

Section 1

Introduction

The City of Los Angeles (City) encompasses an area of 465 square miles with a population of nearly 4 million residents and an annual average water consumption of approximately 215 billion gallons. Local groundwater provides approximately 11 percent of the city's total water supply and has provided up to 30 percent of the city's total supply in drought years.

Unfortunately, nearly 50 percent of the Los Angeles Department of Water and Power's (LADWP) groundwater production wells in the San Fernando Basin (SFB) have been inactivated because of contamination. The SFB is an aquifer that provides drinking water to a large portion of residents within the city. If effective remediation and cleanup measures are not put in place within the next decade, then various contaminants found in the SFB will continue to spread and to degrade this local resource.

LADWP implemented the SFB Groundwater System Improvement Study (GSIS) to address this threat. The GSIS objective is to develop a comprehensive remediation and cleanup program to address the groundwater contamination in the SFB to preserve public and environmental benefits. To achieve this objective, the GSIS has produced this comprehensive Remedial Investigation (RI) Update Report and is simultaneously developing a Draft Feasibility Study (FS) Report for remediation of portions of the SFB impacted by the contamination. This RI Update Report presents LADWP's understanding of the groundwater basin physical characteristics, nature and extent of contamination, and fate and transport of the contamination impacting this most important resource. The GSIS study area is shown on Figure 1-1.

Concurrent with the SFB groundwater characterization developed in this RI Update Report, the Draft FS is evaluating various alternatives to achieve the Remedial Action Objectives (RAOs) developed by LADWP. With the completion of the RI Update Report and Draft FS Report, LADWP will be able to proceed with the necessary environmental reviews, design, permitting, construction, and startup of the groundwater remediation facilities to effectively clean and remove contaminants from SFB groundwater. The groundwater remediation facilities are anticipated to be operational by the mid-2020s.

1.1 Purpose of Report

The GSIS includes the characterization of the groundwater contamination in the eastern San Fernando Valley (SFV). The United States Environmental Protection Agency (USEPA) declared portions of the SFB as National Priorities List (NPL) sites in 1986 (see Section 1.3 of this report for a detailed summary of USEPA activities in the SFB) and subsequently completed a comprehensive investigation of the eastern SFB near the NPL sites (see Section 1.3.3 of this report) starting in 1987. The resultant RI Report (James M. Montgomery [JMM] 1992), herein referred to as the "1992 RI," focused efforts within the NPL sites, which resulted in five Focused Feasibility Studies (FFSs) in the North Hollywood, Burbank, Glendale, Pollock, and Verdugo areas of the SFB. The 1992 RI report did not characterize the groundwater conditions to the north and west of LADWP's North Hollywood (NH), Rinaldi-Toluca (RT), and Tujunga (TJ) well fields. Hence, the purpose of this GSIS RI Update Report is to complete the characterization of the nature and extent of the contamination in the eastern SFB impacting these well fields. This RI Update Report also provides the basis for the Draft

FS, which evaluates various remedial actions to restore the contaminated groundwater. The specific objectives of this RI Update Report are to:

- Assemble data from the contaminated groundwater basin, with an emphasis on hydrogeology and water quality, to identify data gaps within the study area
- Conduct additional field investigation to fill data gaps
- Characterize the groundwater basin and fill the identified data gaps based on the analysis of the data, according to the following categories:
 - Geology
 - Hydrogeology
 - Nature and extent of contamination
- Present factors that influence the fate and transport of compounds in groundwater
- Provide recommendations for future investigations, if any.

This report is prepared in accordance with the guidelines outlined in the *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986 [aka Superfund]) (USEPA 1988) and in *substantial compliance* with the National Oil and Hazardous Substances Pollution Contingency Plan (also known as NCP) as codified in the Code of Federal Regulations (CFR 300, Subpart A, 300.1 through 300.915).

1.2 Report Organization

The GSIS Remedial Investigation Update Report includes the following sections:

- **Section 1: Introduction.** This section provides an introduction to the report, statement of the report purpose, site background information, a review of previous and current Superfund activities in the SFB, and it concludes with a short summary.
- **Section 2: Study Area Investigation.** This section provides an overview of characteristics of the SFB, including its physiography, land use, demography, groundwater extraction, and contaminant sources. Next, a description of RI activities, and a summary of data collected, is presented. The section concludes with a review of additional data sources and ongoing investigations by other parties.
- **Section 3: Physical Characteristics of the Study Area.** The physical characteristics of the SFB includes a discussion of the climate, water inputs and outputs (water budget), surface water flow and containment in the SFV, and an updated discussion of the Hydrogeologic Conceptual Site Model (HCSM) based on data collected (as discussed in Section 2). In general, this section is a summary of past reports and findings with the exception of the HCSM presentation, which is updated based on the information gathered during the field investigations performed between 2012 and 2014.
- **Section 4: Nature and Extent of Contamination.** This section describes the source and release mechanisms for contamination in the SFB, the nature of the contamination in the SFB, the extent of the contamination both horizontally and vertically, and the mass and volume of the high-priority chemicals of concern (COCs) in groundwater that will require remediation. This evaluation is based on the data collected during the recent investigative work, along with data from other sources. The nature of the contamination in the SFB includes a discussion of the COCs.

- **Section 5: Compound Fate and Transport.** With the establishment of the HCSM and the nature and extent of contamination, the anticipated mechanisms of transport of the COCs and the fate of the COCs over time through processes, such as abiotic or biotic reduction, are presented in this section.
- **Section 6: San Fernando Basin Flow Model.** This section summarizes the updated flow model, provides updates and assumptions used as part of this RI to evaluate current conditions and describes the capture zones predicted by the model.
- **Section 7: Risk Evaluation.** The 1992 RI included a baseline risk assessment for COCs in the SFB. Because the exposure pathways have not changed from the 1992 RI and, given that maximum contaminant levels (MCLs), secondary MCLs (SMCLs), notification levels (NLs), and preliminary health goals (PHGs) will be used to develop remedial technologies alternatives, this report does not include an updated baseline risk assessment. This section compares the current understanding of contamination in the SFB to the findings of the 1992 RI risk assessment.
- **Section 8: Summary and Conclusions.** This section includes a summary of the primary findings from this RI Update Report, focusing on the HCSM and the nature and extent of contamination where the primary updates have been made based on recently collected data. This section also includes a discussion of the data limitations, along with recommendations on future work to fill data gaps and support development and implementation of the selected remedial alternatives in the Draft FS.

1.3 Site Background

The SFV includes four groundwater basins of the Upper Los Angeles River Area (ULARA), with the SFB being the largest. The SFB provides an important source of groundwater supply for the cities of Los Angeles, Burbank, and Glendale. A timeline showing the evolution of land use in the SFV, with an emphasis on groundwater and general Superfund activities from the late 1800s to present, is provided as Figure 1-2. The events depicted on the timeline are described herein.

1.3.1 SFB Description

The GSIS study area is located in the eastern half of the SFB (Figure 1-1). The groundwater basin is nearly surrounded by impermeable sedimentary, granitic, and metamorphic bedrock underlying the surrounding San Gabriel and Santa Monica mountains. Its underlying unconfined aquifer is contained by the Santa Monica Mountains on the south, Simi Hills to the west, Santa Susana Mountains to the northwest, and San Gabriel Mountains and Verdugo Hills on the northeast with a relatively thin finger extending eastward into the Tujunga Canyon between the San Gabriel Mountains and the Verdugo Hills (see Figure 1-1).

1.3.2 Water Rights

The SFB is an adjudicated basin administered by the ULARA Watermaster on behalf of the Los Angeles Superior Court. Entitlements were established under the *Judgment of the California Superior Court in Case No. 650079, The City of Los Angeles vs. The City of San Fernando, et al.*, dated January 26, 1979 (Judgment) (California Superior Court for Los Angeles County 1979).

The decision was the result of a lawsuit filed in 1955 by the City of Los Angeles against the cities of Burbank, Glendale, and San Fernando, as well as approximately 200 other parties that pumped groundwater from the SFB. The Judgment defined the rights of all parties to pump groundwater from the four groundwater basins. The City's entitlement averages 87,000 acre-feet per year (AFY), wherein its groundwater production wells are located in the eastern portion of the SFB.

Specifically, the Judgment upheld the native water rights exclusively granted to the City of Los Angeles by the Pueblo Right. The decision provided Los Angeles with all native rights to both the surface water and groundwater. In addition, each city's right to extract a portion of delivered water assumed to percolate into the SFB was better defined. The Judgment fixed the portion of Los Angeles' imported water that could be recaptured at 20.8 percent delivered to the valley floor area and; for the cities of Burbank and Glendale, at 20.0 percent for water delivered to the valley floor, hill, and mountain areas. The cities were also allowed to accumulate credit for stored groundwater from in-lieu pumping or imported spread water. In addition, a "physical solution agreement" was made that allows the cities of Burbank and Glendale and several other private parties to extract a specified amount of water that is chargeable to the rights of others upon payment.

The Judgment is administered by the ULARA Watermaster. Groundwater extraction from the SFV must meet the policies set by the ULARA Watermaster. As part of the responsibility for maintaining a safe yield in the basin, the ULARA Watermaster accounts for all water extracted from the basins in the ULARA, whether it is consumptively used or discharged. Extracted water must be charged to a party's pumping entitlement, as stipulated in the Judgment.

The ULARA Watermaster publishes annual reports for each water year (WY) (October 1 through September 30) on the SFB and conditions within. Specifically, the annual reports address water supply, operations and hydrologic conditions, as well as water quality, treatment, and remedial investigation activities. These reports are available via the ULARA Watermaster Web site (<http://ularawatermaster.com/>) from 1969 to present.

1.3.3 History

During the late 1800s, the SFV was dominated by agriculture and farming activities (as shown on the Figure 1-2 timeline). The early 1900s gave rise to early industrialization and urbanization. By the 1940s, rapid industrialization of the SFV was under way, including aerospace and defense manufacturing, machinery degreasing, dry cleaning, metal plating, and more. In addition, rapid industrialization was combined with unregulated chemical waste disposal.

In the early 1980s, groundwater monitoring in the SFV detected concentrations of chlorinated volatile organic compounds (VOCs), including trichloroethene (TCE) and tetrachloroethene (PCE) in excess of state and federal drinking water standards. These solvents were widely used in a number of industries. In fact, many contaminants currently affecting the basin's water quality can be traced as far back as the 1940s.

Between 1981 and 1987 (Figure 1-2) more than 50 percent of the supply wells in the eastern SFB were contaminated at some level. In response to the public health threat, the cities were forced to either shut down their wells and plan for alternate sources of drinking water, or blend contaminated well water with water from clean sources. State and local agencies acted to provide alternative water supplies, as well as to investigate and clean up potential sources. USEPA provided funds to the Regional Water Quality Control Board (RWQCB) to conduct assessments of facilities in the SFV to determine the extent of VOC solvent usage and to assess past and current chemical handling, storage, and disposal practices.

1.3.4 Historical Water Quality

TCE and PCE were detected in the groundwater as early as 1979. A water quality survey of all production wells in the SFV was performed in response to California State Assembly Bill (AB) 1803 during 1979–80. As a result, a number of agencies, including USEPA, became involved in coordinating efforts to address the contamination.

In 1981, LADWP began a 2-year study to assess the severity of groundwater contamination at several of its municipal water supply well fields in the SFV. This study included field investigations, industrial site surveys, record and archive searches, literature reviews, and water quality analyses of more than 600 samples from water supply wells. Contamination was found in approximately 45 percent of the LADWP SFV water supply wells.

1.4 Current and Previous Investigations in the Eastern San Fernando Valley

This section reviews general Superfund activities in the SFB, followed by a summary of the 1992 RI for the eastern SFV, and a review of other investigations in the study area.

1.4.1 General Superfund Activities

In the early 1980s, USEPA and other agencies became involved in coordinating efforts to address the large-scale contamination in the SFB. In 1984, USEPA proposed (and subsequently placed in 1986) four sites for inclusion on the NPL as shown on Figure 1-3:

- Area 1: Burbank and North Hollywood
- Area 2: Glendale/Crystal Springs
- Area 3: Verdugo (delisted in October 2004)
- Area 4: Pollock/Los Angeles

The NPL is a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States with the intention of guiding the USEPA in determining which sites warrant further investigation.

The USEPA identified five operable units (OUs) to focus remediation efforts and to accelerate regional investigation and cleanup, with Records of Decision (RODs) signed as indicated below:

- North Hollywood OU (NHOU) (USEPA 1987; USEPA 2009a; USEPA 2014a), located in Area 1.
- Burbank OU (BOU) (USEPA 1989), located in Area 1.
- Glendale North OU (GNOU) (USEPA 1993a), located in Area 2.
- Glendale South OU (GSOU) (USEPA 1993b), located in Area 2.
- Glendale Chromium OU (GCOU), which was established in 2007 as the fifth OU to investigate chromium in groundwater within the Glendale area. USEPA has taken the lead agency role for the GCOU to investigate chromium in the Glendale area groundwater.

A ROD for the Verdugo Study area (Area 3) was signed in 2004 (USEPA 2004) that declared a No Action Remedy because low levels of contamination did not pose a significant risk to public health or the environment. Later that year, the Verdugo area was delisted from the NPL.

1.4.2 San Fernando Valley 1992 Remedial Investigation

A Cooperative Agreement between USEPA and LADWP was signed in 1987 to perform a Remedial Investigation of groundwater contamination in the eastern SFV. USEPA selected LADWP as its lead agency and provided funding for the RI under a Cooperative Agreement through CERCLA. The 1992 RI report was prepared by James M. Montgomery, Inc. (JMM 1992).

The investigation was conducted between 1987 and 1992 to characterize the nature and extent of groundwater contamination in the eastern SFB and the Verdugo Basin, with a primary objective of providing a regional characterization of groundwater contamination. Specific areas within the SFB were addressed in greater detail as operable units, as described in the next section. An overarching

purpose of the 1992 RI was for USEPA to use the results to develop a comprehensive feasibility study for long-term remediation of the SFB. Specific objectives of the 1992 RI included:

- Assemble lithological and water quality data and information regarding basin operations
- Develop a regional characterization of the geology, hydrology, hydrogeology, and the nature and vertical and areal extent of contamination
- Review factors that influence the fate and transport of compounds in the environment on a regional scale
- Identify regulatory requirements and applicable or relevant and appropriate requirements (ARARs) pertinent to groundwater remediation for the study area
- Evaluate the potential risk to human health and the environment

A preliminary conceptual model was developed to provide a fundamental understanding of the occurrence and movement of contaminants in groundwater. Data from existing production wells were used to assess the physical features of the San Fernando and Verdugo basins and to provide historical water quality information. TCE and PCE contamination data were also compiled. As part of the Updated RI Update Report, the following work was conducted:

- 43 shallow water table wells were installed and sampled during 1989–90 to help define the areal extent of shallow contamination.
- 44 depth-specific monitoring wells (grouped into a total of 15 clusters) were installed and sampled during 1990 to 1991 to help assess the vertical extent of contamination.
- Most of the 87 monitoring wells and 19 existing monitoring or production wells were also sampled at locations throughout the SFV during 1991 to augment earlier data.
- The 87 RI monitoring wells were incorporated into USEPA's subsequent quarterly sampling program to monitor changes in the groundwater basin.
- A numerical three-dimensional (3D) groundwater flow model (SFBGM) was developed to simulate groundwater flow. The SFBGM is a comprehensive 3D computer model that consists of 64 rows, 86 columns, and up to four layers to reflect the varying geologic and hydrogeologic characteristics of the SFB in three dimensions. In the deepest portion of the SFB, the model is subdivided into four layers, with each layer characterizing a specific depth zone. The model has a variable horizontal grid that ranges from 1,000 by 1,000 feet in size in the southeastern portion of the SFB, to 3,000 by 3,000 feet in size in the northwestern portion where less data are available.
- A baseline risk assessment was performed to establish COCs in SFB groundwater that would require remedial action.

The 1992 RI served to delineate the nature and extent of widespread contamination in the SFB, both vertically and horizontally. The majority of contamination in groundwater was found in the shallow groundwater, with the most prevalent compounds detected being TCE and PCE. Contaminant migration in groundwater was found to be governed primarily by advection-dispersion with groundwater flow. The study also found that contaminants may be retarded by chemical or physical interactions (e.g., sorption/desorption) with the soil matrix; however, neither chemical nor biological transformation processes were expected to significantly influence the fate and transport of compounds on a regional scale within this basin. In effect, the 1992 RI provided a basis for a feasibility study to address possible strategies for remediation of contaminated groundwater on a basin-wide scale. It also identified the need for further investigation on a more localized scale.

In the Verdugo Basin, groundwater contamination was determined to be minor; therefore, the vertical extent of contamination was not investigated. Subsequently, USEPA delisted this site from the NPL on October 12, 2004.

Subsequent to the 1992 RI, USEPA assumed operations of the Groundwater Monitoring Program (GMP) for the SFV Superfund sites, consisting of the 84 RI groundwater monitoring wells.

1.4.3 Summary of Other Investigations

In addition to USEPA, RWQCB, the California Department of Toxic Substances Control (DTSC), other parties have overseen and conducted extensive investigative work in the SFV Superfund site areas. This includes work on the interim remedies for VOC-contaminated groundwater and considerable site-specific investigation and remediation at individual facilities.

Numerous facilities have conducted and continue to conduct monitoring well installation, soil and groundwater sampling, and other investigative activities in the SFB at and/or near former facility sites. Some former facilities are implementing source removal and site-specific cleanups and/or are involved with implementation of the remedies in the various OUs and other parts of the SFB.

This section discusses work and investigation in the five OUs as well other investigations in both the Pollock and TJ areas. The information is presented in the following order:

- NHOU
- BOU
- GNOU and GSOU
- GCOU
- Pollock Area
- Tujunga Area

1.4.3.1 North Hollywood Operable Unit

A ROD for the NHOU was signed in September 1987 (USEPA 1987). The NHOU Interim Remedy began operating in December 1989, consisting of groundwater pump-and-treat using aeration and granular activated carbon (GAC) filtering units to remove VOCs, disinfection with chlorine, and discharge of the treated water to the LADWP North Hollywood Station Complex pumping station. Water is blended with other sources (from the Los Angeles Aqueduct [LAA] Filtration Plant, water purchased from the Metropolitan Water District [MWD], and other groundwater sources) prior to distribution into the public water supply. The 2,000-gallon per minute (gpm) treatment plant operates to remove VOCs to below State of California MCLs.

However, changing groundwater conditions in the aquifer and the discovery of VOC contamination in new areas of the aquifer beneath North Hollywood limited the ability of the Interim Remedy to fully contain the VOC plume in NHOU. In addition, contaminants of emerging concern, including hexavalent chromium (Cr(VI)) and 1,4-dioxane, were detected in excess of their regulatory limits. The NHOU treatment system was incapable of removing these contaminants, and a sharp increase in chromium concentrations in two wells caused them to be shut down, removed from the system, and the water redirected. These wells served an important plume containment function for the high levels of contamination, and the shutdowns demonstrated the need for a change in the remedy.

In response to the shutdowns, as well as continued migration of VOC-contaminated groundwater, USEPA conducted an FFS to evaluate alternatives for changing the groundwater remedy (USEPA 2009b). The FFS developed and evaluated a range of alternatives for addressing the contaminants in groundwater. The Second Interim ROD for the NHOU was signed in September 2009, and the

selected remedy (USEPA 2009a) was to install wellhead treatment for Cr(VI) and 1,4-dioxane, expand the combined treatment system, install additional monitoring wells, install and operate three additional groundwater extraction wells, and continue to provide the treated water to LADWP. More recently, USEPA amended the remedy (USEPA 2014a). The Amended Remedy leaves the groundwater and treatment system selected in the 2009 ROD unchanged, but adds a second end-use option (re-injection), which will allow for remedy implementation with an end use that either delivers the treated water to LADWP for use in its domestic supply (per the 2009 ROD) or re-injects it back into the aquifer.

An Agreement and Order on Consent (AOC) for Remedial Design (RD), dated February 21, 2011, was executed between the United States, Honeywell International, Inc. (Honeywell), and Lockheed Martin Corporation to conduct predesign data acquisition and remedial design activities associated with the 2009 ROD for the NHOU (USEPA 2011). AMEC Environment & Infrastructure (AMEC) has been contracted by Honeywell and Lockheed Martin Corporation to design the Second Interim Remedy for groundwater remediation at the NHOU in compliance with the USEPA ROD dated September 30, 2009. A suite of AMEC reports have been completed regarding their work (including AMEC 2012a; 2012b; 2014). This work is currently under way.

Additional investigation in the NHOU area includes work at the following sites:

- Former Bendix (Allied Signal), where approximately 31 monitoring wells were installed in 2011 to supplement the NHOU FFS investigation
- LA By Products has installed monitoring wells near the former Strathern, Penrose, Sheldon, and Tuxford landfills
- California Car Hikers (former Tuxford landfill) performs groundwater monitoring from its monitoring wells
- Vulcan Materials (former Hewitt landfill) performs groundwater monitoring from its monitoring wells
- Los Angeles Unified School District performs groundwater monitoring of wells located at the Sun Valley school and bus yard

1.4.3.2 Burbank Operable Unit

The ROD for the BOU was signed in June 1989, with Explanations of Significant Difference signed in November 1990 and February 1997. The selected interim remedy (USEPA 1989) addresses VOC-contaminated groundwater in the Burbank area and has been operational since 1996. Groundwater is extracted from wells in the most highly contaminated zones and treated through an air-stripping process and liquid-phase GAC to remove organic solvents. The treated water is blended to lower nitrate levels, and water is delivered to the City of Burbank for municipal supply. Phase I of the remedy, which extracts and treats 6,000 gpm of groundwater, began operations in January 1996. Phase II constructed additional infrastructure to increase groundwater extraction to 9,000 gpm, and began operating in early 1998.

Lockheed Martin Corporation monitors groundwater within the BOU to comply with provisions of the USEPA Consent Decree (Docket No. 91-4527-MRP [Tx]) filed on March 25, 1992, and RWQCB Cleanup and Abatement Order No. 87-161, dated December 17, 1987. Groundwater monitoring was first initiated at the BOU in 1986. Since the late 1990s, groundwater monitoring has been implemented in accordance with the 1997 *Draft Phase 2 Operational Sampling Plan* (HSI Geotrans 1997) and with modifications requested by the regulatory community. The Groundwater Monitoring Plan has evolved to incorporate additional requests by USEPA and RWQCB.

Additional groundwater data and investigation for the BOU includes sampling of monitoring wells installed at former facilities near the Burbank Airport and City of Burbank former production wells. RWQCB investigations at former facilities include:

- Weber Aircraft
- Stainless Steel Products
- Crain Co. (Hydro-Aire)
- Dynamic Plating
- City of Burbank

1.4.3.3 Glendale North and South Operable Units

The 1993 RODs for the GNOU and GSOU selected an interim containment remedy to address VOC-contaminated groundwater in the Glendale area (USEPA 1993a; 1993b), with partial operation beginning in November 2000 and full operation capacity achieved in June 2002. The selected remedy includes groundwater pump-and-treat, with a plant capable of treating 5,000 gpm of contaminated water from eight extraction wells, four in each OU. The treatment plant is operated by the Glendale Respondents Group (GRG) and its contractor, in cooperation with the City of Glendale. Water is purveyed to the City of Glendale for distribution in its municipal water system.

Numerous former and current facilities are conducting groundwater monitoring as follows:

- Menasco/Coltec
- ITT Aerospace Controls
- Greyson Power Plant
- All Metals
- PRC Desoto
- Drilube Wilson and Drilube Broadway
- EEMCO division of Datron
- A.G. Layne
- Excello facility
- Franciscan Ceramics

1.4.3.4 Glendale Chromium Operable Unit

Between the early 1990s, and 2008, numerous investigations were conducted to characterize groundwater conditions within what is now the GCOU. Beginning in 1992, groundwater samples for dissolved chromium analysis were collected annually from the RI monitoring wells. Since that time, USEPA has also conducted several sampling events to collect groundwater samples from selected RI and facility monitoring wells for analysis of dissolved chromium and Cr(VI).

In November 2002, RWQCB issued the *Final Chromium VI Investigation: San Fernando Valley Phase 1 Inspection* (RWQCB 2002). The purpose of this investigation was to identify suspected sources of Cr(VI). A total of 4,040 potentially responsible parties (PRPs) were investigated for their chemical use, and of that 255 suspected Cr(VI) sites were identified in and around the Superfund OUs in the eastern SFV.

Further assessment between 2002 and 2005 identified areas for additional chromium investigation in the 2005 *Final Burbank and Glendale Operable Units Focused Chromium Trend Study* (CH2M Hill 2005) and in the 2007 *Priority Ranking of Potential Well Sites for Chromium Monitoring Technical Memorandum* (CH2M Hill 2007). The nature and extent of chromium contamination in the SFV has been evaluated and mapped through the above studies and regular SFV groundwater monitoring.

With the emergence of chromium contamination, the USEPA established the GCOU in 2007 to characterize emerging chromium contamination and determine remedial action. USEPA prepared and distributed a figure entitled *Facilities Identified as Active Chromium Sites* (USEPA 2007) that presented active groundwater investigation sites.

In 2011, USEPA initiated an RI of chromium contamination in the GCOU, with assistance from a group of four PRPs. The GCOU RI is intended to fill remaining data gaps and further delineate the nature and extent of chromium, particularly Cr(VI), in groundwater throughout the GCOU. Twenty-nine new groundwater monitoring wells have been installed to help evaluate the location and extent of chromium contamination. A site characterization technical memorandum summarizing the RI field activities performed for the GCOU RI through November 2013 and presenting the initial update to the conceptual site model was submitted to USEPA in February 2014. Finalization of the initial evaluations presented in the site characterization, additional RI activities, and an evaluation of the RI data set to assess the potential risks to human health and the environment will be presented in more detail with the GCOU RI Report. This RI Report is being finalized by OTIE for an early 2015 submittal to USEPA. Following the GCOU RI, a Feasibility Study will evaluate cleanup options to address chromium contamination.

1.4.3.5 Pollock Area

The Pollock area (located in Area 4) is an area of contaminated groundwater covering approximately 5,860 acres near the Pollock well field in the city of Los Angeles. USEPA completed an interim investigation of the Pollock well field in April 1994, concluding that selecting and implementing a Superfund remedy was not necessary because LADWP planned to conduct a wellhead treatment project. Subsequently, LADWP developed and funded its own project to build a treatment plant, and in 1998, LADWP reactivated wells to extract and treat the groundwater in the Pollock area. Investigations are still continuing to determine the full nature and extent of contamination in this area.

In effect, the use of an interim alternate drinking water supply and LADWP's operation of the Pollock wellhead treatment project have reduced the potential of exposure to contaminated drinking water and will continue to protect residents near this site while further cleanup activities are being planned.

Although few former industrial facilities are located in the Pollock area, the following facilities perform groundwater monitoring in the area:

- Aerol has a large PCE plume that it monitors.
- Newlowe Properties has localized chromium contamination that is monitored, and contamination is being remediated on site. A Human Health Risk Assessment and Request for Site Closure was completed for the Newlowe site in 2011.
- Taylor Yard is a light industrial area with low-level VOC contamination that performs groundwater monitoring. CDM Smith has completed an FS for the active rail yard area and other parcels.
- Western Magnetics conducts monitoring of its monitoring wells.
- Forest Lawn Memorial Park also performs groundwater monitoring.

1.4.3.6 Tujunga Area

Following the 1992 RI, RWQCB continued investigations into many of the potential source facilities in the TJ area. Many of these facilities were located in areas adjacent to one (or more) of the Superfund study areas in the SFV. As of November 2002, RWQCB had investigated 255 suspected chromium and Cr(VI) sites in the eastern portion of the SFV.

In early 2009, USEPA implemented Stage I of the Discovery Project in the TJ area, which included soil vapor and limited soil sampling along several transects in the study area and near potential source facilities. Stage II, completed in 2010, focused on the Branford Spreading Basin, located immediately upgradient from the TJ well field. The Branford Spreading Basin is situated at the terminus for drainage of a large area of past and present industrial activities, including auto dismantling, engine rebuilding, and electroplating.

Several distinct industrial areas are present in the TJ area. In the northern portion of the study area, two industrial areas were identified during Stage I of the Discovery Project (Figure 1-4):

- The Desmond/Ilex area (north of State Route 118)
- The Sutter Avenue Area (which includes the former Price-Pfister, now a Home Depot and retail shops)

In the southern portion of the study area, three industrial areas were identified during Stage I of the Discovery Project:

- The Branford/Montague area (between Hansen Spreading Grounds and Whiteman Airport)
- The Branford Industrial area (between the former Branford Landfill and Interstate 5)
- The Woodman Avenue area (near the intersection of Woodman Avenue and Osborne Street)

Additional groundwater monitoring is conducted at the following former facilities in the TJ area:

- Price Pfister/Chase Chemical
- D&M Steel
- Bradley Landfill (Waste Management)

1.4.4 Summary

Despite regional cleanup efforts, full containment of VOC contamination has not been achieved and the groundwater in the eastern SFB remains contaminated. Contaminant plumes have escaped containment, continued to expand, and spread further into the SFB, adversely impacting LADWP wells and further degrading this local groundwater resources. Groundwater production wells located upgradient from or outside of the original contaminant plumes defined in the 1992 RI have been impacted, suggesting the presence of additional, previously-unidentified sources of contamination. The migration of VOC contamination is further complicated by the detection of new contaminants of emerging concern, such as 1,4-dioxane, Cr(VI), n-Nitrosodimethylamine (NDMA), and perchlorate. The impacts from contaminant migration and the identification of contaminants of emerging concern are significant for LADWP. Examples include:

- Contaminant migration (TCE and perchlorate) from sources in the Pacoima area has resulted in impaired water quality and loss of sustained production from a number of TJ and RT wells.
- Migration of TCE, PCE, and Cr(VI) has occurred in the North Hollywood area because of loss of containment from reduced operation of the NHOU, impacting North Hollywood West (NHW) wells. The northwestern-most North Hollywood East wells cannot be operated because of excessive levels of chromium that have migrated from a source site in the area.

- In the TJ well field, located at the northwestern end of the SFB both outside and upgradient of the original 1992 contaminant plumes, nearly all wells have been impacted by VOCs in excess of drinking water standards. In 2009, LADWP installed and tested a pilot wellhead treatment facility at the TJ well field. The pilot facility treats about 8,000 gpm of groundwater for potable use.
- Since the 1990s, LADWP SFB wells have also shown a trend of increasing nitrate levels as a result of decades of agricultural activity.

The principal challenge is contamination by VOCs, chromium (including Cr(VI)), 1,4-dioxane, 1,2,3-trichloropropane (TCP), NDMA, perchlorate, and other pollutants. Because USEPA's remedies are limited in scope, only a fraction of the overall groundwater in the SFB has been remediated. As a result, it is critical for LADWP to take independent action and proceed with additional characterization to address the contamination affecting its wells. The justification and need for additional study is unprecedented; therefore, LADWP formulated the RI Update to not only characterize the expanded nature and extent of the known COCs, but also to identify other COCs, including contaminants of emerging concern. A discussion of COCs is included in Section 4 of this RI Update Report.

