2009 Annual Performance Evaluation Report Volume 1

Baldwin Park Operable Unit of the San Gabriel Valley

Superfund Sites

Los Angeles County, California

Prepared for:

Baldwin Park Operable Unit Cooperating Respondents

Prepared by

AMEC Geomatrix, Inc.
1401 17th Street
Suite 600
Denver, CO 80202

ERM – West, Inc.
1777 Botelho Drive
Suite 260
Walnut Creek, CA 94596

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ABBREVIATIONS

1,1-DCE	1,1-Dichloroethene
1,2-DCA	1,2-Dichloroethane
1,2,3-TCP	1,2,3-Trichloropropane
AAWC	Azusa Agricultural Water Company
AJ	Aerojet
ALR	Azusa Land Reclamation
AMEC	AMEC Geomatrix
ARARs	Applicable or Relevant and Appropriate Requirements
AVWC	Azusa Valley Water Company
bgs	below ground surface
BPOU	Baldwin Park Operable Unit
BPOUSC	Baldwin Park Operable Unit Steering Committee
CC	Conrock Company
CDM	Camp, Dresser, and McKee
CDWC	California Domestic Water Company
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIC	Covina Irrigation Company
COC	Chemical of Concern
COI	City of Industry
CRs	Cooperating Respondents

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DPH	California Department of Public Health, Drinking Water Section (formerly Department of Health Services [DHS]).
DQO	Data Quality Objectives
EDB	Ethylene Dibromide
EPA	U.S. Environmental Protection Agency
ERM	ERM-West, Inc.
ESD	Explanation of Significant Differences
FSP	Field Sampling Plan
ft/d	Feet Per Day
ft/ft	Feet Per Foot
f.k.a	Formerly Known As
GAC	Granular Activated Carbon
gpm	gallons per minute
HLA	Harding Lawson Associates
ISEP®	Calgon Ionic Separation Process
LACO	Los Angeles County
LACDPW	Los Angeles County Department of Public Works
LACSD	Los Angeles County Sanitation Districts
LDC	Laboratory Data Consultants
LPGAC	Liquid-Phase Granular Activated Carbon
LPVCWD	La Puente Valley County Water District
MCL	Maximum Contaminant Level
MICR	Maximum Individual Cancer Risk
msl	Mean Sea Level
NDMA	N-Nitrosodimethylamine
NL	Drinking Water Notification Level
ng/L	Nanograms Per Liter
PCE	Tetrachloroethene
PE	Performance Evaluation
PHG	Public Health Goal
PRP	Potentially Responsible Party
PSEP	Performance Standards Evaluation Plan
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RI	Remedial Investigation
ROD	Record of Decision
RMSE	Root-mean squared error
RWQCB	Regional Water Quality Control Board – Los Angeles Region
SA	Subarea
SCAQMD	South Coast Air Quality Management District
SGVWC	San Gabriel Valley Water Company
SOW	Statement of Work
SMR	Self Monitoring Reports
SVOC	Semi-Volatile Organic Compound

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SWS	Suburban Water Systems
TIC	Tentatively Identified Compound
TCE	Trichloroethene
UAO	Unilateral Administrative Order
µg/L	Micrograms Per Liter
UV	Ultraviolet
VCWD	Valley County Water District
VOC	Volatile Organic Compound
VPGAC	Vapor Phase Granulated Activated Carbon
WE	Water Entity
WY	Water Year

2009 ANNUAL PERFORMANCE EVALUATION REPORT
Baldwin Park Operable Unit
San Gabriel Valley, California

1.0 INTRODUCTION

This document presents the 2009 Annual Performance Evaluation (PE) Report for the Baldwin Park Operable Unit (BPOU) of the San Gabriel Valley Superfund Sites, located in the San Gabriel Basin, Los Angeles County, California. This report was prepared jointly by AMEC Geomatrix, Inc. (Geomatrix) and ERM-West, Inc. (ERM), on behalf of the BPOU Cooperating Respondents (CRs). The CRs are:

- Aerojet-General Corporation
- Azusa Land Reclamation Company, Inc. (ALR)
- Fairchild Holding Corporation[1]
- Hartwell Corporation
- Chemical Waste Management (as successor to Oil and Solvent Process Company)
- Reichhold, Inc.
- Winco Enterprises Inc. (formerly known as [f.k.a.] Wynn Oil Company)

This report meets the requirements for the Annual PE Report, as required by Unilateral Administrative Order 2000-13 (UAO) and the supporting Statement of Work (SOW), issued by the U.S. Environmental Protection Agency (EPA) Region IX on June 30, 2000 and amended on February 28, 2002.

1.1 BACKGROUND

Beginning in 1979, volatile organic compounds (VOCs) were detected in groundwater within the San Gabriel Basin (the Basin). In May 1984, four areas of groundwater contamination were listed as San Gabriel Valley Areas 1-4 on EPA's National Priorities List based on available water-quality data. Subsequent investigation by EPA and others revealed widespread VOC contamination in the Basin. As a result, EPA subsequently divided the Basin into seven Remedial Investigation (RI) areas to focus characterization on the extent of

[1] Fairchild Holding Corporation and the Fairchild Corporation filed for bankruptcy on March 18, 2009. At this juncture, the status of Fairchild's continuing participation in the BPOU project is at best uncertain. Fairchild has not participated in the funding or review of this Annual Report.

contamination and plan remedial actions. EPA later designated some of these RI areas as operable units. RI Area 5 was designated as the BPOU.

Although many of the figures provided in this report depict a generalized boundary to the area of impacted groundwater in the BPOU (Figure 1-1), the precise boundary of the BPOU has not been determined, but an approximate boundary is presented to provide a point of reference on the figures.

Since 1986, EPA, various Potentially Responsible Parties (PRPs), and numerous other entities have compiled and evaluated groundwater-quality data from the Basin. Initial field investigations conducted by EPA in the BPOU included the installation and sampling of one multiport monitoring well and the sampling of water supply wells. In 1990, EPA issued a Basin-wide Technical Plan that described options for remediation of VOC plumes through the Basin. In 1992, EPA published an Interim RI Report for the Basin.

In 1993, EPA issued a Feasibility Study Report for the BPOU. This report evaluated various remedial alternatives for the remediation of groundwater in the BPOU. In 1994, EPA issued a Record of Decision (ROD) for the BPOU interim remedy. The ROD identified 17 chemicals of concern (COCs), all of which were VOCs. EPA's selected remedy consisted of pumping and treating approximately 19,000 gallons per minute (gpm) of contaminated groundwater. In approximately 1995, the Baldwin Park Operable Unit Steering Committee (BPOUSC) began to perform pre-remedial design activities, including additional characterization of the extent of VOC-contaminated groundwater and the development of a groundwater extraction plan. Eight multiport monitoring wells were installed and sampled and 26 existing water-supply and monitoring wells were sampled to provide additional characterization of the extent of VOC contamination in the BPOU. The results of these pre-remedial design activities were submitted to EPA in the Draft Pre-Remedial Design Report, dated December 1996 (Camp, Dresser, and McKee [CDM], 1996). The groundwater extraction plan was revised on several occasions. Following review and comment by EPA, the Draft Final Pre-Remedial Design Report, dated September 1997 (CDM, 1997) was issued.

In mid-1997 and then in 1998, certain constituents that were not previously considered as COCs in the ROD, perchlorate, N-nitrosodimethylamine (NDMA), and 1,4 dioxane, were discovered in groundwater within the BPOU. Consequently, EPA requested that the BPOUSC characterize the distribution of these constituents, as well as conduct further characterization of VOCs in groundwater within the BPOU. As a result, the BPOUSC installed and sampled four additional multiport monitoring wells and conducted additional groundwater sampling to evaluate the extent of VOCs, perchlorate, NDMA, and 1,4-dioxane in groundwater in the BPOU.

The results of these investigations and several groundwater extraction plan options were presented to EPA in the Addendum to the Pre-Remedial Design Report, dated January 14, 1999 (Harding Lawson Associates [HLA], 1999). Throughout 1999, these groundwater extraction plan options were refined and new options were formulated. These changes were made in response to comments from EPA and the Main San Gabriel Basin Watermaster (Watermaster). This resulted in a range of candidate groundwater extraction plans with total groundwater extraction rates ranging from 19,500 to 21,500 gpm.

In May 1999, EPA issued an Explanation of Significant Differences (ESD) to supplement the 1994 ROD. The ESD depicted an extended southern portion of the BPOU plume, in Subarea 3, to reflect the results of the additional investigations, and added perchlorate, NDMA, and 1,4-dioxane to the list of COCs. In June 2000, EPA issued the UAO, requiring various PRPs (identified in the UAO as "Respondents"), including but not limited to the CRs, to design, construct, and operate the BPOU interim remedy identified in the ROD, as revised by the ESD. In addition, beginning in the late 1990s, various water agencies, producers, and other water entities (collectively, the "Water Entities" or "WEs") with regulatory oversight and/or financial or other interests in the BPOU groundwater filed lawsuits or asserted claims against the BPOU PRPs for damages allegedly suffered as a result of contamination of the groundwater and water supply wells in the BPOU area. Thereafter, the CRs entered into negotiations with the WEs, which culminated in March 2002 with the CRs and WEs executing the BPOU Project Agreement to implement the BPOU Project. The BPOU Project Agreement was declared effective as of May 9, 2002.

While the BPOU Project Agreement negotiations were underway, the CRs prepared the Remedial Design/Remedial Action Work Plan and the Conceptual Design Report for the implementation of the remedy (HLA, 2000a and HLA, 2000b). The Preliminary Design Report was prepared by the WEs and submitted to EPA in April, 2001 (Watermaster, 2001).

In January 2006, EPA's Remedial Project Manager notified the Cooperating Respondents that EPA was concerned about the detection of 1,2,3,-trichloropropane (1,2,3-TCP) in certain wells within the BPOU. This compound does not have a federal MCL, but does have a California state notification level of 5 nanograms per liter (ng/L)[2]. In response to EPA's requirements, the CRs funded a further modification of the Subarea 1 VCWD Lante Treatment Plan to include Liquid-Phase Granular Activated Carbon (LPGAC) treatment to address EPA's concerns about the presence of 1,2,3-TCP.

[2] In August 2009, the State of California's Office of Environmental Health Hazard Assessment adopted a final Public Health Goal (PHG) for 1,2,3-trichloropropane of 0.7 nanograms per liter, or .0007 parts per billion. While DPH considers a PHG in setting a state MCL, to date no final MCL has been established.

In August 2006, EPA requested that the CRs include in the BPOU monitoring program additional sampling for non-COC VOCs and non-target volatile and semi-volatile compounds (Tentatively Identified Compounds, or TICs) including 1,2,3-TCP. In response to EPA's request, the CRs provided a proposal for non-COC groundwater analysis and reporting in a technical memorandum dated August 24, 2006 (Geomatrix, 2006a). This proposal included the following:

- Information on sampling and analysis of 1,2,3-TCP;
- A proposal for reporting results for non-COC VOCs in a subset of multiport monitoring wells located upgradient of each Subproject ("early warning" wells);
- A proposal for monitoring of non-target VOCs and semi-volatile organic compounds (SVOCs) in a subset of multiport monitoring wells located upgradient of each Subproject ("early warning" wells), and;
- A proposal for periodic analysis of 1,2,3-TCP in Subarea 3.

EPA approved the August 24, 2006, proposal in a letter dated September 13, 2006, subject to the addition of several wells. The complete requirements for non-COC groundwater analysis and reporting were summarized in a technical memorandum dated September 29, 2006 (ERM, 2006).

On October 3, 2006, EPA provided a letter approving the BPOU Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) subject to submittal of final versions of these documents with the complete requirements for non-COC groundwater analysis and reporting. Final versions of the QAPP and FSP were submitted in November 2006 (Geomatrix, 2006b; Stetson, 2006a) and were approved by EPA in a letter dated February 12, 2007. In the February 12, 2007, letter EPA also requested that a data management plan be prepared as an addendum to the QAPP. The report, Data Management Plan for the Baldwin Park Operable Unit Performance Standards Evaluation Plan Monitoring Program was submitted to EPA on May 17, 2007 (Laboratory Data Consultants, Inc. [LDC] 2007).

The FSP for Air, Brine, and Treated Water was submitted to EPA on August 14, 2006 (Stetson 2006b) and the corresponding QAPP for Air, Brine, and Treated Water was submitted on March 16, 2007 (Geomatrix, 2007a).

1.2 OVERVIEW OF THE REMEDIAL ACTION

The UAO and SOW direct the Respondents to design, construct, and implement the remedy described in the ROD and ESD, and to achieve the Performance Standards in accordance with the UAO. The WEs (either directly or through contractors) designed the groundwater extraction and treatment facilities (Subprojects), and construction is largely completed. The

WEs are now operating the Subprojects, which provide for groundwater extraction and treatment in two general areas of the BPOU (Figure 1-2). The treated groundwater is supplied for direct potable use.

Upon completion of the various Subprojects, a total of approximately 23,250 gpm of groundwater will be extracted, 7,000 gpm from the northern portion of the plumes (Subarea 1), and 16,250 gpm from the southern portion of the plumes (Subarea 3). Extracted groundwater will be treated using a treatment train that is designed to remove all COCs to levels acceptable for direct use. The treatment train varies among the treatment plants but generally consists of a series of contaminant treatment processes including air stripping and/or LPGAC to remove VOCs, ion exchange to remove perchlorate, and ultraviolet (UV)/oxidation to remove 1,4-dioxane and NDMA.

1.3 SUMMARY OF REMEDIAL ACTION OBJECTIVES AND PERFORMANCE STANDARDS

Two of the key performance standards are defined in the UAO as follows:

> *The remedial objectives of the Baldwin Park OU are to prevent future increases in, and begin to reduce concentrations of, trichloroethene, tetrachloroethene, carbon tetrachloride, and other VOCs, along with perchlorate, N-nitrosodimethylamine, and 1,4-dioxane in groundwater in the Baldwin Park area (hereafter referred to as contaminants or contaminated groundwater) by limiting further migration of contaminated groundwater into clean and less contaminated areas or depths that would benefit most from additional protection and by removing contaminants from the aquifer.*

The BPOU Project involves the design, installation, operation, and maintenance of groundwater extraction systems in two areas of the BPOU. The two areas are designated in the ROD and ESD as Subarea 1 (the upper area) and Subarea 3 (the lower area). Remedial objectives for the two Subareas are described below.

1.3.1 Subarea 1 Remedial Objectives

In Subarea 1, the movement of COCs in groundwater will be limited by groundwater extraction at rates and locations that will establish the necessary groundwater flow field, such that the resultant capture zone limits migration from known or suspected source areas and depths and removes chemical mass. Source areas and depths include locations believed to contain a significant mass of soil contamination (i.e., vadose zone) or a subsurface source of dissolved-phase groundwater contamination. In Subarea 1, the remedial objectives are designed to prevent groundwater near source areas with higher concentrations of COCs from moving

downgradient toward areas with lower concentrations of COCs. As part of the groundwater extraction process, chemical mass will be removed from Subarea 1 groundwater.

1.3.2 Subarea 3 Remedial Objectives

In Subarea 3, the movement of COCs in groundwater will be limited by groundwater extraction at rates and locations that will establish the necessary groundwater flow field to reduce the potential for groundwater containing unacceptable concentrations of tetrachloroethene (PCE), trichloroethene (TCE), carbon tetrachloride, perchlorate, NDMA, 1,4-dioxane or other COCs from moving into areas where these chemicals are not present at unacceptable concentrations. As part of the groundwater extraction process, chemical mass will be removed from Subarea 3 groundwater.

1.3.3 Performance Standards

Two distinct performance standards have been derived from the Remedial Objectives cited above: 1) limit further migration of COCs in groundwater, and 2) remove COCs from groundwater. Achievement of these performance standards will prevent future increases in concentrations, begin to reduce concentrations, and prevent the spread of COCs from more contaminated areas to less contaminated areas. These two performance standards are described in more detail below.

1.3.3.1 Performance Standard 1 - Limit Migration of Chemicals of Concern

The BPOU extraction plan was developed using an EPA-approved three-dimensional finite-element groundwater flow model, DYNFLOW. In 2002, the model was updated using a similar code, FEFLOW. The construction and calibration of this model relies on many years of data collection activities in the BPOU, including water level measurements and water-quality sampling. The model was calibrated using water level data from a 20-year period (1982 to 2002). Following calibration, the model was run in a forward/predictive manner to select locations and depths of groundwater extraction wells that would allow the remedy to achieve the objectives described above. Review of geophysical logs from exploratory borings at the extraction well locations as well as logs from other wells in the BPOU suggested the presence of relatively thick, fine-grained layers that can be correlated across Subarea 3 but do not extend north to Subarea 1. These layers are present at approximately -200 and -500 feet mean sea level (msl). As a result, the well screened intervals for new extraction wells in Subarea 3 were designed so that they could capture the entire vertical extent of contaminated groundwater without creating hydraulic connections across these layers. Therefore, shallow extraction wells were screened above the layer at -500 feet msl and deep extraction wells were screened below the layer at -500 feet msl. Aquifer testing in the extraction wells confirmed that the layer at -500 feet msl acts as a confining unit that provides hydraulic separation between the shallow and deep elevation intervals. In 2005, the groundwater flow

model was modified to incorporate the confining units in Subarea 3. The groundwater flow model is updated annually with quarterly pumping and recharge data that are compiled from various sources. The CR group will continue to make refinements to the groundwater model to incorporate the results of field testing and other information, such as aquifer testing at new extraction and production wells, and thereby improve the model's ability to simulate observed groundwater conditions in localized areas. Updates and refinements to the groundwater model will be reported in Annual PE Reports as necessary. The calibrated model is the primary tool that will be used to assess system performance in terms of limiting the migration of COCs.

1.3.3.2 Performance Standard 2 - Removal of Chemical Mass

This performance standard, removal of chemical mass, will be met through extraction and treatment of groundwater from the BPOU plumes. Documentation of the removal of chemical mass will use measured flow rates from groundwater extraction wells and results of water-quality sampling and analysis for these same extraction wells. Using these data, the mass removal for selected COCs will be estimated on an annual basis. Cumulative chemical mass removed from the aquifer will also be reported.

1.4 APPROACH TO PERFORMANCE MONITORING AND EVALUATION

Performance monitoring and evaluation focuses on the operation of the proposed groundwater extraction system as it relates to: 1) limiting further migration of groundwater contamination into less contaminated areas, and 2) removing chemical mass from groundwater. This approach involves both short-term and long-term evaluation of extraction system performance. Short-term performance evaluations will rely heavily on the use of groundwater modeling to demonstrate that extraction well operation is limiting further migration of groundwater contamination into less contaminated areas. Other short-term performance evaluation activities will include assessments of changes in groundwater flow conditions, temporal and spatial changes in groundwater quality, and the estimation of chemical mass removal by extraction wells. Short-term performance evaluations will be documented in Annual PE Reports.

Evaluations of long-term performance of the BPOU Project will be reported in Five-Year Reviews as described in the Performance Standards Evaluation Plan (PSEP) (Geomatrix, 2004a). Time-concentration analyses for COCs will be the primary measure of long-term remedy performance. In addition, groundwater modeling and particle tracking will be used to support the evaluation of long-term remedy performance. The model will be used with other data interpretation techniques such as potentiometric maps, well hydrographs, and time-concentrations plots for selected wells to validate observed concentration trends for COCs. The goals for long-term performance evaluations are to determine whether: 1) water quality in

areas located downgradient of the Subarea 1 extraction system, but upgradient of the Subarea 3 extraction system, is improving over time, 2) concentrations of COCs in Subarea 3 extraction wells are decreasing over time, 3) water quality in Subarea 1, upgradient of the extraction wells, is improving over time, and 4) concentrations of COCs in Subarea 1 extraction wells are decreasing over time.

1.5 CONTENT OF PERFORMANCE EVALUATION REPORTS

As outlined in the PSEP, the Annual PE Reports should generally contain the following:

- BPOU-wide potentiometric maps to assist in evaluating changes in groundwater flow patterns in the BPOU;
- Groundwater plume maps and chemical cross sections and an evaluation of any changes in the extent of groundwater contamination within the BPOU;
- Time-concentration plots for selected key constituents for selected monitoring wells;
- Contaminant mass-removal estimates for each extraction well using average flow rates and water-quality sampling results from the extraction wells;
- Results of computer model simulations of extraction system performance and a description of any refinements to groundwater flow models used to evaluate system performance;
- An overall assessment of remedial system performance in relation to Performance Standards established for the BPOU Project; and
- Recommendations for changes to the monitoring program outlined in the PSEP including scheduled changes to the monitoring frequency or monitoring locations.

Although not specifically outlined in the PSEP, EPA has requested that Annual PE Reports also address the performance of the BPOU Project relative to "other project requirements" associated with the implementation of the BPOU Project. These “other project requirements” are not considered performance standards, as they do not directly relate to the remedial objectives of the BPOU Project as defined by EPA, but rather relate to the operational performance of, or discharge requirements for, the various Subprojects following construction. Consequently, only those "other project requirements" that are considered "Other Potential Performance Standards" during system operation are addressed in this Annual PE Report. These “Other Potential Performance Standards” include the following:

- Achievement of treated-water effluent requirements in accordance with California Department of Public Health (DPH; formerly the Department of Health Services ([DHS]) Drinking Water Operating permits;

- Air-emission monitoring requirements in accordance with EPA Applicable or Relevant and Appropriate Requirements (ARARs);

- Monitoring and reporting of brine discharges to the Los Angeles County Sanitation Districts (LACSD) system in accordance with Industrial Waste Discharge permits; and

- Demonstration of proper disposal of waste associated with treatment operations. Applicable waste streams include, but are not limited to, spent granular activated carbon and spent ion exchange resins.

2.0 STATUS OF REMEDIAL ACTIONS

This section presents the status of remedial actions undertaken in 2009 to implement the BPOU interim remedy. These actions include operation of the Valley County Water District (VCWD) Lante Subproject in Subarea 1; operation of the La Puente Valley County Water District (LPVCWD) Subproject; operation of the San Gabriel Valley Water Company (SGVWC) B6 Subproject; and startup testing and operation of the SGVWC B5 Subproject in Subarea 3. The status of the BPOU Subprojects is also described in the monthly progress reports submitted to EPA pursuant to Paragraph 85, Section XV of the UAO.

2.1 SUBAREA 1 REMEDIAL ACTION STATUS

Subarea 1 remedial actions consist of groundwater extraction from the VCWD SA1-1, SA1-2, and SA1-3 (Lante) wells and treatment at the VCWD Lante Treatment Plant, which is owned and operated by VCWD. The report, "Revised Draft Interim Remedial Action Report" (Stetson, 2005), prepared and submitted to EPA in March 2005, provides a summary of the VCWD Lante Subproject background, construction, and completion activities. Construction of the VCWD Lante Treatment Plant began in 2002 and was completed in 2005. The original construction activities included drilling and equipping two new extraction wells (SA1-1 and SA1-2), re-equipping the SA1-3 (Lante) well, installing associated piezometers, constructing raw and treated water pipelines, and constructing the treatment plant. Additional construction work in 2006 and 2007 included adding LPGAC treatment and replacing the resin-based vapor control system with vapor-phase granular activated carbon (VPGAC). The treatment plant consists of four air-stripping towers and associated VPGAC off-gas treatment units for VOC removal, LPGAC for 1,2,3-TCP removal, two regenerable ion exchange carousels (Calgon Ionic Separation Process [ISEP®]) for perchlorate removal, and four UV/oxidation units for 1,4-dioxane and NDMA removal. Treated water is conveyed via a treated water pipeline to Suburban Water Systems (SWS) Plant 121, however, a portion of the treated water can be directed to the VCWD distribution system if desired..

On November 11, 2005, DPH issued domestic water supply Permit Amendment 1910009PA-003, authorizing VCWD to operate the VCWD Lante Treatment Plant. In January 2006,
1,2,3-TCP was detected in the VCWD extraction wells. Subsequent testing confirmed the presence of 1,2,3-TCP. Beginning on February 21, 2006, VCWD began discharging treated water to Big Dalton Wash while a 1,2,3-TCP treatment technology was selected and constructed. LPGAC was selected as the treatment technology and the design and construction of a LPGAC system was completed in Spring 2007. LPGAC startup testing was completed in May 2007 and on July 18, 2007, DPH issued an amended permit to VCWD to resume delivering potable water.

As a result of operational problems, the resin-based off-gas control system was removed and replaced with VPGAC. A temporary VPGAC system was installed while a permanent system was designed and constructed. The temporary system was operational in June 2007 and the permanent system became fully operational in April 2008. The permanent VPGAC system consists of four 20,000 pound adsorbers with associated heaters operated in parallel.

The air strippers also experienced operational problems with calcium carbonate precipitation in the towers and packing. Tower cleaning was initiated in October 2007 and was completed in February 2008. A study was conducted to evaluate precipitation mitigation alternatives that included anti-scalant dosing, acid cleaning, and packing replacement. Anti-scalant testing began in October 2008 and is on hold pending resolution of potential impact on ISEP® and single pass ion exchange resins. One air stripper was acid washed in December 2008 to test the efficacy and cost of this alternative. The results of the acid wash testing were summarized in a February 18, 2009 memorandum "Summary and Evaluation Air Stripper No. 4 Acid Cleaning" (Stetson 2009a). Based on the pilot testing, the acid washing was not a cost effective method to mitigate calcium carbonate precipitation problems.

The air stripper cleaning project was performed again in 2009. Tower #3 was the first to be cleaned beginning in September 2009 and was placed back in operation in October 2009. Tower #4, was taken out of service on October 27, 2009, cleaned, and was placed back into service on November 11, 2009. Tower #1 cleaning began on November 12, 2009, and was completed on November 30, 2009. Work on Tower #2 began on December 1, 2009, and was completed on December 24, 2009.

The process to replace the ISEP® with single pass ion exchange was initiated in 2008. A request for proposal was released in January 2008 and bids were received and evaluated in April and May of 2008. The work was awarded to RC Foster and a notice to proceed was issued in August. California Environmental Quality Act (CEQA) work associated with the single pass ion exchange was completed in September 2008 and design work was completed in early 2009. As part of the ISEP® replacement work, nitrate treatment alternatives were also evaluated (Malcolm Pirnie, 2008).

Design and construction of the single pass IX system was completed in 2009. The associated booster pump upgrade was completed in November 2009. Start-up testing of the single pass IX system is on hold until issues regarding nitrate treatment, ISEP® bybass configurations, and ISEP® modifications are evaluated and resolved. In addition, approvals to discharge water to waste during startup are being negotiated.

Other VCWD Lante Treatment Plant improvements or evaluations initiated in 2009 included:

- The VCWD SA1-1 well was taken out of service beginning in March 2009 to reduce nitrate concentrations in the combined influent and to increase the mass removal of COCs;
- The results of the acid washing pilot study to remove air stripper calcium carbonate precipitation found the method not to be cost effective; and
- The management of salt wash down water was evaluated, a design was prepared, and the work is currently being permitted for construction in 2010.

Technical performance reports are prepared under Provision 42 of the DPH operating permit and are required to be submitted annually to DPH. The most recent of these reports, "2008 Annual Technical Performance Report for the Lante Plant" (Stetson, 2009b), describes the status and performance of the VCWD Lante Treatment Plant for the period January 1, to December 31, 2008. In addition, VCWD submits monthly compliance reports to DPH; these compliance reports are included in monthly progress reports provided to EPA.

In 2009, VCWD treated 8,214 acre-feet of water with an average flowrate of 5,092 gpm (Table 2-1) which is approximately 85% of the EPA-approved extraction rate of 6,000 gpm. Production exceeded the prior year's average flowrate of 4,869 gpm.

2.2 SUBAREA 3 REMEDIAL ACTION STATUS

Subarea 3 remedial actions consist of the LPVCWD, SGVWC B6, and SGVWC B5 Subprojects that are designed to extract and treat an average flowrate of 15,750 gpm (design capacity 18,100 gpm) as discussed below.

2.2.1 La Puente Valley County Water District Subproject Status

The LPVCWD Subproject extracts, treats, and delivers water to the public under a DPH permit that was issued on February 15, 2001, and subsequently amended as Permit No. 04-16-02PA-000 issued on May 8, 2002. The LPVCWD Subproject consists of extraction wells LPVCWD 2, LPVCWD 3, LPVCWD 5, two air strippers and associated off-gas treatment for VOC removal, an ISEP® carousel for perchlorate removal, and UV/oxidation for 1,4-dioxane and NDMA removal operating at a capacity of up to 2,500 gpm. Treated water is conveyed to LPVCWD's distribution system and, when available, a portion of the treated water is also provided to SWS.

To address sanding problems in LPVCWD 2 and 3, a new well, LPVCWD 5, was drilled and installed in 2007. The LPVCWD 5 well was equipped, developed, and tested in 2008. On December 19, 2008, DPH issued an amended permit to allow LPVCWD 5 to be used as a drinking water source. The well became operational in January 2009 and will be LPVCWD's

primary water supply well, with LPVCWD 2 and 3 used as backup water supply wells. The LPVCWD 5 well installation activities are summarized in, "Well No. 5 Well Completion Report" prepared by Stetson and submitted in final on July 2, 2008 (Stetson 2008). DPH issued a permit amendment for the operation of the LPVCWD 5 well on December 19, 2008.

To mitigate perchlorate-bearing brine discharges to the LACSD brine line, the LPVCWD Subproject Committee approved replacing the ISEP® with single pass ion exchange equipment. The single pass ion exchange system was designed and construction was largely completed in 2009. A draft Compliance Test Plan and Operation, Maintenance, and Monitoring Plan for the single pass ion exchange were prepared and submitted to DPH for review. In June 2009, the EPA issued a letter supporting temporary discharges of water during startup testing of the new single-pass IX system to the Walnut Wash. The Los Angeles County Department of Public Works (LACDPW) issued a discharge permit for LPVCWD on November 17, 2009. The IX system was tested during startup activities in December 2009. The single pass IX system is expected to be permitted and online in 2010.

Technical performance reports are prepared under Provision 33 of the DPH operating permit and are required to be submitted annually to DPH. The most recent of these reports, "Technical Performance Report (2008 – 2009) for the La Puente Valley County Water District Treatment Facility" (Stetson, 2009c), describes the status and performance of the LPVCWD facility for the period May 1, 2008, to April 30, 2009. In addition, LPVCWD submits monthly compliance reports to DPH; these compliance reports are included in monthly progress reports provided to EPA.

Treatment system improvements or evaluations initiated in 2009 included:

- Per the EPA's request, failure analysis was initiated. In December 2009 Locus Technologies began controls testing;
- Air strippers were inspected to evaluate scaling potential;
- The brine flow meters and associated piping were cleaned and tested in August. The flow meter was within the required +/-5% error; and
- Plans are being developed to decommission the ISEP® system.

In 2009, approximately 3,701 acre-feet of groundwater were extracted and treated for an average annual flowrate of 2,295 gpm (Table 2-1). This average annual flowrate exceeded the EPA approved extraction rate of 2,250 gpm and was generally consistent with the prior year's production (3,762 acre-feet and 2,326 gpm).

2.2.2 San Gabriel Valley Water Company B6 Subproject Status

The SGVWC B6 Subproject remedial action consists of groundwater extraction from the SGVWC B25A, B25B, B26A, and B26B wells (with B6C and B6D included as backup wells) and treatment at the SGVWC B6 Treatment Plant, which is owned and operated by SGVWC. Construction of the SGVWC B6 Subproject began in 2002 and the SGVWC B6 Treatment Plant was completed in 2005. Construction activities included drilling, installing, and equipping the new extraction wells, installing associated piezometers, constructing raw and treated water pipelines, and constructing the treatment plant. The treatment plant consists of four air-stripping towers and associated carbon off-gas treatment units for VOC removal, two ISEP® carousels for perchlorate removal, and four UV/oxidation units for 1,4-dioxane and NDMA removal. Treated water is conveyed to the SGVWC distribution system. The "Interim Remedial Action Report" (Stetson, 2004) prepared and submitted to EPA in September 2004 provides a summary of SGVWC B6 Subproject background, construction, and completion activities.

On June 8, 2005, DPH issued domestic water supply Permit Amendment No. 1910039PA-002, authorizing SGVWC to operate the SGVWC B6 Treatment Plant using the existing onsite B6C and B6D wells. SGVWC began delivering potable water from the SGVWC B6 Treatment Plant to customers on July 12, 2005. The permit was further amended by DPH with Permit Amendment No. 1910039-004 on February 17, 2006, to incorporate the operation of offsite wells B25A, B25B, B26A, and B26B.

To mitigate perchlorate-bearing brine discharges to the LACSD brine line, the SGVWC B6 Subproject Committee approved replacing the ISEP® with single pass ion exchange equipment. The single pass ion exchange design was initiated in June 2008. Since there is limited space at the SGVWC B6 Treatment Plant, the ion exchange equipment was constructed on three properties that were purchased on the north side of Corak Street. Geotechnical work was completed on the properties in July and existing structures were demolished in the fall of 2008. CEQA work related to the single ion exchange project was filed and the public review process closed on October 6, 2008, without any comments received.

Construction of the single pass ion exchange system was completed in November 2009. On December 8, 2009, EPA issued a letter requesting that the Regional Water Quality Control Board (RWQCB) inform LA County that BPOU discharges fall within the non-prohibited "Potable Drinking Water Supply and Distribution System Releases" category listed in LA County's MS4 permit. The IX system is expected to be tested and operational in 2010.

Technical performance reports are prepared under Provision 15 of the DPH operating permit and are required to be submitted annually to DPH. The most recent report, "Technical

Performance Report for the San Gabriel Valley Water Company Plant B6 Water Treatment Facility" (Stetson, 2009d), describes the status and performance of the SGVWC B6 Treatment Plant for the period April 1, 2008, to March 31, 2009. In addition, SGVWC submits monthly compliance reports to DPH; these compliance reports are included in monthly progress reports provided to EPA.

Treatment system improvements or evaluations initiated in 2009 included:

- Raw water inorganic chemistry was evaluated for calcification potential and the air strippers were inspected for scaling;
- The air strippers were inspected to evaluate the calcium carbonate build-up; and
- The brine vault meter was inspected and tested in August. No calcification was observed on the brine flow meter or associated piping and fittings; therefore, no cleaning was performed. The flow meter was deemed to perform within acceptable error rates for flows up to 200 gpm.

In 2009, the SGVWC B6 Subproject extracted and treated approximately 7,603 acre-feet of water with an average annual flowrate of 4,694 gpm (Table 2-1). This average annual flowrate was 72% of the EPA-approved extraction rate of 6,500 gpm and was below the prior year's annual average flowrate of 6,443 gpm. The CRs sent a letter dated March 5, 2010, to SGVWC expressing concern over the low extraction rate achieved in 2009.

2.2.3 San Gabriel Valley Water Company B5 Subproject Status

The SGVWC B5 Subproject remedial actions consist of groundwater extraction from the SGVWC B5B, B5E, and City of Industry (COI) 5 wells and treatment at the SGVWC B5 Treatment Plant, which is owned and operated by SGVWC. In addition, the SGVWC B5D well is used as a standby water source. The treatment plant consists of LPGAC for VOC removal, single-pass ion exchange for perchlorate removal, and UV/oxidation units for 1,4-dioxane and NDMA removal. The "Interim Remedial Action Report" (Stetson, 2006c) prepared and submitted to EPA in September 2006 provides a summary of SGVWC B5 Subproject background, construction, and completion activities. Construction was largely completed in early 2007.

Startup testing conducted to support permitting was completed in March 2007 and DPH issued amended drinking water permit 1910039PA-008 for the B5 Treatment Plant on April 21, 2008. SGVWC began delivering potable water to their system on July 8, 2008. Prior to delivering potable water, extracted water was treated and discharged to the San Gabriel River.

During 2009, SGVWC B5B and B5E were the primary production wells. The DPH issued a permit amendment to allow for the addition of the COI 5 well in July 2009. The COI 5 well

went online in July 2009 and provided approximately 160 acre-feet of water per month to the system for the remainder of the year.

Technical performance reports are prepared under Provision 53 of the DPH operating permit and are required to be submitted annually to DPH. The first annual report, “Technical Performance Report for the San Gabriel Valley Water Company Plant B5 Water Treatment Facility” (Stetson, 2009e), describes the status and performance of the SGVWC B5 Treatment Plant for the period July 8, 2008, to June 30, 2009. In addition, SGVWC submits monthly compliance reports to DPH; these compliance reports are included in monthly progress reports provided to EPA.

In 2009, the SGVWC B5 Subproject extracted and treated approximately 10,157 acre-feet of water with an average flowrate of 6,294 gpm (Table 2-1), slightly more than last year’s production (9,209 acre-feet and 4,036 gpm), and about 90% of the EPA-approved extraction rate of 7,000 gpm. SGVWC indicated that the extraction rate for 2009 was not achieved due to delays in DPH permitting of well COI 5.

3.0 PERFORMANCE MONITORING ACTIVITIES

As described in the PSEP, monitoring activities for the assessment of the interim remedy performance consist of two phases. The first phase consisted of baseline potentiometric and water-quality monitoring prior to extraction well startup and was completed in April 2005. The second phase involves more frequent potentiometric and water-quality monitoring (referred to as the BPOU-wide monitoring in the PSEP) during startup and initial operation of the extraction wells, followed by reduced monitoring frequencies after several years of continuous operation. The second phase of monitoring began in April 2005, although not all of the extraction wells were fully operational at that time. Potentiometric monitoring was performed on an increased frequency, as required, from April 2005 through November 2006. Water-quality monitoring was performed on an increased frequency, as required, during all of 2006. As described in Section 1.1 of this report, the CRs recommended several modifications to the PSEP, including reduced monitoring frequencies, in technical memoranda dated August 24, September 29, and November 2, 2006 (Geomatrix, 2006a; ERM, 2006; Geomatrix, 2006c) and the changes were incorporated into the final versions of the FSP and QAPP dated November 6, 2006 (Stetson, 2006a; Geomatrix, 2006b). The FSP and QAPP were approved with the modifications to the PSEP by EPA in a letter dated February 12, 2007. In accordance with the approved modifications to the PSEP, reduced monitoring frequencies and several other changes to monitoring activities began in December 2006, as follows:

- Potentiometric monitoring in piezometers and multiport wells was reduced from monthly to quarterly beginning in December 2006.
- Water quality sampling at MW 5-24, MW 5-25, MW 5-26, and MW 5-27 was reduced from quarterly to semi-annual beginning in Spring 2007.
- Low-flow sampling was implemented at the Key Well beginning in 2007 to reduce the volume of purge water requiring disposal.
- At the request of EPA, annual monitoring for “non-target” VOC and SVOC tentatively identified compounds (TICs) was implemented in a subset of the multiport wells and in VCWD Big Dalton beginning in 2007.
- At the request of EPA, annual monitoring for non-COC VOCs (including analysis of ethylene dibromide [EDB] by EPA Method 504.1) was implemented in a subset of the multiport wells and in VCWD Big Dalton in 2007.
- At the request of EPA, annual monitoring for 1,2,3-TCP was implemented in a subset of the multiport wells beginning in Fall 2006.

As proposed by the CRs and approved by EPA, the requirements for monitoring of additional constituents including VOC and SVOC TICs, non-COC VOCs (including EDB), and 1,2,3-TCP were to be re-evaluated after the first sampling event. Results for these constituents in the

BPOU were presented in the 2007 Annual PE Report (Geomatrix and ERM, 2008). Based on the results, the CRs included recommendations for additional modifications to monitoring activities in the 2007 Annual PE Report (Geomatrix and ERM, 2008). The CRs refined the recommended modifications in a technical memorandum to EPA dated September 9, 2008 (AMEC Geomatrix, 2008). EPA approved the recommended modifications with several changes via e-mail correspondence on September 24, 2008, and the recommendations were implemented beginning in October 2008 as follows:

- Potentiometric monitoring in the multiport wells was reduced from quarterly to semi-annual.
- Water quality sampling in selected multiport wells was reduced from semi-annual to annual. Semi-annual sampling continued in MW5-03 (ports 5-10), MW5-19 (ports 3-5), MW5-24 (all ports), MW5-25 (all ports), MW5-26 (all ports), and MW 5-27 (all ports).
- Based on the distribution of 1,4-dioxane, the sampling frequency for 1,4-dioxane was reduced to annual and the number of monitoring locations for 1,4-dioxane was also reduced.
- Based on the limited detections of non-COC VOCs (including EDB) and VOC and SVOC TICs and also based on the redundancy between the PSEP and DPH sampling requirements, monitoring for these compounds was eliminated from the PSEP monitoring program beginning in 2009. Results for non-COC VOCs (including EDB) and VOC and SVOC TICs are reported by the WEs as part of their DPH monitoring requirements. The results are maintained the BPOU project database and are also provided to EPA in monthly progress reports. The results for non-COC VOCs (including EDB) and VOC and SVOC TICs are summarized in Annual PE Reports.

The CRs recommended two additional modifications to the PSEP in the 2008 Annual PE Report (AMEC Geomatrix and ERM, 2009) and in a technical memorandum to EPA dated June 5, 2009 (AMEC Geomatrix, 2009). The recommended modifications are as follows:

- Continue to work with EPA to eliminate redundancies between DPH required monitoring and the PSEP monitoring program, and
- Consistent with the recommendation above, eliminate quarterly sampling in the BPOU Project extraction wells under the PSEP program since this sampling is redundant with sampling that is required under each of the BPOU treatment plant's DPH drinking water permits.

EPA agreed via e-mail correspondence on June 23, 2009, to eliminate PSEP sampling of the extraction wells for the third quarter of 2009. EPA also agreed to consider the permanent elimination of the quarterly sampling in the BPOU Project extraction wells under the PSEP provided that the CRs provide additional information to EPA to compare the PSEP and DPH

monitoring requirements. The CRs provided the additional information to EPA, including a table comparing PSEP and DPH monitoring requirements, via e-mail on August 5, 2009. EPA approved the additional modifications via e-mail on March 25, 2010 thus eliminating the requirement for quarterly sampling of the extraction wells under the PSEP.

Potentiometric monitoring, water-quality monitoring, and groundwater modeling activities that were completed in support of performance assessment activities during 2009 are discussed in the following sections.

3.1 POTENTIOMETRIC MONITORING

Potentiometric monitoring of wells included in the PSEP monitoring program continued to be conducted by the Watermaster and CRs throughout 2009. Locations of the wells included in the BPOU-wide potentiometric monitoring program are shown on Figure 3-1 and their monitoring schedules are presented in Table 3-1. Potentiometric monitoring completed for the PSEP monitoring program during 2009 included the following:

- Potentiometric data were collected quarterly in 11 extraction wells, with a few exceptions: potentiometric data were not collected during the first and third quarters 2009 in LPVCWD 3 because the well was not accessible for water level measurement during the scheduled monitoring event; however, quarterly water level measurements were collected in an adjacent extraction well, LPVCWD 2.

- Potentiometric data were collected quarterly in 16 piezometer clusters and three single piezometers with a few exceptions: the COI piezometer clusters (PZ3-CI5A S/D and PZ3-CI5B S/D) were not accessible for water level measurements during 2009.

- Potentiometric data were collected semi-annually in 18 multiport monitoring wells.

- Potentiometric data were collected weekly in one conventional monitoring well, the LACO Key Well.

- Potentiometric data were collected semi-annually in seven conventional monitoring wells with the following exceptions: monitoring wells AJ MW-2, MW-3, MW-4, and MW-5 were dry during all of 2009.

- Potentiometric data were collected semi-annually in 27 existing production wells, with a few exceptions. The CIC Contract well was inaccessible for water level measurements during the first half of 2009. Also, the SMWC North well was inaccessible for water level measurements in all of 2009.

In addition to the monitoring required by the PSEP, potentiometric data were also collected from various wells for other purposes. Quarterly monitoring at the MW 5-28 monitoring well cluster were used to supplement the PSEP monitoring program upgradient of SWS wellfields located to the east of the BPOU. Continuous water level monitoring was performed using

pressure transducers in seven monitoring well clusters at the LPVCWD and SWS well fields. The continuous water level data was used to evaluate upgradient monitoring locations for COI 5 as part of the SGVWC B5 Subproject.

3.2 WATER-QUALITY MONITORING

Water-quality monitoring of new and existing wells included in the PSEP continued to be conducted by the Watermaster and the CRs throughout 2009. Locations of wells included in the BPOU-wide water-quality monitoring program are shown on Figure 3-2 and their monitoring schedules are presented in Table 3-2. Groundwater samples were analyzed for the 20 COCs listed in PSEP Table 2-1, including: 1,4-dioxane, NDMA, perchlorate, and VOCs. Groundwater samples were also analyzed for nitrate and sulfate because of their importance to treatment plant operations and potable use. Groundwater-quality monitoring completed for the PSEP monitoring program during 2009 included the following:

- Groundwater samples were collected quarterly from 11 extraction wells, with a few exceptions: groundwater samples were not collected in SA1-1 in the second, third, and fourth quarters of 2009 because this well was not in service; groundwater samples were not collected in COI 5 in the first and second quarters of 2009 because this well was not in service.

- Groundwater samples were collected annually from selected ports at 14 multiport wells, with a few exceptions: the shallowest port in WHICO MP-1 (port 6) was dry during the 2009 sampling event.

- Groundwater samples were collected semi-annually from selected ports at six multiport wells, with the following exception: groundwater samples were not collected in the shallowest port in MW 5-03 (port 10) because the port was dry during the semi-annual sampling events.

- Groundwater samples were collected annually from six conventional monitoring wells with the following exceptions: groundwater samples were not collected in AJ MW-2 and AJ MW-3 because these wells were dry during the 2009 sampling events.

- Groundwater samples were collected annually from 16 production wells, with the following exception: groundwater samples were not collected at CC E Durbin and CDWC 14 because these two wells were inoperable during 2009; groundwater samples were not collected from one of two discrete depths in SWS 139W6 due to an omission by the sampling contractor. Except for the omission at SWS 139W6, discrete water-quality sampling was performed using dedicated low-flow sampling equipment that is installed at specific elevations within the well screened intervals at five inactive production wells.

In addition to groundwater-quality monitoring required by the PSEP, other groundwater-quality monitoring was performed to supplement the PSEP monitoring program during 2009 including the following:

- Groundwater-quality samples for the COCs and chemicals of interest were collected quarterly from the MW 5-28 monitoring well cluster. Groundwater-quality data at the MW 5-28 monitoring well cluster is used to supplement the PSEP monitoring program upgradient of SWS well fields that are located to the east of the BPOU.

- Additional groundwater-quality monitoring is performed by the WEs to satisfy the requirements of DPH drinking water permits. As described in Sections 1.1 and 3.0, the CRs have an agreement with EPA to provide the results of the DPH required monitoring in monthly progress reports and also to summarize the results for a subset of chemicals in BPOU Annual PE Reports. The DPH monitoring requirements are summarized in Table 3-3.

Results of the water-quality monitoring are presented in Section 5.2.

3.3 GROUNDWATER MODELING

As described in Section 6.1.1 of the PSEP (Geomatrix, 2004a), the BPOU groundwater model is the primary tool for assessing extraction system performance. Annual simulations consist of quarterly stress periods of basin-wide groundwater flow conditions. The BPOU groundwater model is described in the Comprehensive Groundwater Modeling Report, dated July 29, 2005 (Geomatrix, 2005). Previous updates to the model are described in the Addendum to the Comprehensive Groundwater Modeling Report, dated September 8, 2006, (Geomatrix, 2006d) and in a technical memorandum dated December 14, 2007 (Geomatrix, 2007b).

As part of the December 14, 2007, technical memorandum (Geomatrix, 2007b), the groundwater model was updated through the end of water year (WY) 2005-06. Since that time, the groundwater model was updated with recharge, pumping, and water level data through the end of WY2006-07 (ending June 2007). The most recent model update is described in the 2007 Annual PE Report (Geomatrix and ERM, 2008). EPA reviewed the technical memorandum dated December 14, 2007, and provided comments by e-mail on October 1, 2008. The CRs provided responses to the EPA's comments by e-mail on October 31, 2008.

Given that various BPOU Project extraction wells are not yet operating at the target operational rates due to treatment plant limitations, performance evaluation simulations were not performed for the 2009 reporting period. When the majority of the BPOU Project extraction wells are operating at or near their target operational extraction rates wells, performance evaluation simulations will be performed using the updated BPOU groundwater model and the transient particle tracking code, FETRAC, that is described in the Addendum to the Comprehensive Groundwater Modeling Report (Geomatrix, 2006d). The performance evaluation simulations will be conducted using the updated BPOU groundwater model to demonstrate that the remedy is limiting the migration of COCs in groundwater by simulating

actual pumping conditions in the BPOU project extraction wells and current water level conditions.

4.0 TREATMENT PLANT MONITORING ACTIVITIES

This section summarizes methods used to monitor treatment plant performance. Treatment plant operational results are presented in Section 6.0.

4.1 SUBAREA 1 – VALLEY COUNTY WATER DISTRICT LANTE TREATMENT PLANT

The VCWD Lante Treatment Plant operated on a full-time basis in 2009, experiencing downtime associated with routine maintenance and unplanned operational interruptions. Raw water, partially treated water, and fully treated water were routinely sampled and analyzed for COCs, 1,2,3-TCP, inorganic chemicals, and other diagnostic parameters to evaluate the effectiveness of treatment processes and to monitor the quality of the fully treated water. Treated water was primarily delivered to SWS Plant 121. Water-quality data, as obtained, are summarized in the DPH compliance reports appended to the monthly progress reports to EPA.

In August 2006, by mutual agreement among EPA, South Coast Air Quality Management District (SCAQMD), and VCWD, air stripper and off gas control system permits with SCAQMD were cancelled and EPA assumed compliance oversight with respect to operations formerly covered by the SCAQMD permits. The air stripper vapor abatement equipment consists of four 20,000-pound carbon adsorption systems equipped with heaters. Air compliance samples were collected according to the revised protocol approved by EPA on November 18, 2008. The revised protocol requires air sampling immediately after a carbon change out, monthly while the Maximum Individual Cancer Risk (MICR) control efficiency remains above 75%, and weekly when the control efficiency falls below 75%. All air samples were analyzed by EPA Method TO-15. Four VPGAC changeouts from the new permanent systems occurred in 2009. The VPGAC change outs are summarized in Table 4-1. During each changeout event 20,000 lbs of VPGAC were replaced.

The LPGAC system to treat 1,2,3-TCP became operational in July 2007. Carbon change outs occurred in March and April of 2009. A total of 200,000 lbs of LPGAC was changed out in 2009. The LPGAC change outs are summarized in Table 4-1. The LPGAC is managed at facilities that are authorized to accept Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) wastes. As they are received, certificates of disposal are provided to EPA in the monthly progress reports.

Waste brine and water softener wastes produced by the ISEP® system were discharged under Industrial Wastewater Permit No. 16112 from the LACSD, issued on August 5, 2004. A revised permit was approved on January 10, 2008. Brine discharges occurred throughout 2009 while the treatment plant was operating. Quarterly brine discharge samples were collected and analyzed for VOCs, SVOCs, perchlorate, 1,4-dioxane, sulfide, oil and grease,

chloride, alkalinity, calcium, magnesium, total toxic organics, suspended solids, and chemical oxygen demand. Quarterly Self Monitoring Reports (SMRs) were submitted to LACSD and EPA on or before April 15, July 15, and October 15, 2009, and January 15, 2010. The SMRs summarize flow, pH, and brine quality data collected during the quarter.

4.2 SUBAREA 3 – LA PUENTE VALLEY COUNTY WATER DISTRICT TREATMENT PLANT

The LPVCWD Treatment Plant operated on a full-time basis in 2009, experiencing periodic downtime associated with routine maintenance and infrequent and unplanned operational interruptions. Raw and treated water sampling was performed in accordance with the DPH permit and included weekly sampling for VOCs, perchlorate, 1,4-dioxane, NDMA, and various inorganic and physical parameters. The weekly sampling results are included in monthly progress reports submitted to DPH as a requirement of LPVCWD's drinking water permit. These results are also included in the monthly progress reports to EPA.

In August 2006, by mutual agreement among EPA, SCAQMD, and LPVCWD, air strippers and off-gas unit permits were cancelled and EPA assumed compliance oversight with respect to operations formerly covered by the SCAQMD permits. The VOC treatment equipment consists of a 30-foot tall air-stripping tower with a single 7,000 pound VPGAC adsorber and a 41-foot tall air-stripping tower with a single 20,400 pound VPGAC adsorber. Air compliance samples were collected and analyzed by EPA Method TO-15 according to the revised protocol approved by EPA on April 24, 2008. The revised protocol requires air sampling immediately after a carbon change out and monthly thereafter. The VPGAC was changed out on March 9, May 15, July 23, October 1, and December 10, 2009, according to the 70-day change out criteria. Carbon changeouts are summarized in Table 4-1. All carbon was managed at the Carbon Activated Corporation (Carbon Activated) facility in Compton, California, which is authorized to accept CERCLA wastes. As they are received, copies of disposal manifests for change out of spent VPGAC are provided to EPA in the monthly progress reports.

Waste brine and water-softener wastes were discharged under temporary Industrial Wastewater Discharge Permit 17128 issued by LACSD. The temporary permit was issued while a new permit, due to a requested ownership change to BPOU, LLC., is under review by LACSD. Quarterly brine discharge sampling was performed for VOCs, SVOCs, perchlorate, 1,4-dioxane, sulfide, oil and grease, chloride, alkalinity, calcium, magnesium, total toxic organics, suspended solids, and chemical oxygen demand. Four quarterly SMRs were prepared and submitted to LACSD and EPA on or before April 15, July 15, and October 15, 2009, and January 15, 2010.

4.3 SUBAREA 3 – SAN GABRIEL VALLEY WATER COMPANY B6 TREATMENT PLANT

The SGVWC B6 Treatment Plant operated at reduced rates in 2009, primarily associated with the ISEP® unit's unplanned interruptions. Additionally, the plant was struck by lightening in June, causing the plant to shut down from June 3 – 9, 2009. Production was primarily from B25A, B25B, B26A, and B26B; B6C and B6D were infrequently operated as standby drinking water sources.

Raw and treated water sampling were performed in accordance with the DPH permit and included sampling for COCs, inorganic chemicals, and other diagnostic parameters. Water-quality data are summarized in monthly reports to DPH and are included in the monthly progress reports to EPA.

In August 2006, by mutual agreement among EPA, SCAQMD, and SGVWC, permits for the four air strippers and off-gas units were cancelled and EPA assumed compliance oversight with respect to operations formerly covered by the SCAQMD permits. Air compliance samples were collected according to the revised protocol approved by EPA on April 24, 2008. The revised protocol requires air sampling immediately after a carbon change out, every two months while the MICR control efficiency is greater than 90%, monthly while the MICR control efficiency is less than 90% but greater than 75%, and weekly when MICR control efficiency is less than 75%. The air compliance sampling data were included in the monthly progress reports to EPA. Carbon change outs occurred in January (40,000 pounds), February (40,000 lbs), November (20,000 pounds), and December (20,000 pounds) 2009. Carbon changeouts are summarized in Table 4-1. The VPGAC is managed at facilities approved by EPA to accept CERCLA wastes. As they are received, copies of disposal manifests for change out of spent VPGAC are provided to EPA in the monthly progress reports.

Waste brine and water-softener wastes produced by the ISEP® system were discharged under Industrial Wastewater Permit No. 16499 issued on February 17, 2004. Brine discharges occurred throughout 2009. Quarterly brine discharge sampling is required, and was performed for VOCs, SVOCs, perchlorate, 1,4-dioxane, sulfide, oil and grease, chloride, alkalinity, calcium, magnesium, total toxic organics, suspended solids, and chemical oxygen demand. Four quarterly SMRs that summarize 2009 discharges and brine quality data were submitted to LACSD and EPA on or before April 15, July 15, and October 15, 2009, and January 15, 2010.

4.4 SUBAREA 3 – SAN GABRIEL VALLEY WATER COMPANY B5 TREATMENT PLANT

The SGVWC B5 Treatment Plant operated continuously in 2009, experiencing periodic downtime associated with routine maintenance and infrequent unplanned interruptions. Production during the first half of the year was primarily from wells B5B and B5E. Well COI 5

was permitted as a drinking water source and came online in July 2009. SGVWC B5D was used as a standby drinking water source, making significant contributions in January, May, and June of 2009. B5D is typically used while LPGAC changeouts are scheduled.

Raw and treated water sampling was performed in accordance with the DPH permit and included sampling for COCs, inorganic chemicals, and other diagnostic parameters. Water-quality data are summarized in monthly reports to DPH and are included in the monthly progress reports to EPA.

VOCs are removed using LPGAC and the carbon was replaced in February, May, June, July, October, and November. Carbon changeouts are summarized in Table 4-1. Copies of disposal manifests for change out of spent LPGAC are provided as they are received in monthly progress reports to EPA.

Single pass ion exchange used to remove perchlorate was replaced in March and December using resins from Calgon, Siemens, and Purolite. Resin changeouts are summarized in Table 4-1. Copies of disposal manifests for the change out of spent resins are provided as they are received in the monthly progress reports to EPA.

5.0 PERFORMANCE MONITORING RESULTS

Potentiometric and groundwater-quality monitoring data obtained for the PSEP monitoring program during 2009 were collected in support of performance monitoring during continued construction, testing, and operation of the BPOU remedy. Results of potentiometric and water-quality monitoring are presented in the following sections.

5.1 POTENTIOMETRIC MONITORING RESULTS

The primary objective of the potentiometric monitoring described in Section 3.1 is to verify that the BPOU groundwater flow model accurately reflects the observed flow field and to verify that the remedy is limiting further migration of COCs in groundwater. As noted in Section 6.1.2 of the PSEP, results from potentiometric monitoring are also used to develop potentiometric surface maps to assist in evaluating changes in groundwater flow patterns in the BPOU.

Key components of the assessment of potentiometric data include the following:

- Regional water level fluctuations due to basin-wide recharge and pumping conditions;
- Local-scale water level fluctuations due to ongoing groundwater production and extraction system pumping;
- Regional and local-scale lateral hydraulic gradients and flow directions; and
- Regional and local-scale vertical hydraulic gradients and flow directions.

Potentiometric monitoring results for 2009 are discussed in the following sections.

5.1.1 Water Level Fluctuations

Long-term regional water level conditions in the BPOU are evaluated using water level data for the LACO Key Well. Figure 5-1 shows the water levels measured in the Key Well from 1982 through 2009. During 2009, groundwater levels in the LACO Key Well continued to decline from approximately 201.5 feet mean sea level (msl) in January 2009 to approximately 190.5 feet msl in August 2009. Water levels are currently at an historic low level for the past 30 years. Review of 2009 monitoring data suggests that the observed water level decline in the LACO Key Well occurred in response to below average recharge in 2009.

Figures 5-2 and 5-3 show water levels in multiport monitoring wells MW 5-03 and MW 5-20. The hydrographs for MW 5-03 and MW 5-20 represent water level conditions in Subarea 1, in the northern portion of the BPOU, and in Subarea 3, in the southern portion of the BPOU, respectively. As shown on Figures 5-2 and 5-3, water levels in both Subarea 1 and Subarea 3 declined in 2009 as compared to the prior year's recorded water levels. Water levels in Subarea 1 declined approximately 13.3 feet between June 2008 and September 2009, while

water levels in Subarea 3 declined approximately 13.3 to 13.6 feet during the same period. Water level data depicted on Figure 5-2 indicate that all ports in MW5-03 exhibit similar trends. As shown on Figure 5-3, water levels in the deeper ports of MW 5-20 (Ports 1 – 5) exhibited higher rates of decline than the shallow ports during 2009. As discussed in Section 1.3.3.1, the difference in the observed water level trend between the shallow and deep ports is likely the result of confining units in Subarea 3 that provide hydraulic separation between pumping in different elevation intervals.

5.1.2 Lateral Hydraulic Gradients

Generalized potentiometric surface maps for the shallow and deep elevation intervals were developed based on water level data collected in the multiport monitoring wells to assess observed groundwater flow patterns and hydraulic gradients across the BPOU. Figures 5-4 and 5-5 show observed groundwater flow conditions in the shallow (above -500 feet msl) and deep (below -500 feet msl) elevation intervals in March 2009. Figures 5-6 and 5-7 show observed groundwater flow conditions in the shallow and deep elevation intervals in September 2009. Evaluation of observed groundwater flow patterns on a more detailed scale is limited by spatial variations in hydrostratigraphy and significant short-term water level fluctuations that occur in response to variations in local recharge and pumping.

As shown on Figures 5-4 through 5-7, the lateral hydraulic gradients are towards the west-southwest, with a more westerly gradient in Subarea 3 in the vicinity of the SGVWC B5 Subproject and the California Domestic Water Company (CDWC) Bassett wellfield. In general, regional groundwater flow directions interpreted from Figures 5-4 through 5-7 are similar to the westerly flow directions observed in previous years. These data are consistent with the variation in groundwater flow directions that have been described in past Annual PE Reports. Although it is difficult to generalize groundwater flow directions given the complexity of pumping influences in Subarea 3, groundwater flow directions are generally more southerly during higher water level conditions and are more westerly during lower water level conditions.

Regional-scale lateral hydraulic gradients were estimated using water levels measured in MW 5-03 and MW 5-20 during March and September 2009. Estimated lateral hydraulic gradients are summarized in Table 5-1. The following observations are presented based on the results shown in Table 5-1:

- Estimated lateral hydraulic gradients in the shallow elevation interval ranged from 4.5×10^{-4} to 5.3×10^{-4} toward the west-southwest.
- Estimated lateral hydraulic gradients in the deep elevation interval ranged from 7.0×10^{-4} to 9.0×10^{-4} toward the west-southwest.

- Lateral hydraulic gradients continue to be lower in the shallow elevation interval above -500 feet msl compared to lateral hydraulic gradients in the deep elevation interval below -500 feet msl.

5.1.3 Vertical Hydraulic Gradients

Water level measurements in multiport monitoring wells and piezometer clusters installed near extraction wells indicate that vertical hydraulic gradients vary throughout the BPOU. As discussed in Section 5.1.1, hydrographs shown on Figures 5-2 and 5-3 represent water level conditions in Subarea 1 (MW 5-03), in the northern portion of the BPOU, and in Subarea 3 (MW 5-20), in the southern portion of the BPOU, respectively. As shown on Figure 5-2, hydrographs for ports at different depths in MW 5-03 plot essentially on top of each other, indicating that there is no significant vertical hydraulic gradient in Subarea 1. However, as shown on Figure 5-3, water levels measured at different depths in MW 5-20 are separated by up to 25 feet, indicating that there are significant downward vertical hydraulic gradients in Subarea 3.

Vertical hydraulic gradients calculated at selected multiport wells and piezometer clusters located in Subarea 1 and Subarea 3 are summarized in Table 5-2. The estimates summarized in Table 5-2 are based on semi-annual water level conditions in March/April 2009 and September/October 2009. As shown in Table 5-1, vertical hydraulic gradients continue to be lower in Subarea 1 compared to vertical hydraulic gradients in Subarea 3. Estimated vertical hydraulic gradients in Subarea 1 ranged from 3.7×10^{-4} upward to 7.7×10^{-4} downward. Estimated vertical hydraulic gradients in Subarea 3 ranged from 9.6×10^{-3} to 2.7×10^{-2} and are consistently downward.

5.2 GROUNDWATER QUALITY

Groundwater samples were collected from wells in the PSEP monitoring program to evaluate groundwater-quality conditions during continued construction, testing, and operation of the BPOU remedy. As described in Section 3.2, groundwater samples were analyzed for the 20 COCs listed in PSEP Table 2-1 including: 1,4-dioxane, NDMA, perchlorate, and VOCs. Groundwater samples were also analyzed for nitrate and sulfate because of their importance to treatment plant operations and potable use. As described in Section 3.2, other groundwater-quality monitoring was performed to supplement the PSEP monitoring program during 2009. Water-quality monitoring results for 2009 are discussed in the following sections.

5.2.1 Water-Quality Results

Water-quality results for the PSEP monitoring program in 2009 are summarized in Table 5-3. Table 5-3 also includes results from the MW 5-28 monitoring well cluster. An evaluation of the 20 COCs relative to their compliance with or exceedance of either California Maximum

Contaminant Levels (MCLs) or, if no MCL has been established, California Drinking Water Notification Levels (NLs) and their frequency of occurrence was submitted to EPA in the technical memorandum dated February 17, 2004 (Geomatrix, 2004b). This memorandum recommended that interpretations of the spatial distribution and temporal trends of COCs in groundwater focus on seven selected COCs including: 1,2-dichloroethane (1,2-DCA); 1,4-dioxane; carbon tetrachloride; NDMA; perchlorate; PCE; and TCE. These seven COCs were selected because they meet one or more of the following criteria:

- Observed concentrations of the compounds meet or exceed either MCLs or, if no MCL has been established, the NLs, as applicable;
- They occur relatively frequently in the BPOU; and
- They may be controlling compounds relative to effectiveness of treatment processes used in BPOU Treatment Plants.

Although this report contains approximate depictions of the interpreted current spatial distribution and concentration trends of the seven selected COCs in groundwater, such depictions are at best approximate and are further evaluated in Sections 5.2.3 and 5.2.4 as well as Section 4.0 of Appendix A.

Results for other water-quality monitoring that was performed by the WEs to satisfy the requirements of DPH drinking water permits presented in Table 3-3 are summarized as follows:

- Water-quality results for 1,2,3-TCP are presented in Table 5-4. Concentrations of 1,2,3-TCP were detected at levels that exceeded the NL (5 ng/L) at EPA MW 5-03 (port 7), MW 5-11 (port 2), MW 5-13 (ports 1-2), MW 5-15 (port 1), MW 5-17 (port 1), and MW 5-18 (port 3) in the mid-plume region. Concentrations of 1,2,3-TCP did not exceed the NL in Subarea 3 monitoring locations.
- Water-quality results for EDB analyses are presented in Table 5-5. EDB was not detected above the method reporting limit (RL).
- Water-quality results for non-COC VOCs are presented in Table 5-6. Fifteen non-COC VOCs were detected in various wells. Vinyl chloride was detected in MW 5-03 (port 9) and MW 5-22 (port 2) at a level that exceeded the MCL (0.5 micrograms per liter [µg/L]). All other non-COC VOC results were below their respective MCL or NL.
- Water-quality results for VOC and SVOC TICs are presented in Table 5-7. PCE was tentatively identified at two locations and TCE was tentatively identified at three locations at concentrations above the MCL using a SVOC analysis; these compounds are currently monitored using EPA Method 8260 and are addressed by the remedy for VOC treatment within the BPOU. Sixteen other compounds were tentatively assigned a specific chemical association with no current regulatory standard or limit.

5.2.2 Data Validation and Data Quality Assessment

Data management activities for the BPOU Project are managed by LDC under contract to the Watermaster. LDC utilizes EDMSi, an EQUIS web-based database, for the management of historical data that was compiled from the EPA San Gabriel Basin database, CRs, WEs, and other relevant sources. New water-quality data that are collected for the PSEP monitoring program are reported to LDC by laboratories and are validated in EDMSi as part of the real-time automated Tier 1A/1B process and Tier 3 selection. As specified by the QAPP (Geomatrix, 2006b), Tier 1A/1B validation was performed by LDC on all water-quality data collected in support of the PSEP monitoring program and Tier 3 review was performed on approximately ten percent of the PSEP monitoring data. Results of the data validation are used to evaluate laboratory performance and ensure that data quality is acceptable to meet BPOU Project objectives.

Data qualifiers that were assigned during the Tier 1A/1B and Tier 3 reviews are shown with the groundwater-sampling results summarized in Table 5-3. Based on the data validation efforts and the evaluation of field quality control (QC) samples all analytical sample results are considered usable to support the BPOU Project Data Quality Objectives (DQOs). Final Tier 3 validation reports were submitted by LDC to the Watermaster on September 8, 2009, and February 1, 2010 (LDC, 2009, 2010). The Tier 3 results were submitted by the Watermaster to EPA via e-mail and are also posted on a secure LDC BPOU web portal.

5.2.3 Distribution of Selected Chemicals of Concern

Consistent with previous Annual PE Reports, water-quality data from wells screened at selected depths within the aquifer were interpreted using the three-dimensional geospatial modeling software, Earth Vision®. A detailed description of the approach used for the development of plume maps and chemical cross sections for the seven selected COCs is presented in Appendix A. Isoconcentration contours for these seven COCs are shown on the generalized distribution maps on Figures 5-8 through 5-14. The isoconcentration contours shown on the generalized distribution maps represent the composite lateral extent of each individual chemical at all depths in groundwater. The lateral distribution of the selected COCs is also shown in plan view at three specific elevation intervals in Appendix A. The three elevation intervals are as follows:

- Elevations between the water table (or potentiometric surface) and -200 feet msl;
- Elevations between -200 feet and -500 feet msl; and
- Elevations below -500 feet msl.

The plume maps for the three elevation intervals shown in Appendix A include two sets of isoconcentration contours on each map. Isoconcentration contours at “discrete” elevations are shown for thin slices through the plumes at -50, -350 and -550 feet msl. Isoconcentration contours for “composite” elevation intervals are also shown for thicker slices through the plumes in the intervals between the water table and -200 feet msl, between -200 and -500 feet msl, and below -500 feet msl.

Given the three-dimensional nature of the plumes, the reader should consider the three-dimensional visualization that is inset in the corner of each figure when reviewing the two-dimensional plume maps and chemical cross sections. The three-dimensional visualizations provide the appropriate context within which to review the two-dimensional isoconcentration contours shown on each plume map and chemical cross section. It should be noted that the water-quality data used to create the three-dimensional plume interpretations are posted on the plume maps according to the composite elevation intervals described above. Therefore, in many instances the discrete contours may not appear to correspond to water-quality data that are within the composite elevation interval but that are either above or below the elevation of the discrete contours.

Chemical cross sections showing the vertical distribution of selected COCs along four discrete transects are also shown in Appendix A. Cross section A-A’ represents a north-south transect that is aligned generally with the longitudinal axis of the COC plumes. Cross sections B-B’, C-C’, and D-D’ represent east-west or northwest-southeast transects that are aligned generally perpendicular to the dominant groundwater flow direction in the BPOU. Cross sections B-B’, C-C’, and D-D’ show the distribution of the COC plumes in the upgradient, mid-plume, and downgradient areas of the BPOU and include various production wells that are vulnerable to lateral migration of the COC plumes toward the west or east.

The depictions of plume geometry presented in Appendix A and summarized on Figures 5-8 through 5-14 represent the estimates of the distribution of the COCs in the BPOU in 2009. However, as with any approach used to interpolate data between known data points, there are uncertainties and limitations to the approach that may result in alternative interpretations of the distribution of COCs in groundwater. These uncertainties and limitations are summarized as follows:

- For clarity, and as requested by EPA, we have depicted the seven principal COCs in separate plume maps at three elevations. Plumes for the various COCs overlap (and/or diverge) at various depths throughout the impacted areas.
- The plume maps and chemical cross sections attempt to depict the dynamic and temporally changing three-dimensional distribution of COCs in groundwater with static

two-dimensional images. While these maps and cross sections show two-dimensional isoconcentration contours of the COC plumes in plan view and in profile, they represent interpolated approximations of the distribution of COCs in groundwater based on available data. The exact subsurface distribution of the COCs cannot be completely ascertained given these and other potential limitations. The spatial and temporal spread of the chemical data may not encompass the entire distribution of chemicals in the groundwater (i.e., additional assumptions are necessary as to chemical concentrations in areas that may not be completely represented by monitoring wells). In particular, results of the interpolation should be carefully evaluated in areas where available data are limited or concentrations change significantly over short distances.

- Alternative interpretations of the distribution of the COC plumes are possible and may differ from the plume depicted here by utilizing plumes drawn manually using professional judgment. For example, plume maps and chemical cross sections for certain COCs portray discontinuous plumes in areas where the plumes may in fact be continuous.

- As described in Appendix A, the plume interpretations generally incorporate water-quality data collected during April through June 2009. However, where data were not available for that time period, data from the next closest date during the January through December 2009 time period were utilized. While using such an expanded data set is helpful to some degree in the contouring exercise, it introduces additional uncertainties in comparing data taken from different time periods and assuming that the ultimate projection is a consistent one. Moreover, even using this temporally diverse data set, there are inevitable gaps in the existing data that limit our ability to define the distribution of COCs in groundwater completely. In addition, the EarthVision® software used to create the plume maps and chemical cross sections utilizes certain algorithms to interpolate or “fill in” data gaps in order to provide a more comprehensive picture of the distribution of COCs. Although the EarthVision® software objectively applies the selected interpolation scheme, other software and other interpolation schemes may be applied that may generate reasonable, yet differing, results, each appropriately honoring the available monitoring data. This is not a unique limitation of the EarthVision® software, but simply a limitation of any methodology with limited data. Consequently, the interpretation may result in differences between actual and interpreted concentrations at any given point in the Project area.

- The Duarte Fault is represented as a diffuse zone of faulting on the plume maps and chemical cross sections. However, no faulting was explicitly represented in any way in the 3D grid used to interpolate the plumes. The diffuse fault zone is considered to be a reasonable representation of the uncertainty in the fault’s location as it has several fault splays concealed beneath alluvial deposits.

- The northern-most limits of some COCs depicted on the plume maps are uncertain due to the limited amount of data available to the CR group from other EPA-named PRPs, including the Mobil/Lockheed/Valspar group, as well as other entities that may be PRPs in the northern portions of the BPOU. In consideration of the lack of recent available groundwater data from several PRP facilities and historical detections of several COCs such as TCE and PCE in the area north of the Duarte Fault zone,

isoconcentration contours for TCE and PCE are truncated at the downgradient (southern) extent of the Duarte Fault zone.

Evaluation of both the generalized plume maps shown on Figures 5-8 through 5-14 and the detailed elevation-specific plume maps and chemical cross sections that are shown in Appendix A resulted in the following general observations of the spatial distribution of COCs in the BPOU:

- The longitudinal extent of the longest COC plumes extends from north of the Duarte Fault zone in Subarea 1, approximately 7.5 miles towards the southwest, where the plumes terminate near the confluence of Avocado Creek and the San Gabriel River.

- The maximum lateral extent of the various COC plumes generally overlap throughout their extent, with the exception of the 1,4-dioxane plume, which has a much smaller lateral extent in comparison to other COC plumes.

- The vertical extent of the various COC plumes ranges from depths of approximately 600 feet below ground surface (bgs) to the north of Arrow Highway, in Subarea 1, to approximately 1,000 feet bgs in Subarea 3. The COC plume with the maximum vertical extent is carbon tetrachloride.

- As described in previous Annual PE Reports, the 1,4-dioxane plume appears to be vertically disconnected in the area of MW 5-24 with the deeper portion separated by approximately 600 vertical feet from the shallower and more laterally extensive portion of the plume. These deeper detections of 1,4-dioxane are considered anomalous and may be the result of contamination introduced into the formation by the borehole mudcake during well construction.

In addition to the general observations described above, minor changes in the COC concentrations in various wells resulted in slightly different interpretations of the extent of the COC plumes compared to the previous year. In particular, concentrations of COCs in several wells that are located near the edges of the plumes changed relative the respective MCL (or NL); the concentrations of some COCs in some wells located near the edges of the plumes increased above MCLs (or NLs) whereas the concentrations of some COCs in some wells decreased below MCLs (or NLs). Such changes in concentration resulted in a slightly different location of the isoconcentration contours at the MCL (or NL) compared to the previous year. Changes in the concentrations of COCs relative to the MCL (or NL) that resulted in a different location of the isoconcentration contours at the MCL (or NL) compared to the previous year are as follows:

- In Subarea 1, the 1,2-DCA, 1,4-dioxane and carbon tetrachloride plumes do not appear to extend as far to the north compared to the previous year. The difference is due to decreased concentrations of these three chemicals in several multiport monitoring wells in Subarea 1. In addition, historic low water levels resulted in several monitoring wells in Subarea 1 being dry during 2009.

- In Subarea 1, the lateral extent of the perchlorate plume does not appear to extend as far to the west compared to the previous year due primarily to lower concentrations of perchlorate in MW 5-24 in 2009.

- In Subarea 1, the PCE and TCE plumes do not appear to extend as far to the east compared to the previous year due primarily to lower concentrations of these two chemicals in SA1-1, SA1-2, and MW 5-01 in 2009.

- In Subarea 3, the perchlorate plume does not appear to extend as far downgradient to the south compared to the previous year due to lower concentrations in MW 5-26 and COI 5 in 2009.

- In Subarea 3, the PCE plume appears to extend slightly deeper compared to the previous year due to slightly higher concentrations in SGVWC B25B and B6D.

When reviewing the evaluation presented above, apparent changes in the interpreted spatial distribution of a particular COC plume from year to year should be evaluated with considerable caution. Historical variations in chemical concentrations have been observed seasonally and from year to year as basin water levels vary. In some instances, observed COC concentrations have fluctuated above and below MCLs (or NLs) and RLs (or DLs) during the span of one or two years or even from one sampling event to the next. Therefore, very slight changes in water quality results from one sampling event to the next may significantly alter the interpreted spatial extent of the COC plumes that are depicted on the plume maps and chemical cross sections. Thus, while the apparent short-term changes in the interpreted plume extents may be representative of seasonal or annual changes, the apparent short-term changes should not be considered as representative of longer-term (multi-year) trends until such observations can be confirmed over several years. This is particularly important for wells located along the perimeter of the COC plumes.

5.2.4 Temporal Trends

Temporal trends in chemical concentrations for the seven selected COCs were evaluated by developing time-concentration graphs for all wells in the PSEP water-quality monitoring network as presented on Figures 5-15 through 5-21. Time-concentration graphs were created for selected multiport wells included in the BPOU-wide water-quality monitoring program for the period from 1994 through December 2009 using available data in the BPOU Project database. The graphs include data that were collected for BPOU performance monitoring activities as well as DPH and RWQCB monitoring requirements. Concentrations of chemicals detected in groundwater samples are plotted using closed circles; chemicals not detected in groundwater samples were plotted at the reporting limit using open circles. Groundwater-quality results in multiport monitoring wells are grouped on the time-concentration graphs according to measurement port elevations in three elevation intervals as follows: between the water table and -200 feet msl, between -200 and -500 feet msl, and below -500 feet msl.

Based on a review of the time-concentration graphs shown on Figures 5-15 through 5-21, the following observations were noted:

- Monitoring wells MW 5-11, MW 5-13, and MW 5-18 are located in the upgradient area of the COC plumes, north of Arrow Highway in the Subarea 1 portion of the BPOU. These wells are considered to be general indicators of the quality of groundwater that is flowing toward downgradient extraction wells installed for the VCWD Lante Subproject. Concentrations of most COCs in these wells were generally consistent or or slightly lower in 2009 in comparison to previous years with a few exceptions: concentrations of perchlorate in MW 5-11 (port 3) increased slightly in 2009; concentrations of PCE increased slightly in MW 5-13, Port 2, and decreased slightly in Port 3, in 2009.

- Monitoring wells MW 5-05, MW 5-08, and MW 5-15 are located in the mid-plume area of the COC plumes, downgradient of Subarea 1 and upgradient of Subarea 3. These wells are considered to be general indicators of the quality of groundwater that is flowing downgradient toward the SGVWC B5, SGVWC B6, and LPVCWD Subproject extraction wells. Concentrations of most COCs in MW 5-05 and MW 5-15, located towards the center of most plumes, generally remained elevated above the MCL or NL in 2009 as observed in previous years. Concentrations of COCs increased in most ports in MW 5-05 in 2009 whereas concentrations of all COCs decreased in MW 5-15 in 2009.

- Monitoring wells MW 5-19 and MW 5-23 are located within Subarea 3, upgradient of the SGVWC B5 Subproject extraction wells and the CDWC Bassett wellfield. These wells are considered to be general indicators of groundwater quality in the southern portion of the BPOU and representative of the quality of groundwater that is flowing downgradient toward the SGVWC B5 Subproject extraction wells and CDWC Bassett wellfield. In the shallowest elevation interval, above -200 feet msl, concentrations of COCs have been decreasing since 2001. In the elevation interval between -200 feet and -500 feet msl, concentrations of the COCs have remained relatively unchanged in MW5-19; COCs have generally increased in MW 5-23 in this depth interval. In the deep elevation interval, below -500 feet msl, concentrations of the COCs continued to remain below MCLs and NLs in both MW 5-19 and MW 5-23, with the exception of carbon tetrachloride concentrations, which appear to have generally increased over time.

Observed increases or decreases in the concentration of a particular COC during a single sampling event should not be considered as a significant change in the overall trend of chemical concentrations at a particular well. Historical variations in chemical concentrations have been observed seasonally and from year to year as basin water levels vary. In some instances, observed COC concentrations have fluctuated above and below MCLs (or NLs) and RLs (or DLs) during the span of one or two years or even from one sampling event to the next.

5.3 GROUNDWATER EXTRACTION AND CHEMICAL MASS REMOVAL

Monthly groundwater extraction volumes for 2009 were compiled from monthly reports submitted to DPH and EPA in monthly progress reports. Groundwater extraction volumes for all extraction wells that were operational in 2009 are shown in Table 2-1. Average monthly and average annual extraction rates are also provided in Table 2-1 together with design

extraction rates for each extraction well, target operational extraction rates, and EPA-approved extraction rates for each well. Design extraction rates are based on the peak design capacity of the treatment plants whereas target operational extraction rates generally assume ten percent downtime for each well for treatment plant maintenance. The EPA-approved extraction rates shown in Table 2-1 are based on groundwater flow model simulations performed in 2000 and 2001 and represent the average extraction rates necessary to achieve the remedial action objectives.

Estimates of chemical mass removed from extracted groundwater in 2009 for the LPVCWD, SGVWC B5, SGVWC B6, and VCWD Lante Subprojects are presented in Section 6.0.

6.0 TREATMENT PLANT PERFORMANCE RESULTS

This section presents a summary of the operational performance results for those treatment plants that were operational in 2009.

6.1 SUBAREA 1 – VALLEY COUNTY WATER DISTRICT LANTE SUBPROJECT

As described earlier in this report, the VCWD Lante Treatment Plant operated throughout 2009. Approximately 8,214 acre-feet of groundwater were extracted and treated from the production wells for an annualized production rate of approximately 5,092 gpm.

Water-quality data collected from the individual production wells and from the fully treated water are summarized in Table 6-1. Table 6-1 also includes the design concentrations and expected average influent concentrations for the VCWD Lante Treatment Plant together with applicable MCLs and NLs for the COCs. Raw water concentrations for the compounds reported in Table 6-1 did not exceed design concentrations. No COCs were detected at concentrations exceeding MCLs or NLs in the fully treated water. However, a false positive was reported for NDMA in sample port SP-9 on July 14, 2009. The sample collected upstream of SP-9 at SP-7 on the same day reported NDMA below the detection limit. Figures 6-1 to 6-14 illustrate raw and treated water concentration trends relative to the applicable MCL or NL. In general, COC concentrations appeared to be relatively constant or slightly decreasing in the three production wells. NDMA concentrations in SA1-3 have displayed a steady decrease during 2009 from over 0.06 μg/L in January to approximately 0.02 μg/L in December. Cis-1,2-DCE has also decreased in well SA1-3. In addition, 1,1-DCE concentrations in SA1-2 have decreased from 8.5 to 1.2 μg/L from January to December 2009.

Average concentrations for untreated influent and fully treated water are summarized in Table 6-2. Mass removed was calculated by using the average raw water concentration for each COC from each of the three production wells and multiplying that result by the volume of water treated, with the appropriate dimensional conversion. In these calculations, concentrations below the detection limit were treated as zero. For the compounds considered, approximately 7,424 pounds of chemical mass were removed by the VCWD Lante Treatment Plant in 2009. This is more than double the 3,638 pounds of mass removed in 2008, reflecting the shift in extraction by inactivating the SA1-1 well and substantially increasing production from the SA1-3 well. Similar to 2008, perchlorate, TCE, PCE, 1,1-DCE and cis-1,2-DCE represent most of the total mass removed, with TCE and PCE representing the vast majority of the total mass removed.

Inlet and exhaust air quality data for 2009 are summarized in Table 6-3 for the four air strippers and carbon off-gas abatement systems. As expected from water-quality data, PCE,

TCE, 1,1-DCE, and cis-1,2-DCE were the primary VOCs detected in the vapor phase. Table 6-4 provides a summary of air risk and hazard calculated from compounds detected in the air exhaust. Risk was calculated using SCAQMD Tier 4 procedures and compared against ARARs. Calculated risk and hazard values were below ARARs for the MICR, acute hazard, chronic hazard, and cancer burden.

In 2009, the VCWD Treatment Plant discharged approximately 80,573,000 gallons of waste brine to the LACSD sewer with an annual average discharge rate of approximately 154 gpm. Discharges met permit requirements, which include a minimum pH limit of 6.0. Brine flows and pH data are summarized in Table 6-5.

6.2 SUBAREA 3 – LA PUENTE VALLEY COUNTY WATER DISTRICT SUBPROJECT

In 2009, the average annual flowrate at the LPVCWD Treatment Plant was 2,295 gpm, which exceeded the EPA-approved extraction rate of 2,250 gpm. Approximately 3,701 acre-feet of groundwater were extracted, primarily from LPVCWD 5.

Water-quality data are summarized in Table 6-6. Figures 6-15 to 6-25 illustrate raw and treated water concentration trends relative to the applicable MCL or NL for selected COCs. All treated water concentrations were below the MCLs and NLs. TCE and carbon tetrachloride were the only compound detected in the raw water at concentrations exceeding the design concentrations. These design exceedances were only in the LPVCWD 2 well, which is not used as the primary extraction well. In general, COC concentrations in the raw water were stable or showed a slightly decreasing trend. The exception being well LPVCWD 5, which showed a decrease in almost all the COCs from January until about April and then a stable trend for the remainder of the year.

Average chemical concentrations for treatment plant influent and treated water are summarized in Table 6-7 together with the volume of water treated and the total mass removed per chemical. In these calculations, concentrations below the detection limit were treated as zero. For the COCs considered, approximately 612 pounds of chemical mass were removed from the aquifer. This is less than the 884 pounds removed in 2008. The decrease in mass removal is largely due to the activation of LPVCWD 5 as the primary extraction well, which has lower COC concentrations than LPVCWD 2.

Air quality data collected weekly from the Small Tower and Large Tower inlet and outlet are summarized in Table 6-8. A summary of the air risk and hazard associated with the off-gas GAC systems is provided in Table 6-9. The MICR, acute hazard, chronic hazard, and cancer burden ARARs were not exceeded in 2009.

The LPVCWD Treatment Plant discharged approximately 8,576,000 gallons of waste brine to the LACSD sewer in 2009 with an average annual discharge rate of 16 gpm. Brine flows and pH data are summarized in Table 6-10. Discharges met permit requirements. The pH excursions, which occurred in 2008, were avoided in 2009.

6.3 SUBAREA 3 – SAN GABRIEL VALLEY WATER COMPANY B6 SUBPROJECT

In 2009, the average annual flowrate at the SGVWC B6 Treatment Plant was 4,694 gpm, which was below the EPA-approved extraction rate of 6,500 gpm, mainly due to problems with the ISEP® system. Approximately 7,603 acre-feet of groundwater were extracted and treated.

SGVWC B6 Treatment Plant raw water-quality data are collected monthly and treated water data are collected weekly (Table 6-11). Table 6-11 also includes the design and expected average influent concentrations for the SGVWC B6 Treatment Plant together with applicable MCLs and NLs for the COCs. With the exception of carbon tetrachloride in SGVWC B26B, raw water concentrations did not exceed design concentrations in the production wells. No COCs were detected at concentrations exceeding MCLs or NLs in the fully treated water. Figures 6-26 to 6-37 illustrate raw and treated water concentration trends relative to the applicable MCL or NL. With the exception of nitrate and sulfate, which remained relatively stable, COC concentrations in Well B25A showed slight increases from January to December of 2009. COC concentrations in the other raw water wells were relatively constant or showed slight decreases through the year.

Average chemical concentrations for raw influent and fully treated effluent are summarized in Table 6-12, together with the volume of water treated and the total mass removed per chemical. In these calculations, concentrations below the detection limit were treated as zero. For the compounds considered, approximately 1,553 pounds of chemical mass were removed from the aquifer, a decrease from 2008 (2,361 pounds removed), due mainly to the decrease in extraction volume. Carbon tetrachloride, perchlorate, PCE, and TCE represented nearly 93 percent of the mass removed, with TCE and perchlorate alone accounting for 75 percent of the mass removed.

SGVWC B6 Treatment Plant air quality data are summarized in Table 6-13. Table 6-14 provides summary of air risk and hazard calculated from compounds detected in the air exhaust. Risk was calculated using SCAQMD Tier 4 procedures and compared against ARARs. Average calculated risk values were below ARARs for MICR, acute hazard, chronic hazard, and cancer burden. The MICR, acute hazard, chronic hazard and cancer burden ARARs were not exceeded in 2009.

The SGVWC B6 Treatment Plant discharged approximately 47,243,000 gallons of waste brine to the LACSD sewer in 2009 with an average flowrate of 90 gpm. Brine flows and pH data are summarized in Table 6-15. Discharges met permit requirements.

6.4 SUBAREA 3 – SAN GABRIEL VALLEY WATER COMPANY B5 SUBPROJECT

The average annual extraction rate for the SGVWC B5 Subproject was about 6,294 gpm, below the EPA-approved extraction rate of 7,000 gpm due mainly to the delays in permitting of Well COI 5. COI 5 became operational in July 2009. Approximately 10,157 acre-feet of water were extracted and treated.

Raw water-quality data for the SGVWC B5 Treatment Plant are provided in Table 6-16, which also includes the design and expected average influent concentrations for the SGVWC B5 Treatment Plant and applicable MCLs and NLs for the COCs. Raw water concentrations did not exceed design concentrations in the production wells. COCs were not detected at concentrations exceeding MCLs or NLs in the fully treated water during 2009. However, on July 21, a false positive was reported in the UVPHOX combined effluent sample. The sample from the B5 reservoir effluent on the same day showed NDMA to be below the detection limit. Figures 6-38 to 6-46 show raw and treated water concentration trends relative to the applicable MCL or NL. COC concentrations in the raw water were relatively constant, with the exception of decreasing NDMA concentrations in Wells B5B and B5E. There also appears to be a slightly decreasing trend for perchlorate in Wells B5B and B5E. Because of the relatively limited data set for COI 5, which came online in July, it is difficult to draw conclusions regarding chemical concentration trends in that well.

Average chemical concentrations for raw influent and fully treated effluent are summarized in Table 6-17, together with the volume of water treated and the total mass removed per chemical. In these calculations, concentrations below the detection limit were treated as zero. For the compounds considered, approximately 427 pounds of chemical mass were removed from the aquifer, compared to 408 pounds in 2008. Perchlorate and TCE represented approximately 86 percent of the mass removed.

7.0 EVALUATION OF REMEDY PERFORMANCE AND TREATMENT PLANT OPERATIONS

7.1 GROUNDWATER EXTRACTION SYSTEM PERFORMANCE

As described in the PSEP and Section 3.0 of this report, the evaluation of remedy performance involves both short-term and long-term evaluation of groundwater extraction system performance. Annual PE Reports evaluate the short-term performance of the groundwater extraction system using groundwater modeling and empirical data to assess whether extraction well operation is limiting further migration of groundwater contamination into less contaminated areas. Groundwater extraction system performance is discussed in the following sections.

7.1.1 Extraction Well Performance

Based on step-drawdown testing, aquifer testing, and DPH-permitted operation, the VCWD Lante, LPVCWD, SGVWC B6, and SGVWC B5 Subproject wells are capable of achieving design extraction rates. To reliably achieve EPA-approved extraction rates, LPVCWD 5 was activated to replace LPVCWD 2 and 3 as the primary extraction well at the LPVCWD Subproject in early 2009. In addition, the COI 5 well was permitted and became operational in 2009.

7.1.2 Groundwater-Quality Trends

Spatial and temporal trends in groundwater quality in the BPOU as observed during baseline monitoring are described in Sections 5.2.1.1 and 5.2.2.2. Given that the majority of BPOU Project extraction wells have been in operation for only a few years and some wells are not yet operational at full production, it is premature to assess groundwater-quality trends as they relate to groundwater extraction system performance. Future Annual PE Reports and Five-Year Reviews will provide further assessment of groundwater trends as they relate to groundwater extraction system performance.

7.1.3 Groundwater Extraction and Chemical Mass Removal

The VCWD, LPVCWD, and SGVWC B6 Treatment Plants were all operational in 2009. At the VCWD Lante Treatment Plant, operational restrictions imposed by the ISEP® systems due to high nitrate and sulfate concentrations in the SA1-1 and SA1-2 wells limited treatment capacity and the plant did not meet its extraction target. To help mitigate the high nitrate and sulfate loading and to increase mass removal, well SA1-1 was taken out of service and the extraction rate was increased in well SA1-3. The VCWD Lante Treatment Plant had an average annual extraction rate of 5,092 gpm compared to the EPA-approved extraction rate of 6,000 gpm. The LPVCWD Treatment Plant achieved an annual average extraction rate of 2,295 gpm, exceeding the EPA-approved extraction rate of 2,250 gpm. The B6 Treatment Plant

experienced significant operational problems with the ISEP® systems resulting in prolonged periods of downtime. The average B6 extraction rate was 4,694, compared to the EPA-approved extraction rate of 6,500 gpm. The SGVWC B5 Treatment Plant operated at an annual average flowrate of 6,294 gpm, compared to the EPA-approved extraction rate of 7,000 gpm, and the COI 5 well was permitted and became operational in 2009.

Overall, BPOU extraction from the combined four primary treatment facilities averaged 18,375 gpm on an annual basis, compared to the EPA-approved extraction rate of 21,750 gpm, or approximately 85% of target.

The chemical mass removed at the VCWD Lante, LPVCWD, SGVWC B6 and SGVWC B5 Treatment Plants was 7,424 pounds, 612 pounds, 1,553 pounds, and 427 pounds, respectively. The BPOU project-wide total mass removed in 2009 was 10,016 pounds, the highest annual total to date. Since 2004, the cumulative mass removed is 32,668 pounds (Table 6-18).

7.1.4 Assessment of Migration Control

As discussed in Section 3.4.2, the assessment of migration control for the BPOU Project is dependent on the startup and continuous operation of all 11 extraction wells and all four treatment plants. Only the LPVCWD Subproject operated on a full-time basis at the target extraction rate. However, VCWD consistently operated above 5,000 gpm and the B5 project became fully operational with rates generally exceeding 6,500 gpm with the activation of COI 5.

As described in Section 3.3, once the majority of the BPOU Project extraction wells are operating at or near their target operational extraction rates, the CRs intend to conduct performance evaluation simulations using the BPOU groundwater model. The CRs will present the results of these simulations in future Annual PE Reports and Five-Year Reviews to assess groundwater extraction system performance as it relates to chemical migration control.

7.2 TREATMENT SYSTEM OPERATIONS

The treatment plant operations that were described in detail earlier in this report are summarized below.

7.2.1 Subarea 1 – Valley County Water District Lante Subproject

The VCWD Lante Treatment Plant operated under its DPH drinking water permit and delivered fully treated water to SWS. The treatment plant reliably treated extracted water to drinking water standards.

Improvements, operational problems, and issues that impacted operations and performance in 2009 and future operational issues include:

- The air-stripping towers continued to experience carbonate precipitation problems, acid washing of Tower 4 was pilot tested and found not to be cost effective;
- The single pass ion exchange system was largely completed and is on hold while nitrate treatment and ISEP® bypass options are evaluated;
- The single pass ion exchange system will undergo startup testing, DPH permitting, and begin operation in 2010; and
- The Arrow well was sampled in January 2010 and will be evaluated for potential incorporation into the extraction plan to lower nitrate loading and further increase mass removal.

7.2.2 Subarea 3 – La Puente Valley County Water District Subproject

The LPVCWD Subproject extracted and treated groundwater at an annual rate of about 2,295 gpm, exceeding the extraction target. The plant reliably treated raw water to drinking water standards for all COCs.

Improvements, operational problems, and issues that impacted operations and performance in 2009 and future operational issues include:

- The single pass ion exchange equipment construction was completed and startup testing occurred in December 2009;
- LPVCWD 5 became the primary extraction well for LPVCWD in early 2009;
- The single pass ion exchange equipment will be permitted and will begin full time operation in 2010;
- Chemical dosing including peroxide, sodium hypochlorite, ortho/poly phosphate, and acid should be optimized once single pass ion exchange comes online in 2010; and
- The ISEP® equipment will be decommissioned.

7.2.3 Subarea 3 – San Gabriel Valley Water Company B6 Subproject

The SGVWC B6 Treatment Plant extracted and treated water at an annual rate of 4,694 gpm, well below the EPA approved extraction rate of 6,500 gpm. The plant reliably treated raw water to drinking water standards for all COCs.

Improvements, operational problems, and issues that impacted operations and performance in 2009 and future operational issues include:

- ISEP® beds were taken off line and cleaned repeatedly to mitigate backpressure problems;

- The continued ISEP® problems resulted in substantial down time and a reduced annual extraction rate relative to target;

- The single pass ion exchange construction was completed in 2009 and will undergo startup testing, permitting, and begin full time operation in 2010;

- Work to optimize chemical dosing and other operational parameters should be initiated in 2010, once the single pass ion exchange system comes online.

7.2.4 Subarea 3 – San Gabriel Valley Water Company B5 Subproject

The SGVWC B5 Treatment Plant operated at an average annual flowrate of 6,294 gpm. The plant reliably treated raw water to drinking water standards for all COCs.

Improvements, operational problems, and issues that impacted operations and performance in 2009 and future operational issues include:

- Water levels in the vicinity of COI 5 will be evaluated in accordance with the amended drinking water permit; and

- Chemical dosing and other operational parameters should continue to be optimized in 2010.

8.0 SUMMARY AND RECOMMENDATIONS

All treatment plants are expected to be operational with single pass ion exchange systems in place in 2010. Recommendations and operational issues to be addressed for the BPOU treatment plants in 2010 include:

- Complete DPH permitting and begin implementation of single pass ion exchange at the LPVCWD Treatment Plant.
- Complete startup testing, DPH permitting, and operation of single pass ion exchange systems at the VCWD Lante, and SGVWC B6 Treatment Plants;
- Finalize response to EPA letter of June 15, 2009 and prepare revised air monitoring program for the BPOU;
- Update air portions of the SAP and QAPP and based on revised air monitoring program.
- Complete treatment plant controls failure analysis at the LPVCWD Treatment Plant;
- Track carbon and resin changeouts and provide disposal certificates to EPA in the monthly progress reports on a more timely basis;
- Optimize chemical amendment dosing at all treatment plants including peroxide (1,4-dioxane treatment), sodium hydroxide (pH adjustment), sodium hypochlorite (chlorination), ortho/poly phosphate (red water control), and acid (pH adjustment and calcium carbonate precipitation control); and
- Evaluate options for decommissioning ISEP® equipment.

Recommended changes to the overall performance monitoring program for 2010 are as follows:

- Numerous modifications to the PSEP monitoring program have been implemented since the PSEP was approved in 2004 and the FSP and QAPP were approved in 2007. Therefore, the PSEP, FSP, and QAPP documents will be updated in 2010 to reflect the current requirements of the PSEP monitoring program.

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