Document (JTD) containing a proposed EMP was submitted to RWQCB (RTF&A, 2005b). The Amended JTD included proposed EMP evaluation methods for assessing the VOCs found at well DW-16. Those methods have been implemented, pending RWQCB approval of the proposed EMP. The Engineering Feasibility Study (EFS) for DW-16 was submitted to RWQCB on June 7, 2005 (RTF&A, 2005c). A time series chart for VOCs detected in groundwater samples from DW-16 is provided in Figure 7-1.

The Amended JTD (RTF&A, 2005b) included a preliminary assessment of the nature and extent of the release, which appeared to result from landfill gas (LFG) migration from the adjacent unlined Primary Canyon. The EFS identified LFG system improvements as a corrective action measure. In 2005, CCL conducted detailed performance testing and evaluation of the Primary Canyon LFG collection system to identify potential areas for improvements. Since 2006, CCL has completed the design and installation of additional LFG controls at Primary Canyon.

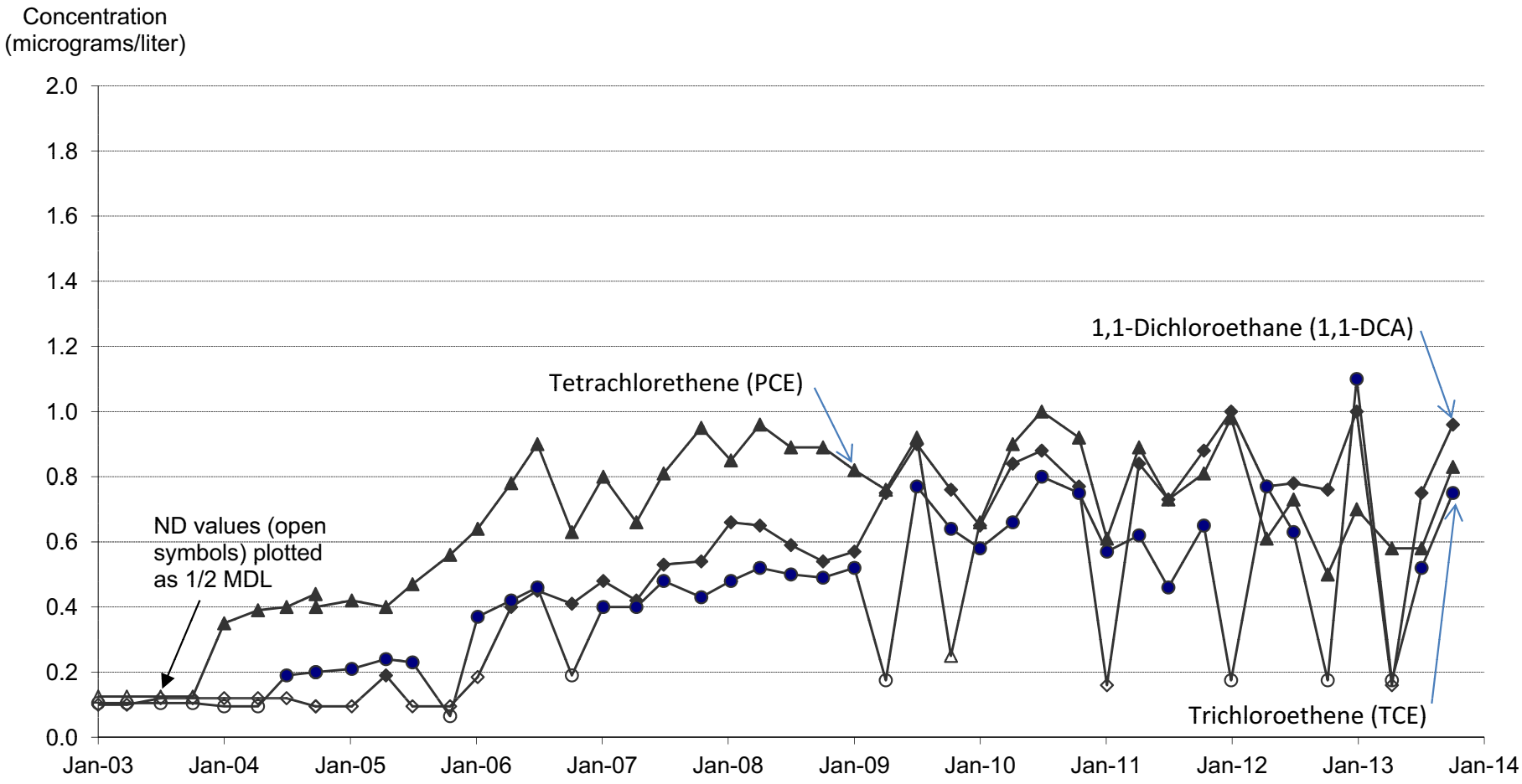


FIGURE 7-1
VOCs Detected
Well DW-16 Time Series Plot
Chiquita Canyon Landfill
Master Plan Revision

Source: R.T. Frankian and Associates

SCO486708.14.06 CCL_VOCs_DW-16.ai 5/14

CH2MHILL

Evaluation Monitoring Program – DW-20

In 2003, second quarter retest samples from well DW-20 contained the VOC 1, 1-dichloroethane (1,1-DCA) at concentrations greater than the PQL, so a release was reported on July 22, 2003 (RTF&A, 2003c). In response to the determination of a release, an Amended JTD containing a proposed EMP and EFS was submitted to RWQCB (RTF&A, 2003b). The Amended JTD included proposed EMP evaluation methods for assessing the VOCs found at well DW-20, and those methods have been implemented, pending RWQCB approval of the proposed EMP. A time series chart for VOCs detected in groundwater samples from DW-20 is provided in Figure 7-2.

The Amended JTD (RTF&A, 2003b) included a preliminary assessment of the nature and extent of the release, which appeared to result from LFG migration from Canyon D, the nearest landfill area. The EFS identified installation of additional vertical LFG extraction wells in Canyon D as the corrective action measure. CCL has completed the design and installation of additional LFG controls at Canyon D.

Corrective Action Programs – DW-1 and DW-3

A CAP is in progress at well DW-1, downgradient from Primary Canyon, and at well DW-3, downgradient from Canyon B. VOCs have been historically reported in groundwater samples from both wells. Implemented corrective action measures at both disposal areas include LFG collection system improvements aimed at reducing subsurface gas migration to groundwater. Time series charts for VOCs detected in groundwater samples from wells DW-1 and DW-3 are provided in Figures 7-3 and 7-4, respectively.

7.6.1.4.2 Recent Results for 2013

The results for the DMP, EMP, and CAP are presented below for 2011. A summary of the statistical analysis of the inorganic monitoring parameters are presented in Table 7-1 for 2013. Summaries of VOCs detected are presented in Table 7-2 for 2013.

Detection Monitoring Program

The intent of the DMP is to assess groundwater quality and determine whether it is being affected by the landfill. The quarterly assessments of monitoring parameters are made through both nonstatistical and statistical analyses, as described in the WDRs.

The nonstatistical VOC analysis is a comparison of each detected VOC with its respective MDL and PQL. A release is tentatively indicated if the groundwater sample contains two or more VOCs at concentrations greater than their respective MDLs, or one or more VOCs at concentrations above the respective PQLs.

The nonstatistical qualitative trend analysis (QTA) for monitoring parameters including COD, chloride, electrical conductivity, nitrate (as N), nitrite, pH, sulfate, and total hardness (as $CaCO_3$) is performed using time series plots for each reporting period, as specified in the WDRs. A statistical analysis for these parameters is conducted after each 5-year COC scan.

The statistical analysis of the remaining monitoring parameters is the control chart approach contained in the JTD (EMCON, 1997c). This intrawell approach involves using the historical water chemistry for each well as the background data for that well, rather than comparing current water chemistry to data from a different, hydraulically upgradient well. The statistical results are presented in a series of control charts (Appendix E of RTF&A, 2014b) for each well/monitoring parameter pair; the results are tabulated in Table 7-1.

For the 2013 monitoring year, VOCs were not detected in the DMP monitoring points. In general, the results reported during the 2013 monitoring period are within historical ranges at each monitoring point.

The DMP statistical summary is provided on Table 7-1 for 2013. For the monitoring parameters evaluated statistically in the first quarter, none of the compliance values exceeded the control limits. For the monitoring parameters evaluated statistically in the second through fourth quarters, only the compliance value for boron exceeded the control limit for the DW-18 sample. As previously reported, boron concentrations increased in upgradient wells DW-8 and DW-19 (prior to destruction) starting in 2008, so the increased boron at well DW-18 is not considered evidence of a landfill release. Based on evaluation of the VOC results, the QTA time series plots, and the statistical analysis results, there was no evidence of a landfill release in the DMP for 2013.

Evaluation Monitoring Program – DW-16

The landfill release identified at well DW-16 was initially indicated by the presence of trace concentrations of the VOCs TCE and PCE. In the 2013 samples from well DW-16, low to trace concentrations of TCE, 1,1-DCA, and PCE were present (Table 7-2). The proposed EMP evaluation method is to plot VOC concentrations versus time (time series plots) and evaluate trends (Figure 7-2). The VOC concentrations in samples from DW-16 have increased since January 2004, when VOCs were first reported. However, these VOC concentrations remain at low levels, less than 1 μg/L. For the monitoring parameters evaluated statistically, no compliance values exceeded their control limits.

Evaluation Monitoring Program – DW-20

The landfill release identified at well DW-20 was initially indicated by the presence of various VOCs (1,1-DCA, CFC 12, TCE, and PCE) at trace to low concentrations. The only VOC present in the 2011 samples from well DW-20 was 1,1-DCA, which was reported at trace concentrations in the first and fourth quarter samples (Table 7-2). The proposed EMP evaluation method is to plot VOC concentrations versus time (time series plots) and evaluate trends (Figure 7-4). The VOC concentrations in groundwater samples from well DW-20 have declined through time, with only 1,1-DCA present at trace concentrations.

For the monitoring parameters evaluated statistically, the only compliance values at well DW-20 that exceeded control limits were bicarbonate in the first and second quarters and boron in the third quarter. Given the similar increases in bicarbonate concentrations in nearby upgradient wells DW-8 and DW-28, the recent increase in bicarbonate concentration at well DW-20 does not appear to be evidence of a release from the landfill. As previously reported, boron concentrations increased in upgradient wells DW-8 and DW-19 (prior to destruction) starting in 2008, so the increased boron at well DW-20 sample is not considered evidence of a landfill release.

Corrective Action Program

The CAP consists of well DW-1, downgradient from Primary Canyon, and well DW-3, downgradient from Canyon B, with VOCs historically reported from each. Implemented corrective action measures at both disposal areas include LFG collection system improvements aimed at reducing gas migration to groundwater.

Determination of Compliance: As specified in the CAP, the COCs at both wells DW-1 and DW-3 are those VOCs identified using United States Environmental Protection Agency (EPA) Method 8260, and the concentration limits are the respective MDLs. For the first, second, and third quarters of 20131, the DW-1 samples had trace to low concentrations of 1,1-DCA and PCE (Table 7-2). CFC 12 was the only VOC detected in the samples collected from well DW-3 in 2013 (Table 7-2). These VOC results remain consistent with past sampling events at wells DW-1 and DW-3.

The analytical results for metals and general water quality parameters are summarized with the historical groundwater chemistry in Appendixes G and I of the Annual Report (RTF&A, 2014b). The QTA time series plots for monitoring parameter/well pairs are presented in Appendix D. In general, the results reported this monitoring period are within historical ranges at the site. For the CAP monitoring parameters evaluated statistically at wells DW-1 and DW-3, none of the compliance values exceeded the control limits.

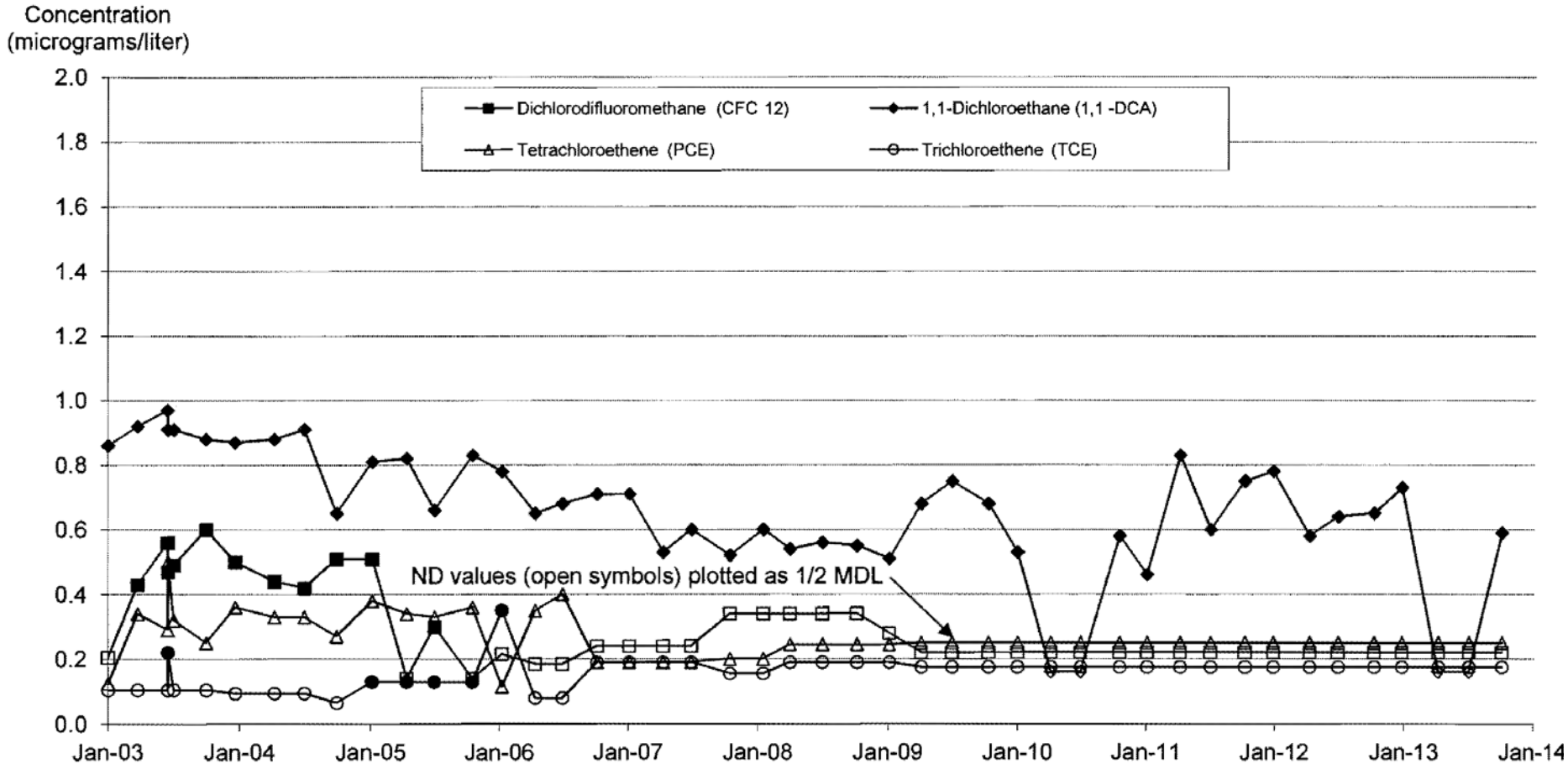


FIGURE 7-2
VOCs Detected
Well DW-20 Time Series Plot
Chiquita Canyon Landfill
Master Plan Revision

Source: R.T. Frankian and Associates

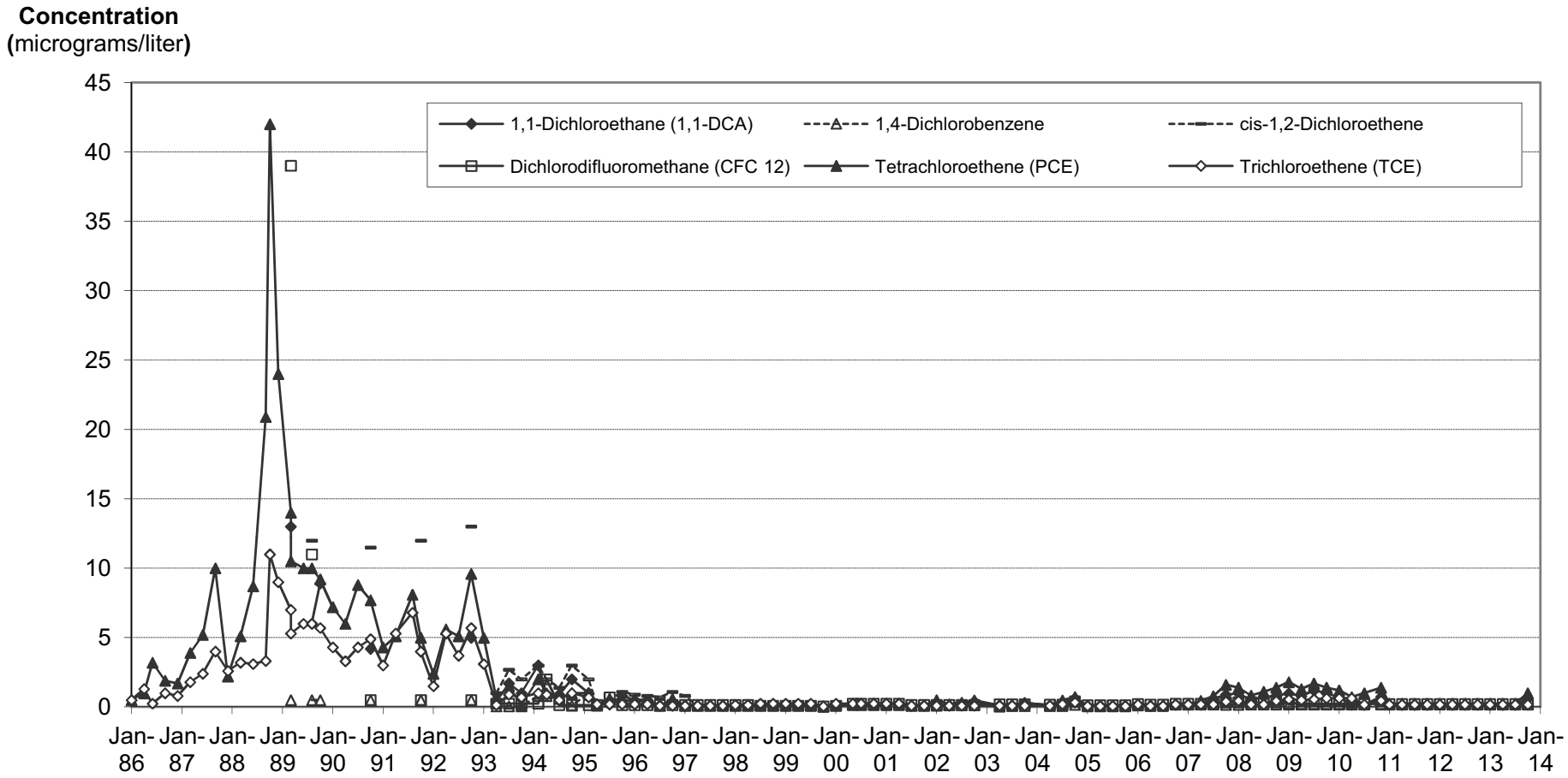


FIGURE 7-3
VOCs Detected
Well DW-1 Time Series Plot
Chiquita Canyon Landfill
Master Plan Revision

Source: R.T. Frankian and Associates

SCO486708.14.06 CCL_VOCs_DW-1.ai 5/14

CH2MHILL

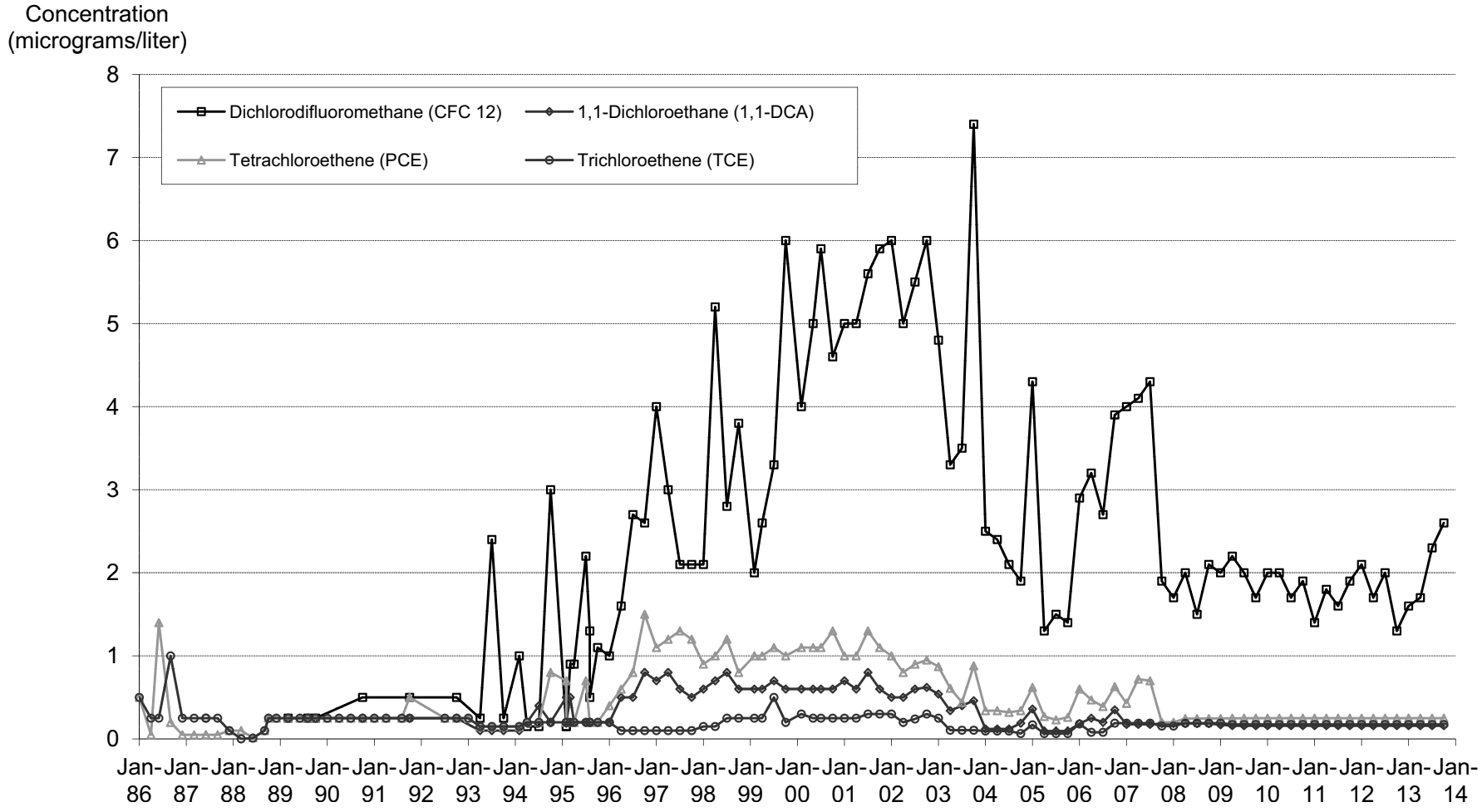


FIGURE 7-4
VOCs Detected
Well DW-3 Time Series Plot
Chiquita Canyon Landfill
Master Plan Revision

Source: R.T. Frankian and Associates

SCO486708.14.06 CCL_VOCs_DW-3.ai 5/14

CH2MHILL

TABLE 7-1
Statistical Analysis Results in 2013
Chiquita Canyon Landfill

Groundwater Monitoring Point	First Quarter 2013				Second Quarter 2013			
	Bicarbonate	Boron	Sodium	TDS	Bicarbonate	Boron	Sodium	TDS
DW-1	(1)	W	W	W	(1)	(1)	(1)	W
DW-3	W	W	W	(1)	(1)	W	W	(1)
DW-7	(1)	W	W	(1)	(1)	W	W	(1)
DW-8	(1)	W	W	(1)	(1)	W	W	(1)
DW-12	(1)	W	W	W	(1)	W	W	(1)
DW-14	W	W	W	W	W	W	W	W
DW-15	(1)	W	W	(1)	(1)	W	W	(1)
DW-16	W	W	W	W	W	W	W	W
DW-17	W	(1)	W	W	W	W	W	W
DW-18	W	W	W	W	W	E	W	W
DW-20	E	W	(1)	W	E	W	(1)	W
DW-21	(1)	W	W	W	(1)	W	W	W
DW-28	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
PZ-4	W	W	W	(1)	W	W	(1)	(1)

TABLE 7-1
Statistical Analysis Results in 2013
Chiquita Canyon Landfill

Groundwater Monitoring Point	Third Quarter 2013				Fourth Quarter 2013			
	Bicarbonate	Boron	Sodium	TDS	Bicarbonate	Boron	Sodium	TDS
DW-1	(1)	(1)	(1)	W	(1)	W	(1)	W
DW-3	(1)	W	W	(1)	(1)	W	W	(1)
DW-7	(1)	W	W	(1)	(1)	W	W	(1)
DW-8	W	W	W	(1)	(1)	W	W	(1)
DW-12	(1)	W	W	(1)	(1)	W	W	(1)
DW-14	W	W	W	W	W	W	W	(1)
DW-15	(1)	W	W	(1)	(1)	W	W	(1)
DW-16	W	W	W	W	W	W	W	W
DW-17	W	W	W	W	(1)	W	W	W
DW-18	W	E	W	W	W	E	W	W
DW-20	W	E	(1)	W	W	W	(1)	W
DW-21	(1)	W	W	W	(1)	W	(1)	W
DW-28	W	(1)	W	W	W	(1)	W	W
PZ-4	W	W	(1)	(1)	W	W	(1)	(1)

Notes:

Statistical analysis performed using all values between past 1 and 6 years as background and values for the most recent four quarters as compliance concentrations. Shapiro-Wilk normality test was used to test for normal data distribution.

Shewhart-CUSUM Control Chart Results: W = Within control limit, E = Exceeds control limit.

(1) Not analyzed due to non-normal data distribution and data could not be normalized using "Ladder of Powers" transformation.

(2) Not analyzed due to insufficient number of data.

TABLE 7-2
Detected Volatile Organic Compounds in 2013
Chiquita Canyon Landfill

EMP VOCs (µg/L)	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
	DW-16	DW-20	DW-16	DW-20	DW-16	DW-20	DW-16	DW-20
1,1-DCA	1.0	0.73 tr	nd	nd	0.75 tr	nd	0.96 tr	0.59 tr
Dichloromethane (Methylene Chloride)	nd	nd	nd	nd	0.41 tr	nd	0.43 tr	nd
TCE	1.1	nd	nd	nd	0.52 tr	nd	0.75 tr	nd
PCE	0.70 tr	nd	0.58 tr	nd	0.58 tr	nd	0.83 tr	nd

CAP VOCs (µg/L)	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
	DW-1	DW-3	DW-1	DW-3	DW-1	DW-3	DW-1	DW-3
1,1-DCA	nd	nd	nd	nd	nd	nd	0.58 tr	nd
CFC 12	nd	1.6	nd	1.7	nd	2.3	nd	2.6
PCE	nd	nd	nd	nd	nd	nd	1.0	nd

Notes:

VOC concentrations in micrograms per liter.

CFC 12 = dichlorodifluoromethane

µg/L = micrograms per liter

nd = not detected

tr = estimated (trace) concentration; analyte detected above MDL, but below PQL

Demonstration of Effectiveness: Time series plots of VOCs detected in 2013 illustrate trends in VOC concentrations through time at well DW-1 (Figure 7-3) and at well DW-3 (Figure 7-4). Samples with analyte concentrations less than the MDL (nondetected) were plotted at one-half the MDL. The VOC concentrations from both the DW-1 and DW-3 samples are within historical ranges. At well DW-1, the absence of detectable VOCs in the 2011, 2012, and first three quarter 2013 samples appears to be returning to 2006 levels. At well DW-3, the VOC concentrations appear to be generally decreasing through time, with the 2013 results relatively unchanged from 2008.

Corrective action measures are continuing to be implemented at the landfill. Corrective action measures at both the Primary Canyon and Canyon B disposal areas include LFG collection system improvements aimed at reducing gas migration to groundwater. In 2009, CCL identified locations on both Primary Canyon and Canyon B where either replacement LFG wells or additional vertical wells could be installed to improve gas collection, and installed those LFG wells in summer 2009. During March 2010, additional LFG wells and replacement LFG wells were installed in Primary Canyon and the Main Canyon area to further control subsurface LFG migration.

During the late third and fourth quarters 2010, construction activities across both the Primary Canyon and Canyon B areas necessitated temporarily shutting down numerous LFG wells, which may have resulted in the observed slight increases in the VOC concentrations at well DW-1 at the end of 2010. The existing LFG wells were returned to production in January 2011. During December 2010 and into January 2011, additional LFG wells were added to both the Main Canyon area and the Primary Canyon (near well DW-16).

Historically, the LFG collection system appears to be effective at reducing VOC concentrations in groundwater at wells DW-1 and DW-3, so no further changes to the CAP are recommended at this time.

Summary

Results of the 2013 monitoring periods are summarized below.

- Groundwater flow directions are generally south beneath the Main Canyon area, Primary Canyon, and Canyon C as described in Chapter 5.0, Geology and Hydrogeology. At Canyon B, groundwater appears to flow eastward down the canyon. The groundwater gradients and velocity are consistent with past results.
- For the DMP, no VOCs were detected, and the inorganic monitoring parameters statistically analyzed do not indicate landfill impacts to groundwater.
- For the EMP, VOCs continue to be present at trace to low concentrations at well DW-16. The VOC concentrations at DW-16 have increased since January 2004, but remain at low levels. At well DW-20, only 1,1-DCA was present in trace quantities during the first and fourth quarters. The inorganic monitoring parameters that were statistically analyzed did not indicate landfill impacts.
- For the CAP, LFG control measures continue to operate at Primary Canyon, Canyon B, and Main Canyon; replacement LFG wells were installed in December 2010 and January 2011 to improve LFG collection. At well DW-1, no VOCs were detected in the first through third quarters, and 1,1-DCA and PCE were present in trace to low concentrations in the fourth quarter sample. In samples from DW-3, CFC 12 was the only VOC detected, and concentrations remained within historical ranges. No changes to the corrective action measures are recommended.

In addition, the statistical and nonstatistical analyses of the 5-year COC results from October 2011 resulted in no indication of a landfill release.

7.6.1.5 Proposed Groundwater Monitoring System

The monitoring wells and piezometers proposed for the future groundwater monitoring system for the Proposed Project are shown in Figure 5-13 and listed in Table 5-1. The maximum groundwater elevation contour map for the water table and the planned cell excavation plan for the Proposed Project are shown in Figure 5-19. Table 5-1 notes the Disposal Units (landfills) monitored and whether the monitoring points are located upgradient or downgradient of the respective Disposal Units.

The POC for each landfill area is a vertical surface located in the hydraulically downgradient limit of the waste management unit that extends through the uppermost water-bearing zone underlying the unit. The proposed downgradient monitoring points are located as close as possible to the POC, given the operational and physical constraints of positioning monitoring wells where they will remain accessible. These proposed Saugus and Pico Formation wells will be completed in the uppermost water-bearing zone as determined during exploratory drilling operations.

The proposed monitoring system consists of 19 groundwater points (DW-1, DW-7, DW-8, DW-14 to DW-18, DW-23, DW-26, DW-28 to DW-35, and PZ-4) and 3 vadose zone points (SW-1, VP-2 [GP-29], and VP-3 [DW-30]) (Table 5-1 and Figure 5-13), and an additional 3 groundwater points to be monitored for groundwater levels only (DW-9, DW-21, and DW-27). Thirteen existing monitoring points will be destroyed (LP-1, GP-9, VP-1 [GP-10], DW-3, DW-6, DW-12, DW-20, DW-24, DW-25, PZ-3, PZ-5, PZ-6, and PZ-7), either because they are within the proposed landfill development area, or because they no longer provide useful monitoring data (vadose zone lysimeter LP-1).

Main Canyon: The proposed extension of the Main Canyon footprint into South Main Canyon requires one new downgradient groundwater monitoring well, DW-29. Well DW-29 is centrally located in the Main Canyon drainage to monitor downgradient from the lowest elevations in the landfill floor, and is also downgradient from the POC on the west slope. Additional groundwater monitoring along the Main Canyon POC is provided by wells DW-15 and DW-16, and monitoring downgradient from the POC is provided at wells DW-1 and DW-18. Upgradient groundwater monitoring will be conducted at Pico Formation wells DW-8 and DW-28, and at Saugus well DW-17. On the west ridge, Saugus well DW-9 is not in the proposed monitoring system, but should be retained for groundwater level measurements only. Proposed vadose points consist of downgradient vadose well SW-1 and upgradient VP-2 (GP-29).

North and East Canyons: The POC for the proposed North and East Canyons footprint will require downgradient monitoring in the Pico Formation along the north (well DW-34), and in the Saugus Formation along the northeast (wells DW-23 and DW-33), east (DW-26 and DW-32), and southeast (wells DW-30 and DW-31). Upgradient monitoring will be provided by Pico Formation well DW-28. Monitoring point DW-27 should be used for groundwater level measurements only, and is not part of the proposed groundwater monitoring program. Wells DW-24 and DW-25, and piezometers PZ-3, PZ-5, PZ-6, and PZ-7 will be destroyed as landfill development proceeds; but water levels should be monitored until their destruction. Vadose points consist of downgradient VP-3 (DW-30) and upgradient VP-2 (GP-29).

Primary Canyon: The Primary Canyon POC is unchanged, and the proposed points include existing monitoring points DW-1, DW-7, and DW-16 through DW-18. Because well DW-12 will be destroyed by the entrance road development, a replacement well DW-35 will be installed. Well DW-21 should be retained for groundwater level measurements only, but could be used in the event that a new landfill release impacts nearby wells. Well DW-21 is a deep pair to well DW-18, and their historical water quality results have been similar since installation of well DW-21 in 1999. The vadose zone point will be well SW-1.

Canyon B: The Canyon B POC also is unchanged, and the proposed groundwater monitoring system includes existing points DW-14 and PZ-4. Because well DW-3 and vadose zone point GP-9 will be destroyed by the landfill development, replacement downgradient points DW-30/VP-3 and DW-31 will be installed. The shallow vadose point VP-3 in the boring for well DW-30 replaces vadose zone point GP-9. Inactive well DW-6 will be within the landfill development area and should be destroyed.

The well depth and design for each of the additional monitoring points will meet CCR Title 27 regulatory requirements, and be determined based on geologic and groundwater conditions encountered during drilling. In general, the groundwater wells will target the uppermost water-bearing zone, and will be completed with a relatively short screen intended to sample approximately 20 feet of saturated rock. As required by CCR Title 27, a detailed Well Installation Work Plan will be submitted for RWQCB review and approval prior to installation of the proposed monitoring points.

7.6.1.6 Proposed Perimeter Landfill Gas Monitoring System

To meet the perimeter LFG monitoring requirements of the South Coast Air Quality Management District (SCAQMD) Rule 1150.1 and CCR Title 27, the proposed perimeter LFG monitoring program will consist of a total of 27 multi-level gas monitoring probes (Figure 7-5 and Table 7-3). The proposed probes are spaced less than 1,000 feet apart around the proposed landfill limits. The expanded landfill footprint will require installation of nine additional LFG monitoring probes (GP-27 through GP-35) on the north and east sides of the property. Nine existing monitoring probes (GP-A, GP-B, GP-9, GP-10, GP-11, GP-12, GP-24, GP-25, and W-2) will be destroyed as the expansion progresses.

The number and depth of gas probes at each of the additional monitoring points will meet SCAQMD Rule 1150.1 and CCR Title 27 regulatory requirements, and will be determined based on geologic conditions encountered during drilling, maximum depth of refuse, and local groundwater elevations. As required by CCR Title 27, an LFG Monitoring Plan that provides justification for the monitoring point locations, depths, and construction methods will be submitted for agency review and approval prior to installation of these points.

7.6.1.7 Separation between Groundwater and Waste

The Proposed Project changes the currently permitted landfill footprint in two areas: (1) the North and East Canyon Excavation Area northeast of, and contiguous with, the Main Canyon landfill; and (2) the South Main Canyon Excavation Area, which is south of and adjoining the Main Canyon landfill. The cell excavation plan illustrates the proposed grading (with red elevation contour lines) in these areas (Figure 5-19).

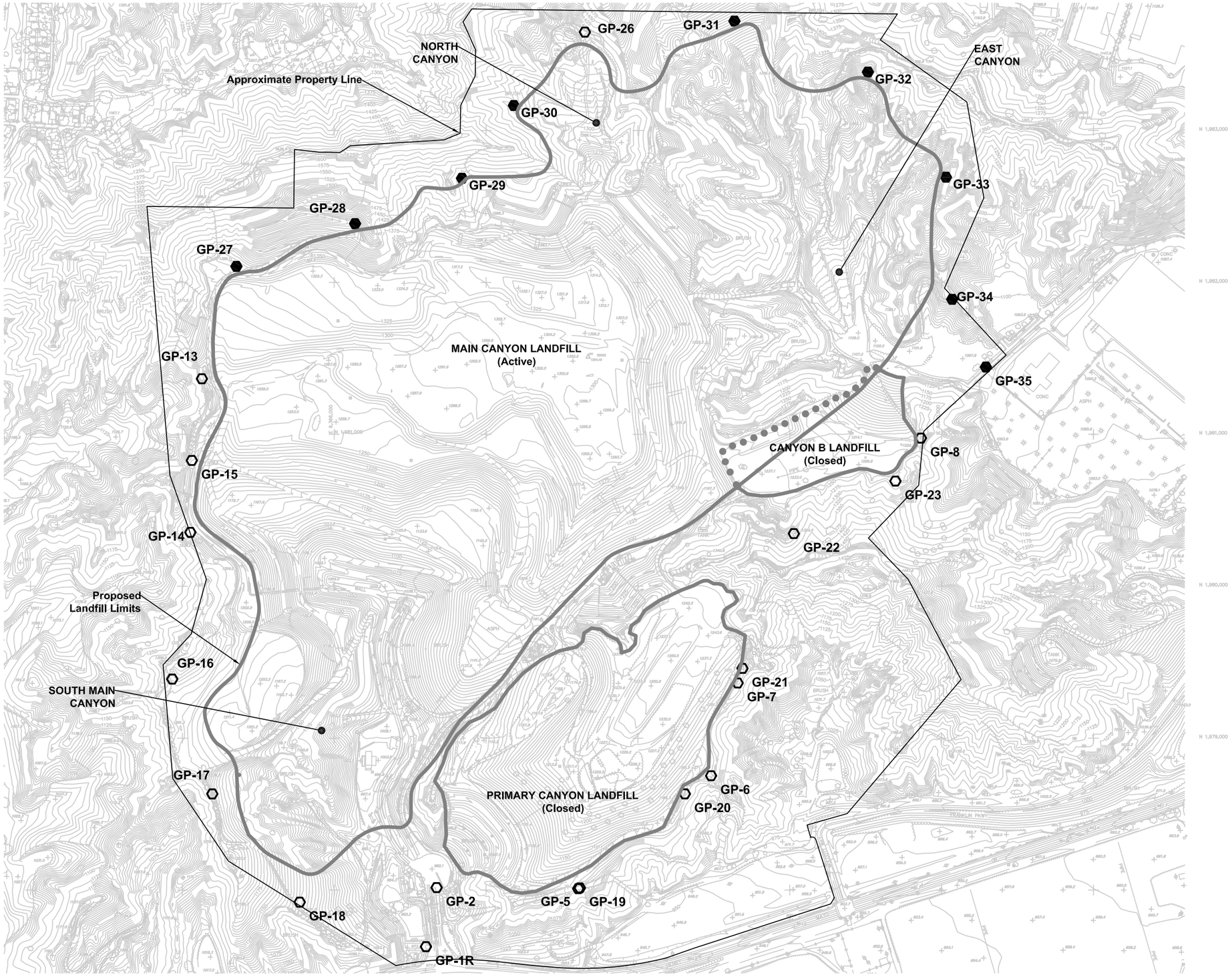
The Proposed Project cell excavation plan (red elevation contours) is also presented in Figure 5-19 to illustrate the waste-groundwater separation in both the North/East Canyons and South Main Canyon landfill areas, where the elevation difference between the red and blue contour lines represents the approximate minimum waste-groundwater separation. As discussed in Chapter 5.0, because the bottom of refuse will be slightly higher than the excavation elevations, depending on the approved liner system design, the waste-groundwater separation calculated from these contour lines represents a minimum. North, East, and South Canyons will meet the minimum of 5 feet above the highest anticipated elevation of underlying groundwater criteria.

7.7 Potential Impacts

7.7.1 Standards of Significance

Potential impacts of the Proposed Project resulting from water quality considerations are assessed below. Section 15065 of the *California Environmental Quality Act (CEQA) Guidelines* indicates that a lead agency shall find that a project may have a significant effect on the environment if the project has the potential to substantially degrade the quality of an environment. Specific to the water quality aspects of the Proposed Project, the project will have a significant effect if it will:

- Violate any surface water quality standards or WDRs
- Violate any groundwater quality standards or WDRs
- Contaminate public water supply
- Otherwise substantially degrade water quality



EXPLANATION

- Landfill Gas Monitoring Probe (existing)
- Landfill Gas Monitoring Probe (future)

Note:
Proposed Landfill Limits from Golder Associates November, 2011 Excavation Plan

N

0 300 600
Feet

FIGURE 7-5
Perimeter Landfill Gas Monitoring Systems
Chiquita Canyon Landfill
Master Plan Revision

Source: RTF&A, 2012.

CH2MHILL

TABLE 7-3
Master Plan Revision Landfill Gas Monitoring System
Chiquita Canyon Landfill

	Monitoring Programs			Monitoring Programs	
Existing Gas Probes	**Title 27**	**Rule 1150.1**	**Future Gas Probes**	**Title 27**	**Rule 1150.1**
GP-1R	No	Yes	GP-27	Yes	yes
GP-2	Yes	Yes	GP-28	Yes	yes
GP-5	No	Yes	GP-29	Yes	yes
GP-6	No	Yes	GP-30	Yes	yes
GP-7	No	Yes	GP-31	Yes	yes
GP-8	Yes	Yes	GP-32	Yes	yes
GP-13	Yes	Yes	GP-33	Yes	yes
GP-14	Yes	Yes	GP-34	Yes	yes
GP-15	Yes	No	GP-35	Yes	yes
GP-16	Yes	No			
GP-17	Yes	No			
GP-18	Yes	No			
GP-19	Yes	No			
GP-20	Yes	No			
GP-21	Yes	No			
GP-22	Yes	No			
GP-23	Yes	No			
GP-26	Yes	Yes			

Note: The following existing gas probes will be destroyed: GP-A, GP-B, GP-9, GP-10, GP-11, GP-12, GP-24, GP-25, and W-2.

7.7.1.1 Proposed Project

The Proposed Project has the potential to (1) violate surface water quality standards or WDRs, (2) violate groundwater quality standards or WDRs, (3) contaminate public water supply, and (4) otherwise substantially degrade water quality. However, these impacts would be less than significant because the Proposed Project would be in compliance with NPDES requirements, CCR Title 27 requirements, and Orders and WDRs issued by RWQCB as further described below.

The Proposed Project will include preparing and implementing a SWPPP and SWMP in accordance with a General Permit issued under SWRCB Order No. 97-03-DWQ, in accordance with NPDES requirements, and in accordance with RWQCB Order No. R4-2011-0052.

The Proposed Project will meet or incorporate the following siting and design features in accordance with Title 27, Chapter 3, Subchapter 2:

- Minimum 5-foot separation between waste above the highest anticipated elevation of underlying groundwater (Section 20240[c])
- Liner system with hydraulic conductivity of $1x10^{-6}$ centimeters per second or less to ensure protection of the quality of groundwater and surface water (Section 20260)
- Design and construction of liner system to contain the fluid, including LFG, waste, and leachate (Section 20330)
- Leachate collection and removal systems (Section 20340)
- Precipitation and drainage control structures designed and constructed to limit, to the greatest extent possible, ponding, infiltration, inundation, erosion, slope failure, washout, and overtopping (Section 20365)

Additionally, the Proposed Project will comply with the Los Angeles County Low Impact Development Ordinance. The Proposed Project will implement the required water quality monitoring and response programs for detecting, characterizing, and responding to releases to groundwater, surface water, or the unsaturated zone in accordance with CCR Title 27, Chapter 3, Subchapter 3. RWQCB will specify, in facility-specific WDRs, the type or types of monitoring programs required and the specific elements of each monitoring and response program. These type(s) of monitoring programs will include a DMP (Section 20420) and, if necessary, an EMP (Section 20425), and/or CAP (Section 20430) to ensure no impairment of beneficial use of surface water or groundwater beneath or adjacent to the landfill. The specific elements of each program will include the following:

- Water Standard (Section 20390)
- COCs (Section 20395)
- Concentration Limits (Section 20400)
- Monitoring Points and POC (Section 20405)
- Compliance Period (Section 20410)
- General Water Quality Monitoring and System Requirements (Section 20415)

The proposed groundwater monitoring system for the Proposed Project meets these requirements.

7.8 Mitigation Measures

The Proposed Project will not result in significant impacts to surface water and groundwater, and no mitigation measures would be required.

7.9 Significance After Mitigation

The Proposed Project would result in less-than-significant impacts without mitigation.

7.10 Cumulative Impacts

Urbanization of previously undisturbed land has the potential to cause cumulative degradation of surface water quality via siltation and introduction of urban contaminants from household and industrial products, automobiles, and fertilizers. Implementation of design features described in this Draft Environmental Impact Report, as well as required implementation of best management practices for stormwater runoff at each specific related project, would mitigate potential cumulative impacts to below a level of significance.

Planned or approved development in the project area is residential, commercial, or industrial park in character; therefore, development of vacant land from other related projects is not expected to affect groundwater quality since these projects are not expected to expose groundwater resources to contaminants. While the potential exists for groundwater contamination due to the nature of landfilling, design features proposed for the Proposed Project would all but eliminate the project's potential impact on groundwater quality. Therefore, cumulative projects are not expected to significantly impact the quality of groundwater.