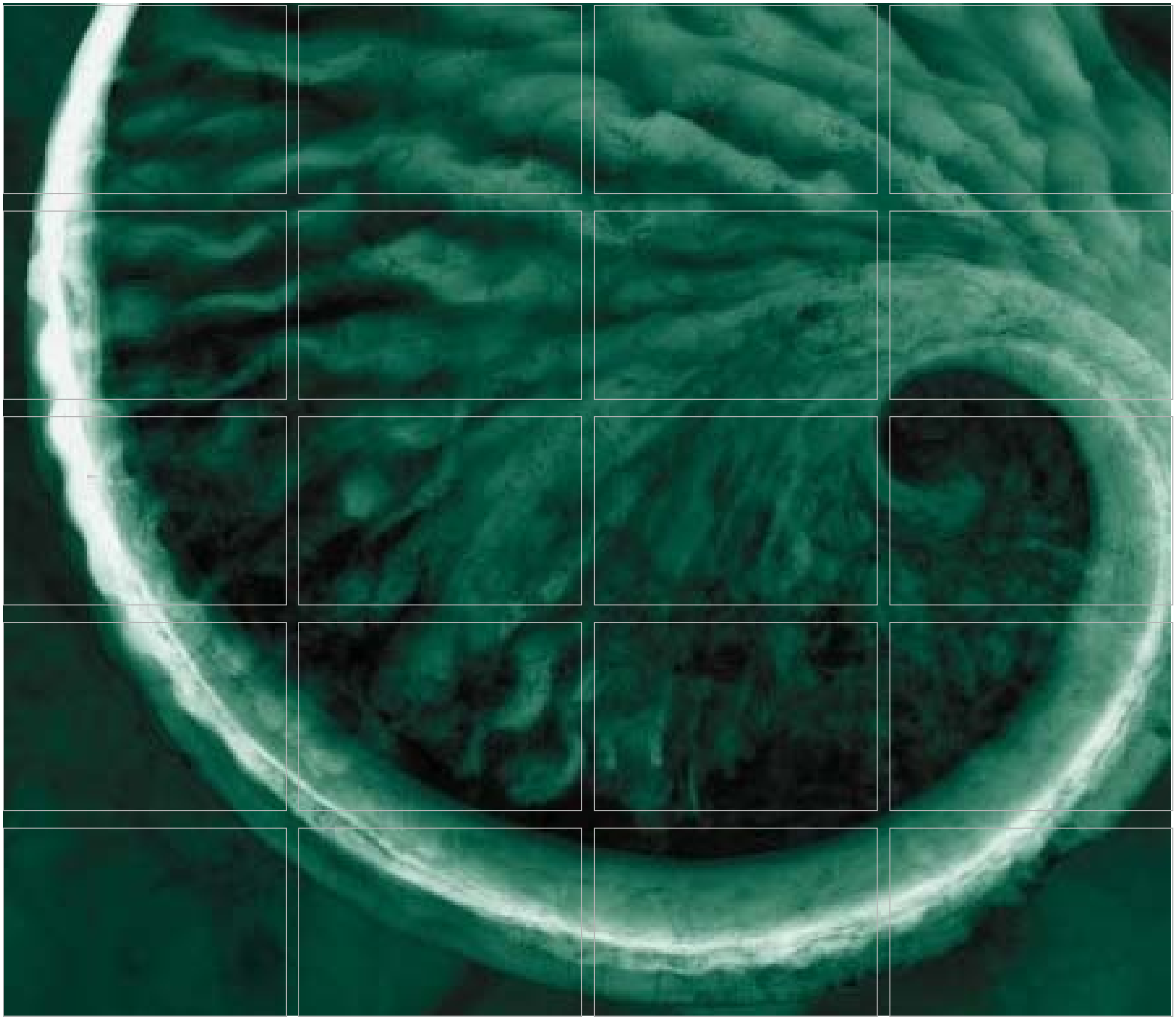


Prepared for:
Glendale Chromium
Operable Unit
Respondents Group

Specified Work Plan

Glendale Chromium Operable Unit
San Fernando Valley Superfund Site – Area 2

November 2011

www.erm.com

ERM

Delivering sustainable solutions in a more competitive world

Glendale Chromium Operable Unit Respondents Group

Specified Work Plan

Glendale Chromium Operable Unit
San Fernando Valley Superfund Site – Area 2

November 2011

Project No. 0130384

Bryan Stone, P.E.
Program Manager

Truong T. Mai, P.E.
Principal-in-Charge

Environmental Resources Management
2875 Michelle Drive, Suite 200
Irvine, California 92606
T: 949-623-4700
F: 949-623-4711

www.erm.com

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

µg/L	Micrograms per liter
ASTM	American Society for Testing and Materials
bgs	Below ground surface
BOU	Burbank Operable Unit
BWC	Burbank Western Channel
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIP	Community Involvement Plan
COC	Compounds of concern
CoC	Chain-of-custody
CSM	Conceptual site model
DCER	Data Compilation and Evaluation Report
DO	Dissolved oxygen
DQO	Data quality objectives
DTSC	Department of Toxic Substances Control
ERM	ERM-West, Inc.
FSP	Field Sampling Plan
GCOU	Glendale Chromium Operable Unit
GNOU	Glendale North Operable Unit
GSOU	Glendale South Operable Unit
GWTP	Glendale Treatment Plant
HASP	Health and Safety Plan
HSA	Hollow stem auger
ICP	Inductively Coupled Plasma
IDW	Investigation-derived waste
JMM	James M. Montgomery Consulting Engineers, Inc.
LADWP	Los Angeles Department of Water and Power
MCL	Maximum Contaminant Level
NHOU	North Hollywood Operable Unit
ORP	Oxidation reduction potential
OSHA	Occupational Safety and Health Administration
PCE	Tetrachloroethene
PWA	Proposed well area
PWO	Potential wells of opportunity
QA/QC	Quality assurance/quality control
QAPP	Quality Assurance Project Plan
Respondents	Glendale Chromium Operable Unit Respondents Group

RI	Remedial Investigation
RWQCB	Los Angeles Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SFV	San Fernando Valley
SOW	Statement of Work
SWP	Specified Work Plan
SWRCB	California State Water Resources Control Board
TCE	Trichloroethene
ULARA	Upper Los Angeles River Area
USA	Underground Services Alert
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound
WBA	Weak-based anion

1.0 INTRODUCTION

On behalf of the Glendale Chromium Operable Unit Respondents Group (Respondents), ERM-West, Inc. (ERM) has prepared this Specified Work Plan (SWP) describing detailed SWP field activities to be performed at the Glendale Chromium Operable Unit (GCOU), which is within Area 2 of the San Fernando Valley (SFV) Superfund Site, in California (Figure 1). The SWP field activities are being conducted to evaluate the nature and extent of chromium in the GCOU; to assess chromium fate and transport; and to update the preliminary Conceptual Site Model (CSM). This SWP is submitted in accordance with the GCOU Specified Work Statement of Work (SOW) attached to the Administrative Settlement Agreement and Order on Consent (AOC) for Remedial Investigation dated 5 March 2011 (Appendix A).

The SOW will be performed in accordance with the AOC for Remedial Investigation signed by the Respondents and U.S. Environmental Protection Agency (USEPA) Region IX with an effective date of 7 March 2011, under Docket No. 2011-09 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This SWP was developed based on guidelines set forth in *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (USEPA, 1988).

For the purposes of this report, chromium shall be inclusive of trivalent chromium and hexavalent chromium unless specified otherwise.

1.1 OBJECTIVES

The GCOU was established in 2007 to investigate chromium within Area 2 of the SFV Superfund Site after a 4-year chromium study, conducted by the Los Angeles Regional Water Quality Control Board (RWQCB) and the USEPA. The study revealed a number of potential chromium sources and groundwater wells with total chromium concentrations above the California Maximum Contaminant Level (MCL) of 50 micrograms per liter (μg/L) for total dissolved chromium. Both total and hexavalent chromium were found at levels above 50 μg/L in the eastern SFV. The goal of the GCOU is to select an appropriate regional remedy for chromium in groundwater in Area 2.

The objectives of the GCOU SOW are as follows:

- Identify and evaluate existing chromium data for the preparation of a preliminary CSM as part of the Data Compilation and Evaluation Report (DCER, ERM, 2011A).
- Perform SWP field activities to collect additional chromium data and utilize findings to update the preliminary CSM to:
  - Identify and evaluate potential additional sources of chromium;
  - Describe the nature and extent of chromium in groundwater;
  - Evaluate chromium fate and transport; and
  - Evaluate background geochemical conditions.
- Assess the mobility and persistence of chromium to support future evaluation of remedial actions.

1.2 SCOPE OF WORK

In order to achieve the objectives presented above, USEPA developed a GCOU SOW that describes the scope of work expected to support the characterization of chromium in groundwater at specified locations in Area 2. The SOW tasks are:

- Task 1 – Planning: This task includes the evaluation of existing chromium data, preparation of the DCER and a preliminary CSM. Project planning and the preparation of several deliverables are also a part of the planning task. The supporting deliverables will include:
  - This SWP, to provide the procedures for investigating data gaps at specified locations through soil borings, installation of additional monitoring wells, and/or sampling of existing wells;
  - A Sampling and Analysis Plan (SAP) which will consist of a Quality Assurance Project Plan (QAPP) and a Field Sampling Plan (FSP); and
  - A Health and Safety Plan (HASP).
- Task 2 – Community Involvement: This task may consist of developing and implementing community involvement activities, such as preparing and distributing fact sheets prior to the initiation of drilling activities.

- Task 3 – Specified Work: This task provides for the implementation of characterization/investigation activities, designed to further evaluate the nature and distribution of chromium in the GCOU, including fate and transport mechanisms influencing chromium migration in the GCOU. This task also includes data management, updating the CSM, and preparation of a Specified Work Report.

These tasks are the main focus of this SWP and are described in detail in Section 6.0.

1.3 DOCUMENT ORGANIZATION

This SWP is organized as follows:

- Section 2.0 summarizes site background information including history, setting, geology, and hydrogeology;
- Section 3.0 summarizes the current site conditions including the distribution of chromium and the identified data gaps;
- Section 4.0 describes the site management strategy, documents supporting the SWP, Planning, and Community Involvement activities;
- Section 5.0 provides a detailed description of the Site Characterization Process;
- Section 6.0 provides a detailed description of the rationale and implementation of field tasks and scope of work;
- Section 7.0 provides a list of deliverables and a schedule;
- Section 8.0 lists references cited in the text;
- Figures and Tables follow the text; and
- Appendices of supporting information follow the tables.

2.0 SITE BACKGROUND AND PHYSIOGRAPHIC SETTING

This section provides a site description and physical setting, summarizes the geology and hydrogeology, and provides a history of site activities and response actions.

2.1 SITE HISTORY

This section provides a description of the SFV Superfund Site and a brief history of the Glendale North Operable Unit (GNOU) and Glendale South Operable Unit (GSOU) and the introduction of the GCOU.

In 1979, in response to detecting organic compounds in groundwater in the San Gabriel Valley, the State of California Department of Health Services, now known as the California Department of Public Health (CDPH), requested that all major water purveyors sample and analyze groundwater as part of a statewide groundwater quality surveillance program. Trichloroethene (TCE) and tetrachloroethene (PCE) were consistently detected in a number of production wells in the SFV at concentrations exceeding the MCLs (James M. Montgomery Consulting Engineers, Inc. [JMM], 1992). Chlorinated solvents, including TCE and PCE, were widely used in a variety of industries and applications including metal plating, dry cleaning, and degreasing machinery.

In 1980, the Los Angeles Department of Water and Power (LADWP) conducted a 2-year study to evaluate the extent of compounds of concern (COCs) in the SFV. The results of the study, published in 1983, revealed widespread presence of volatile organic compounds (VOCs) in groundwater. Due to these findings, a number of municipal supply wells for the cities of Los Angeles, Burbank, and Glendale were taken out of service (LADWP, 1983).

In 1986, USEPA designated the following four Areas within the SFV:

- Area 1 – North Hollywood, which includes the North Hollywood Operable Unit (NHOU) and the Burbank Operable Unit (BOU);
- Area 2 – Crystal Springs, which includes the GNOU and the GSOU;
- Area 3 – Verdugo, located in the eastern end of the valley between the Verdugo and San Gabriel Mountains; and
- Area 4 – Pollock, the area located southeast of the GCOU.

From 1987 to 1992, JMM conducted a Remedial Investigation (RI) of the SFV under the direction of the LADWP and USEPA. The investigation included installing 43 monitoring wells in the GNOU and GSOU (Figure 2). The results of the RI were presented in the *Remedial Investigation of Groundwater Contamination in the San Fernando Valley* (JMM, 1992). The RI Report included a summary of the geology and hydrogeology, an evaluation of the nature and extent of COCs, a baseline risk assessment, and groundwater modeling.

From the late 1980s to late 1990s, USEPA provided funds to the California State Water Resources Control Board (SWRCB) to assess facilities in the SFV to determine the extent of solvent use and assess past and current chemical handling, storage, and disposal practices. These investigations were conducted under the SWRCB Well Investigation Program and resulted in investigation and some remediation activities at facilities within the SFV. Facility-specific investigation and remediation activities continue currently under the lead and oversight of the RWQCB and the California Department of Toxic Substances Control (DTSC).

In 1999, USEPA provided funds to the RWQCB to investigate potential chromium sources in the SFV. In 2002, the RWQCB released the findings from its investigation of 4,040 potential source sites, recommending further assessment of 106 sites (RWQCB, 2002).

The GCOU was established in 2007 as the fifth Operable Unit (OU), to investigate chromium in groundwater within the Glendale area of the SFV Superfund Site. Other potential sources of chromium in groundwater in the SFV continue to be evaluated by the RWQCB, DTSC, and USEPA. USEPA has taken the lead agency role for the GCOU to investigate chromium in the Glendale area groundwater.

2.1.1 *Previous Site Investigations*

Between the initial RI prepared for the GSOU and GNOU in the early 1990s, and 2008, numerous investigations have been conducted to characterize groundwater conditions within what is now the GCOU. Based upon the conclusions of the RI, earlier investigations focused on the occurrence of TCE and other VOCs as comprising the primary human health risk.

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 targeted RI monitoring wells and targeted facility monitoring wells for analysis of dissolved chromium and hexavalent chromium.

Data collected during investigation and remediation activities identified several areas of dissolved chromium within the Golden State Freeway (Interstate 5) corridor between the Burbank Airport and Los Feliz Boulevard.

In November 2002, the 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 hexavalent chromium. After review of 4,040 potential responsible parties investigated for their chemical use, 255 suspected hexavalent chromium sites were identified in and around the Superfund OUs in the eastern SFV. To date, RWQCB has issued a cleanup and abatement order for heavy metals, including chromium, at six facilities within the BOU and GCOU.

Of the 255 sites identified in the RWQCB report in 2002, further assessment was required for 106, to determine whether they were potential sources of chromium in soil and groundwater. The remaining 149 sites were recommended for No Further Requirements status by the RWQCB (RWQCB, 2002). As of March 2005, of the 106 sites designated for further assessment, 39 have been recommended for No Further Requirements status by the RWQCB. Of the remaining 67 sites designated for further assessment (not including the cleanup and abatement order sites), 19 sites are within the BOU; 32 sites are located within the GCOU; 13 sites are located upgradient to the GCOU but have yet to be investigated in detail; and 3 sites are downgradient of the GCOU (CH2M HILL, 2005).

RWQCB and USEPA investigations identified total dissolved chromium above the State MCL of 50 μg/L in groundwater in the eastern SFV and potential chromium sources. These findings led to the establishment of the GCOU in 2007.

2.1.1.1 *Interim Remedies*

Records of decision for the GNOU and GSOU were issued in 1993 and documented the selection of interim remedies to address groundwater contamination in both OUs. The selected interim remedy consists of groundwater extraction, treatment of VOCs by air stripping and liquid-phase granular activated carbon, blending at the Grandview Reservoir, and conveyance to the City of Glendale as a drinking water supply source.

The remedy construction occurred from 1997 to 2000 and consisted of installing eight extraction wells; installing conveyance piping from the extraction wells to the groundwater treatment facility; designing and constructing the groundwater treatment facility; and installing treated water conveyance piping from the groundwater treatment facility to the City of Glendale Grandview Reservoir. The interim remedy began operation in August 2000 and achieved its full operational capacity of 5,000 gallons per minute in June 2002 (CDPH, 2000). The interim remedy treatment plant is owned and operated by the City of Glendale and the treated water is incorporated into its water supply system. A concise discussion of the GOU interim remedy through 2008 is provided in *Five-Year Review Report, First Five-Year Review Report for San Fernando Valley – Area 2 Superfund Site*, Los Angeles County, California (USEPA, 2008a) and is summarized below.

Since 2000, the interim remedy has successfully removed chemical mass and treated VOCs at the Glendale Water Treatment Plant (GWTP) to below drinking water standards. The GWTP, however, has experienced ongoing difficulties in managing hexavalent chromium to meet treatment and discharge limits. Although the levels of total chromium in the GWTP influent are below both the federal MCL (100 μg/L total chromium) and the state MCL (50 μg/L total chromium), the City of Glendale has adopted a limit on the levels of hexavalent chromium that will be acceptable. The City of Glendale adopted a limit of 5 μg/L, which it has been able to achieve by blending treated water from the GWTP with other water sources. To meet the blended hexavalent chromium limit of 5 μg/L, the GWTP targeted a treated-water goal of 10 μg/L until April 2007.

In April 2007, the RWQCB changed the effluent standards for treated water discharges to the Los Angles River. In order to maintain the GWTP effluent below the new RWQCB effluent standard of 8 μg/L for hexavalent chromium, the City of Glendale needed to modify and manage pumping to lower the raw water influent hexavalent chromium concentrations. This was achieved by alternating pumping from GS-3 and GN-3, the two extraction wells with the highest hexavalent chromium concentrations. USEPA approved the alternate pumping arrangement with the condition that treatment alternatives to meet the new RWQCB 8 μg/L discharge limit be developed so the GWTP can be operated at design pumping rates.

In response to the need to manage hexavalent chromium, the City of Glendale developed a program to evaluate hexavalent chromium treatment alternatives and technologies. After identifying and screening numerous alternatives, weak-based anion exchange and reduction, coagulation, and filtration were selected as alternatives for pilot and demonstration scale testing. Weak-based anion was installed to treat groundwater pumped from GS-3, the extraction well with the highest hexavalent chromium concentrations of concern, and began operation in March 2010. A reduction, coagulation, and filtration system was also installed to treat 100 gallons per minute slipstream from the GOU north extraction well GN-3 and began operation in April 2010.

The treatment plant has experienced planned and unplanned downtime and a well screen failure in GN-3. Well GN-3 was out-of-service for approximately 1.5 years, and pumping from other wells was increased to compensate for the loss of flow. As a result, the City of Glendale prepared an extraction well evaluation plan to evaluate and maintain the other wells to avoid similar unplanned outages (CDM, 2009).

2.2 REGIONAL PHYSICAL SETTING

The SFV Superfund Sites are located in the San Fernando Basin. The San Fernando Basin is within the Upper Los Angeles River Area (ULARA) and consists of the upper watershed of the Los Angeles River and its various tributaries (ULARA Watermaster, 2010). The San Fernando Basin covers approximately 175 square miles. The basin is approximately 23 miles long in an east-west direction and approximately 12 miles wide in a north-south direction. The San Fernando Basin is an adjudicated basin managed by the ULARA Watermaster. The valley is bounded on the north and northwest by the Santa Susana Mountains, on the northeast by the San Gabriel Mountains, on the west by the Simi Hills, and on the south by the Santa Monica Mountains.

The GCOU is located south and downgradient of the NHOU and BOU in the southeastern portion of the SFV and north of the Pollock Area. The GCOU is about 6 miles long from east to west and about 3 miles wide from north to south, with an area of approximately 15 square miles (Figure 1). The elevation of the valley floor in the GCOU ranges from about 500 feet above mean sea level in the north portion of the GCOU to approximately 400 feet above mean sea level in the southern portion of the GCOU near the Los Angeles River Narrows. The GCOU is intersected by the Los Angeles River, Interstate 5, and the Ventura Freeway (State Route 134).

2.3 *GEOLOGY AND HYDROGEOLOGY*

The uplands surrounding the SFV are comprised of crystalline and sedimentary rocks. Groundwater in the eastern SFV occurs primarily in alluvial valley-fill deposits of Quaternary age, eroded from the adjacent San Gabriel and Verdugo Mountains. The valley fill is bounded to the east and at depth by low-permeability granitic and metamorphic bedrock and has been subdivided into four distinct lithologic/aquifer zones (JMM, 1992):

- Upper Regional Zone – The Upper Regional Zone consists of layers and lenses of silt, sand, and gravel from the land surface to a depth of approximately 250 feet below ground surface (bgs). Localized perched water zones are reported to exist within the Upper Regional Zone.
- Middle Regional Zone – The Middle Regional Zone is approximately 50 feet thick (from approximately 250 to 300 feet bgs) and contains increased proportions of fine-grained sand and silt relative to other zones. This Zone appears to grade into coarser-grained deposits in the GSOU, making the Upper and Middle Regional Zones difficult to distinguish.
- Lower Regional Zone – The Lower Regional Zone consists of interbedded sand, silt, and gravel, with cobbles in the upper portion. The thickness of this zone is estimated to be 200 to 250 feet (from approximately 300 to 550 feet bgs). Most of the groundwater pumped from the eastern SFV is pumped from this highly productive zone.
- Deep Regional Zone – The Deep Regional Zone lies below approximately 550 feet bgs and consists mainly of fine-grained, relatively low-permeability sediments, including silt and clay. Few wells have intersected this zone and therefore, its thickness is not well defined.

Depths to groundwater measured in monitoring wells in 2010 within the GCOU range from approximately 35 to 145 feet bgs. As indicated above, some localized areas of perched groundwater exist above the Upper Regional Zone. Excluding perched groundwater, groundwater is typically first encountered in the Upper Regional Zone. The Middle, Lower, and Deep Regional Zones are believed to be fully saturated through most of the GCOU.

Since 1995, groundwater elevations have gradually declined throughout the basin. Water levels in the basin declined in recent years due to lower precipitation and increases in groundwater pumping (ULARA, 2007).

For the purposes of differentiating groundwater elevations and chromium distribution with respect to depth, USEPA has designated wells screened within the upper 50 feet of the water table in the Upper Regional Zone as monitoring "shallow zone" groundwater and wells screened greater than 50 feet below the water table in the Upper Regional Zone as monitoring "deep zone" groundwater (CH2M HILL, 2007). These hydrologic designations should not be confused with the lithologic designations of the Upper, Middle, Lower, and Deep Regional Zones.

Horizontal hydraulic gradients, and therefore the direction of groundwater flow in the GCOU, are generally southeast toward the Los Angeles River Narrows, where nearly all groundwater and surface water outflow from the SFV occurs. Localized deviations to this pattern occur in the vicinity of low permeability zones, pumping wells and extraction wells at several locations in the GCOU. Groundwater flow velocities are estimated to be generally highest in the southeast part of the SFV in the GSOU and Los Angeles River Narrows area.

Vertical hydraulic gradients in the GCOU are much smaller than horizontal gradients. Recent potentiometric data at cluster well locations generally show little variation with depth, indicating vertical gradients are small. Increased vertical gradients can be induced in the vicinity of well fields by groundwater extraction (JMM, 1992). The relatively fine-grained, low-permeability nature of the Middle Zone however, impedes movement of groundwater between the Upper and Lower Zones in portions of the eastern SFV. Deposits that comprise the Middle Zone become coarser in the GSOU and in the Los Angeles River Narrows, making the Middle Zone less distinct hydraulically from the Upper and Lower Zones.

3.0 SUMMARY OF CURRENT CONDITIONS

Information and data pertaining to the GCOU were reviewed to assess historical and current conditions and incorporate the detailed data evaluation from the DCER, including identification of data gaps.

3.1 DISTRIBUTION OF CHROMIUM

The distribution of chromium was assessed in the DCER using the SFV groundwater database. Figures were prepared to illustrate the distribution of average total chromium and hexavalent chromium concentrations from 2004 through 2008. The distribution of average concentrations for total and hexavalent chromium over the 2004 through 2008 period is depicted in Figures 3 and 4, respectively.

The highest concentrations of chromium in groundwater of the GCOU occur mostly in the industrially developed corridor along Interstate 5. Although there are limited data available to accurately delineate the horizontal dimensions of the plume, these intermittent areas of high chromium concentrations appear within a long, narrow, corridor, and are limited to the Upper Regional Groundwater Zone and localized perched water zones. There is a lower concentration chromium plume extending into the GCOU from the BOU and NHOU that is not being captured by BOU and NHOU extraction wells.

Total chromium and hexavalent chromium concentrations exceeding the California MCL of 50 μg/L for total chromium are predominantly reported from wells screened within the upper 100 feet of the saturated zone, coinciding with the Upper Regional Zone. Groundwater samples obtained from wells with deeper screened intervals in this area contain much lower concentrations of total chromium and hexavalent chromium, typically less than 10 μg/L.

Data were compiled from multiple information sources to determine proposed drilling locations, focusing on the presence of chromium within the regional groundwater. Localized, perched water zones containing chromium concentrations have been reported by ITT and Goodrich to exist beneath their former facilities. The chemical data from monitoring wells associated with these perched water zones are included in the figures. Dual-phase extraction well analytical data from the ITT facility are not included in the figures. Remedial activities for soil and groundwater at the

GCOU Group sites, including the perched water zones reported by ITT and Goodrich, are being addressed under the oversight of the RWQCB.

It is noted that facility specific chromium investigations are ongoing within the GCOU. The results of these investigations may be used, as appropriate, to refine the SCM. In addition, the GOU Respondents Group is currently implementing a Focused Feasibility Study Work Plan (FFS WP) that involves the installation of new monitoring wells, pumping tests, and groundwater sampling. The details of the work can be found in the *Draft FFS WP Addendum* (ERM, 2011c). Work to be performed as part of the FFS WP includes the installation and sampling of 14 monitoring wells, and conducting up to four pumping tests using the GN and GS extraction wells.

In addition to other investigations, the data collected from the FFS may provide valuable additional information with respect to mechanisms influencing the distribution of chromium in the GCOU.

3.2 IDENTIFIED DATA GAPS

Potential data gaps were identified in the DCER using spatial analysis considering the physical settings from the preliminary CSM and overlaying analytical data and potential chromium site locations. These data gap areas were compared to locations proposed in the SOW and modifications to the SOW locations were proposed, where warranted, including the identification of any potential wells of opportunity (PWOs) (i.e., an available existing well in lieu of installation of a new monitoring well). The results of the data gap analysis are shown in Figure 5.

Where data gaps have been identified, supplemental primary data will be collected by the Respondents as provided for in this Specified SOW. The Respondents will conduct SWP field activities to augment the existing chromium data for information necessary to:

- Identify and evaluate potential additional sources of chromium in soil and groundwater;
- Describe the nature and extent of chromium in groundwater;
- Evaluate chromium fate and transport;
- Evaluate background geochemical conditions;
- Update and/or revise the preliminary CSM; and
- Assess the mobility and persistence of chromium to support future evaluation of remedial actions.

3.2.1 *Rationale for New Groundwater Monitoring Well Locations*

To address data gaps identified in the DCER, the Respondents have proposed the installation of groundwater monitoring wells, in up to 13 proposed well areas (PWAs) in the GCOU. The installation of 13 new wells may not be necessary based upon the availability and feasibility of identified PWOs. If an acceptable PWO is available within or near a PWA, a new monitoring well will not be drilled for that PWA. The criteria for acceptance of a PWO will include the following:

- Single screen;
- Screen intersects the water table surface, or the top of the screen is no more than 20 feet below the water table surface;
- Appropriate construction as a monitoring well (i.e.; casing diameter, engineered filter pack, etc.);
- Acceptable to USEPA; and
- Accessible both physically and legally.

Rationale for proposed well locations and identification of PWOs are in the table below, as shown on Figure 5, and summarized in Table 1. Proposed well locations are depicted in Figures 5 though 8. The list of wells, including proposed screen depths, and rationale for the wells is provided in Table 2.

Eleven of these wells will be installed within or near the SOW-PWAs. The locations for the wells in PWA 4 and 5 are proposed to be installed outside the SOW-PWA with the following rationale:

- PWA 4 – There are 3 existing monitoring wells on N. Mariposa Street that may be appropriate for assessment of potential impacts from the former Alert Plating site. The proposed well location would assess several potential chromium sources east of SOW-PWA 4 including Comet Plating – Palm Site, Access Controls, and Burbank Water and Power.
- PWA 5 – There are multiple existing monitoring wells north of the SOW-PWA next to Edison High School that assess impacts from the BOU in that area. The proposed well location is in an area with no known monitoring wells.

Assessment of the Statement of Work-Proposed Well Areas

PWA	SOW Rationale for Selection	Description and Discussion	Proposed Adjustment
1	Evaluate groundwater concentrations. Evaluate whether Spence Electro Plating and other nearby facilities are a source downgradient of BOU.	There is a low level detection (<25 µg/L) about 200 feet to the southwest. There are potential chromium sites to the west and north.	No adjustments. No PWOs.
2	Downgradient of BOU, evaluate potential local sources, including from the Burbank Western Channel (BWC)	No samples in PWA. Potential chromium sites within and to west. BOU to north, Interstate 5 to east, and bisected by BWC.	No adjustments. No PWOs.
3	Evaluate eastern extent and whether there are upgradient sources (e.g., potential Scott Road Landfill, BWC).	No samples in PWA. Potential chromium sites 1,000 feet to north-northwest. Interstate 5 to northeast, BWC to southwest.	No adjustments. No PWOs.
4	Downgradient of BOU and to evaluate Alert Plating and other potential sources. Assess eastern extent.	Low-level detection 300 feet to east, west, and 600 feet northwest. Only potential chromium sites in vicinity are cross-gradient to the east.	Proposed well location is 450 ft east-southeast of SOW-PWA. No PWOs.
5	Downgradient of BOU, assess extent.	Low-level detection over 1,000 feet north. No potential chromium sites in PWA.	Proposed well location is 1,200 ft northwest SOW-PWA. No PWOs.
6/12	Evaluate extent and potential sources from Drilube-Wilson and Lanco Metals.	Low-level detection within southwestern portion of PWA and elevated detections to the north. Potential chromium site within and to the northwest. LA River to west.	No adjustments. No PWOs.
7	Evaluate whether J&M Anodizing is a source and assess extent.	Detections within northeastern portion of PWA. Potential chromium site within PWA. 134 Freeway to north and LA River to west.	No adjustments. Propose using SC-E3 as PWO.
8	Evaluate lateral extent.	No chrome sampling in immediate vicinity. Elevated chrome detections 2,000 feet northwest. One potential chromium site within PWA and several to northwest. BWC to west and Interstate 5 to east.	No adjustments. No PWOs.
9	Evaluate whether upgradient sites are sources and assess lateral extent.	Chromium detections cross-gradient to the west. Potential chromium site to the northwest and west.	No adjustments. No PWOs.
10	Evaluate extent and potential impacts migrating from the west.	Low-level detection within PWA and higher detections to the north. No potential chromium sites within vicinity. BWC to west and Interstate 5 interchange within PWA to east.	No adjustments. Propose using CS-VPB-08 as PWO.

PWA	SOW Rationale for Selection	Description and Discussion	Proposed Adjustment
11	Evaluate extent.	Low-level detection to north and northeast. Potential chromium sites within and to the north. LA River to west.	No adjustments. Propose using either V13CCLW1 or V13EEMW1 as PWO.
13	Assess extent; evaluate potential sources including BWC.	No data in the PWA. Multiple potential chromium sites cross-gradient to northeast. Avibank and BWC to east.	No adjustments. No PWOs.

The SOW Rationale for Selection is directly from the SOW. For PWA #7, the rationale incorrectly includes a reference to J&M Anodizing, which is over 2 miles away.

Based on the PWOs presented above, further assessment of these wells will be necessary to confirm or determine well construction details. The following information is known about each well:

- PWA 7 – Sunland Chemical McDermid, Inc. is the listed owner of SC-E3. McDermid, Inc. is listed in the DTSC EnviroStor database as site #80001650 for this location, but there are no investigation or monitoring well details available for SC-E3. This well is accessible from San Fernando Road West.
- PWA 10 – CS-VPB-08 is a shallow well owned by USEPA and the available construction details indicate that the top of the 20-foot screen is approximately 61 feet bgs. The last measured depth to water at this location was approximately 51 feet bgs, so the screen does not intersect the groundwater surface of the Upper Regional Zone. This well is accessible from Winchester Avenue.
- PWA 11 – Carter Plating is the listed owner of V13CCLW1. Carter Plating is listed in the RWQCB GeoTracker database as site #SL603798603, but the site indicated under that ID is located at 1842 N. Keystone Street in Burbank, which is more than 4 miles away. This well is accessible from Brazil Street.
- PWA 11 – V13EEMW1 is a shallow well owned by EEMCO (Division of Datron) and the available construction details indicate that the top of the 25-foot screen is approximately 10 feet bgs. The last measured depth to water at this location was approximately 19 feet bgs, so the screen intersects the surface of the Upper Regional Zone groundwater surface. This well is on the property of Quixote Studios at 4585 Electronics Place.

In an effort to further understand the influx of chromium concentrations in the groundwater from the BOU; several nested well groups owned by Lockheed Martin Corporation along the northern boundary of the GCOU are proposed to be included in the initial sampling event. Further assessment of these wells will be necessary to confirm or determine well construction details. The information known about each well is included in the table below.

Proposed Well Group for Sampling

Well ID	Approximate Elevation (feet mean sea level)				2004-2008 Average Concentration (mg/L)	
	Ground Surface	Groundwater Surface	Top of Screen	Bottom of Screen	Cr	Cr6
3852F	605	460	480	430	NS	NS
3852G	605	460	U	384	NS	NS
3852H	607	458	336	306	2.5	1
3852M	595	473	U	U	1.2	0.4
3852N	594	456	U	U	2.5	1.8
3862C	586	459	495	455	NS	NS
3862D	586	454	411	391	21	22
3862E	586	458	329	309	2.5	1.9
3872Q	578	454	U	U	4.6	2.3
3872R	578	468	U	U	7.1	6.6
3872S	578	474	U	U	6.5	7.4

Cr = Chromium
Cr6 = Hexavalent Chromium
Mg/L = milligrams per Liter
NS = Not Sampled
U = Unavailable

3.2.2 *Rationale for Geotechnical Boring Locations*

To address data gaps identified in the DCER, the Respondents have proposed the installation of 5 geotechnical borings in the GCOU. The rationale for proposed boring locations is provided in the table below. Proposed boring locations are depicted on Figures 5 though 8. The list of borings, including proposed depths and locations, is provided in Table 3.

Assessment of the Statement of Work-Proposed Geotechnical Boring Locations

Geotechnical Boring	Rationale for Selection	Proposed Adjustment
1	This boring is proposed to provide geochemical properties in an area of elevated chromium concentrations. This location is in close proximity to All Metals Processing and K&L Anodizing, an area of elevated chromium concentrations.	No adjustments.

Geotechnical Boring	Rationale for Selection	Proposed Adjustment
2	This boring is proposed to provide background geochemical properties. The boring location is north and east of known elevated chromium concentrations.	No adjustments.
3	This boring is proposed to provide geochemical properties in an area of elevated chromium concentrations. This location is in an area of elevated chromium concentrations.	No adjustments.
4	This boring is proposed to provide background geochemical properties. This location is west of reported elevated chromium concentrations.	No adjustments.
5	This boring is proposed to provide geochemical properties in an area of elevated chromium concentrations. This location is in close proximity to Excello Plating, an area of elevated chromium concentrations.	No adjustments.

4.0 SITE MANAGEMENT STRATEGY

A site management strategy is developed so that procedures are in place to ensure the Specified Work is well managed, efficient, and technically sound. Site management includes those activities necessary to clearly evaluate and establish site objectives so that the project requirements are clear. Documents governing the execution of the overall SWP field activities include this SWP and the companion SAP (consisting of the FSP and QAPP) and HASP deliverables. Finally, project management supports the site management strategy with guidelines for managing communication among the GCOU parties and the project schedule. These elements of the site management strategy are presented below.

4.1 SAP AND HASP

In accordance with the SOW, the Respondents have prepared the SAP and HASP documents for USEPA review and approval prior to the initiation of field activities. The Respondents have developed these documents to ensure that data collected during currently anticipated field activities meet the sampling objectives established during scoping and that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and in a safe manner. These plans are being submitted under separate cover as stand-alone documents, but provide integral guidance supporting this SWP. A brief description of each of the plans is provided in the following subsections.

4.1.1 SAP - FSP

In order to achieve the sampling objectives, the Respondents have identified the following sampling and data gathering methods to be employed at the GCOU during site characterization, groundwater monitoring, and related field activities:

- Subsurface drilling and soil sampling;
- Groundwater monitoring well design, installation, construction, development, and sampling;
- Potential sampling at existing production wells in the GCOU;
- Field equipment calibration;
- Quality control sampling;

- Sampling equipment for data collection;
- Sample handling and analysis;
- Equipment decontamination;
- Field documentation; and
- Investigation-derived waste (IDW) management.

These methods are described in detail in the *Draft Field Sampling Plan* (ERM, 2011b). In the event that additional work not included in the SOW is required, ERM will submit written changes in the form of addenda to this SWP, if necessary.

4.1.2 SAP - QAPP

In order to achieve the desired data quality objectives (DQOs), the Respondents have developed the following project objectives and organization, functional activities, and quality assurance and quality control (QA/QC) protocols:

- Project organization and responsibilities;
- QA objectives for measurements;
- Sampling procedures (including groundwater sampling, soil sampling, groundwater levels, lithologic data, borehole geophysical survey data, and geodetic survey data);
- Sample custody;
- Calibration and analytical procedures;
- Data reduction, validation, and reporting procedures;
- Internal quality control methods;
- Preventative maintenance schedule;
- Data management (including procedures to enter, store, correct, manipulate, and analyze data);
- Document control procedures; and
- Preservation of records.

Details supporting the Respondent's selected laboratories' qualifications in the use of methods and analytical protocols for the COCs in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs approved for the site are also included in the QAPP. In addition, the Respondents will coordinate with USEPA to establish protocols for transferring data in an electronic format to the SFV database. Details regarding the QAPP are included in the *Draft Quality Assurance Project Plan* for Site Characterization (ERM, 2011e).

4.1.3 HASP

The Respondents have prepared a HASP to identify potentially hazardous operations and exposures and prescribe appropriate protective measures for on-site workers, the surrounding community, and the environment. The HASP includes the following required elements:

- A detailed site description, site maps, and a summary of results from previous sampling activities;
- Key personnel and alternates responsible for site safety and health;
- A health and safety risk analysis;
- Employee training;
- Personal protective equipment to be used by employees for each of the site tasks and operations being conducted;
- Medical surveillance requirements;
- Air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation;
- Site control measures;
- Decontamination procedures;
- Standard operating procedures; and
- A contingency plan.

The HASP has been prepared to comply with *Occupational Safety and Health Administration (OSHA) Code of Federal Regulations Title 29, Section 1910.120* and *California (Cal)/OSHA California Code of Regulations Title 8, Article 109, Section 5192 Hazardous Waste Operations and Emergency Response*. Details regarding the HASP are included in the *Health and Safety Plan for Site Characterization* (ERM, 2011d).

4.2 PROJECT MANAGEMENT PLAN

Project management consists of those procedures and activities needed to ensure that the SWP field activities proceed smoothly; are appropriately staffed; schedules and budgets are met; and there is adequate communication and coordination among the GCOU parties. The project management approach for the SWP field activities includes:

- Roles and responsibilities as outlined in the organization chart presented in Figure 2 of the QAPP;
- Establishing and maintaining schedules for those deliverables prescribed in the SOW and in Section 6.0, herein;
- Documentation regarding the scope of work described in this SWP, including subsequent addenda as necessary, the QAPP, the FSP, and the HASP;
- Data Management Plan is detailed in the QAPP (ERM, 2011e) and Quality Management Plan (presented in Appendix B);
- Convening bi-weekly calls and regular face-to-face meetings among the GCOU parties to discuss progress and identify any problems or issues impacting the SWP field activities;
- Convening meetings and teleconferences with USEPA and their technical representatives, as necessary; and
- Submitting monthly progress reports to USEPA advising on the SWP field activities status, and other deliverables and communications.

4.3 PLANNING

Initial planning largely consisted of activities necessary to compile, review, and evaluate existing chromium data associated with the site, culminating in the preparation of the preliminary CSM presented in the DCER. Following evaluation of the preliminary CSM, data gaps were identified and supplemental primary data will be collected through the performance of this SWP and the supporting SAP and HASP support documents. The results of the existing chromium data compilation and evaluation are summarized in Sections 2 and 3 of this document.

4.4 COMMUNITY INVOLVEMENT

USEPA will initiate community outreach activities as part of the USEPA-lead RI, including holding informational meetings, distributing a fact sheet to inform the community about the RI and the purpose and logistics of field activities, and distributing informational flyers to residents living in the vicinity of locations targeted for monitoring well installation. The flyers will notify residents of upcoming fieldwork and identify points of contact to assist in answering questions and responding to concerns regarding field activities.

As community involvement tasks for the Respondents are identified, specific tasks and an implementation schedule will be developed to provide a detailed description of these activities. This task is included as a placeholder activity until specific community involvement and public participation needs are identified. As described in the SOW,

> *"If directed to do so by EPA, the Respondents shall develop and implement community involvement activities subject to approval by EPA. At EPA's discretion, EPA may elect to take the lead role and responsibility in the development and implementation of community involvement activities. The critical community involvement planning steps include conducting community interviews and developing a Community Involvement Plan (CIP). The Respondents may assist EPA, as requested by EPA, by providing information regarding the site's history, participating in public meetings, or by preparing fact sheets for distribution to the general public." In addition, the Respondents may establish a community information repository, at or near the site, to house one copy of the Administrative Record. The extent of the Respondents' involvement in community involvement activities will be at EPA's discretion. The Respondents' community involvement responsibilities, if any, will be specified in the CIP. All of the Respondents' community involvement activities will be subject to oversight by EPA.*

5.0 SITE CHARACTERIZATION PROCESS

The scope of work includes tasks identified in the SOW that are necessary to complete the SWP field activities. These tasks are described in the following sections.

5.1 FIELD INVESTIGATION

The objectives, rationale, and methods for the field investigation are detailed in the FSP (ERM, 2011b). Field investigation work will be conducted to evaluate selected areas as to the nature and general extent of chromium in the saturated zone and in the portion of the vadose zone directly above the saturated zone and to assess chromium fate and transport within those areas. Field investigation tasks will include drilling and sampling 5 soil borings, drilling and installing up to 13 groundwater monitoring wells, and obtaining soil and groundwater quality data from the borings and wells.

5.2 IMPLEMENTATION AND DOCUMENTATION OF FIELD SUPPORT ACTIVITIES

Following approval of the SWP and the SAP by the USEPA, the Respondents will prepare to initiate the required field support activities. The Respondents will notify the USEPA at least 2 weeks prior to initiating field support activities so that USEPA may adequately schedule oversight tasks. The field support activities are anticipated to consist of the following tasks:

- Scheduling, procuring, and sub-contracting the selected, licensed, drilling and well installation company; traffic control engineer and traffic safety company; geophysical and land survey engineers; equipment suppliers; and accredited analytical laboratory;
- Obtaining the appropriate encroachment permits, building and safety permits, excavation permits, and street use permits for borings and/or groundwater monitoring wells installed in public rights-of-way;
- Obtaining the appropriate permits for soil borings, groundwater monitoring well installation, and groundwater sampling;
- Executing access agreements with any potential private parties, if necessary;

- Marking all locations where intrusive fieldwork will be performed and contacting Underground Services Alert (USA) at least 48 hours prior to the initiation of fieldwork to locate underground facilities within the planned work areas; and
- Clearing all proposed subsurface drilling/sampling locations using a private geophysical locating company.

The USEPA will be notified in writing upon completion of the field support activities. The field support activities will be documented using project file memoranda and records of conversation. These documents will be retained electronically within a secure network folder and in some cases in hardcopy within a field support file.

5.3 CHARACTERIZATION OF CHROMIUM CONDITIONS

One objective of the specified work outlined within the SOW is to characterize the concentrations, characteristics, and physical attributes of chromium from two representative conditions: (1) the anthropogenic and (2) background geochemical.

Primary data will first be obtained and evaluated from available existing information and then supplemented by analytical results from the geotechnical soil borings and groundwater monitoring wells installed by the Respondents during the SWP field activities. Two geotechnical borings will be installed in selected areas of the GCOU thought to represent background conditions (CRI-GC-2 and CRI-GC-4). Three geotechnical soil borings will be installed to further evaluate geochemical conditions in areas suspected to be impacted by elevated chromium concentrations (CRI-GC-1, CRI-GC-3, and CRI-GC-5).

As part of characterizing chromium origins, both groundwater and overlying vadose-zone soil contamination will be considered, which could impact groundwater in the future via leaching or saturation (if groundwater levels rise). Data will be obtained from the available existing information and the proposed soil borings and monitoring wells. In addition, determination of background geochemical conditions and chromium concentrations, based on analytical results from upgradient wells and borings, will be required. This will include evaluating the mobility and persistence of chromium, which is important in the assessment of chemical fate and transport and treatment technologies.

In addition, background chromium concentrations and characteristics will be evaluated using data from existing upgradient groundwater monitoring wells and two proposed geotechnical soil borings. Two soil borings will be advanced in suspected background areas of the GCOU to characterize the background chromium concentrations and the fate and transport mechanisms influencing chromium in the subsurface environment of the underlying geologic formation(s). The soil geochemistry from the geotechnical borings in areas suspected to be impacted by elevated chromium concentrations will be compared to the soil geochemistry from the geotechnical borings in the assumed background areas to potentially differentiate anthropogenic impacts or identify unique anthropogenic characteristics from natural characteristics, if possible.

5.4 DATA ANALYSIS

ERM will evaluate and interpret data collected during the field investigation activities. The data analysis will include lithologic and hydrogeologic field data collected during borehole advancement; soil and groundwater geochemical data acquired from laboratory analysis of soil and groundwater samples; COC concentration data acquired from laboratory analysis of soil and groundwater samples; stratigraphic formation data collected through down-hole geophysics; and the spatial distribution of the collected data will be interpreted and evaluated.

Field data such as lithologic descriptions, hydrogeologic observations, well construction details, and survey coordinates will be compiled and presented in electronic boring logs, tables, and figures. AutoCAD may be used to generate and present boring logs, geologic cross-sections, groundwater flow maps, and vertical and lateral iso-concentration plots. Summary tables containing analytical data will be generated directly from the laboratory's electronic deliverables.

Analyses of the data collected for site characterization will meet the DQOs developed in the QAPP. The DQO process provides a cost-effective systematic approach to determine performance criteria for existing data and data proposed for collection to properly characterize the nature and extent of impact. A summary of data analysis parameters is provided in Table 4. Specific DQOs and a detailed presentation of DQOs are provided in the QAPP.

5.5 DATA MANAGEMENT PROCEDURES

The analytical, survey, and geological electronic and hardcopy data will be managed and maintained by ERM. In addition, data will be provided to the SFV database maintained by USEPA. Data management for the project has the following objectives:

- Establish a controlled, functional, and efficiently operated data management system and accompanying procedures to manage, analyze, document, and transfer the environmental data that are collected and generated;
- Maintain a usable and accurate database throughout the life of the project;
- Transfer specific data components to other parties, as appropriate; and
- Archive the database and related documentation upon closure of the project.

The data, at a minimum, will meet the requirements of previous data submittals to the SFV database. All changes and additions must be reviewed and approved by the ERM Project Manager and/or ERM QA/QC Manager. Laboratory data management is discussed in the laboratory Quality Assurance Manual.

5.5.1 Documentation of Field Activities

Field logbooks will be the main source of field documentation for all field activities. Field team members will keep a daily record of significant events, observations, measurements, and information pertinent to the investigation program in a field logbook. The logbooks will be permanently bound and durable to withstand adverse field conditions. All pages will be numbered consecutively. All pages will remain intact, and no page will be removed for any reason. The field logbooks will be stored in the project files when not in use and upon completion of each field task.

Sampling forms and equipment logs will be used during the investigation process to supplement the information collected in the field logbook. The sampling forms and equipment logs will be used to document specific field activities such as borehole logging, monitoring well construction, well development, groundwater sampling, and instrument calibration. Once completed, these forms will be scanned and maintained in the electronic project file.

All documents generated during the field effort are controlled documents that become part of the project file. The forms are presented in Appendix A of the FSP.

5.5.2 *Sample Management and Tracking*

Accurate and comprehensive sampling documentation will be performed to create a complete record of all sampling and analysis efforts. This will allow for detailed tracking of all samples from collection through transport and laboratory analysis. Sampling designations are included in the FSP and will be reviewed and coordinated with the USEPA so that nomenclature is consistent with the existing SFV database.

Chain-of-custody (CoC) forms will be used to document sample collection and shipment from the field to a laboratory for analysis. The CoC form is an integral component of the sample tracking process, and represents the permanent record of sample holding and shipment. Forms will be completed and sent with the samples to each laboratory and for each shipment.

When releasing samples from their custody, the ERM representative will relinquish them to a laboratory representative who will check them against the respective CoC form(s) into the laboratory. The ERM representative will retain a copy of the signed CoC form for the project files. The original CoC form will be returned to the ERM Project Manager with the analytical results going into the project files.

5.5.3 *Site Characterization Deliverables*

As stated in the SOW, the Respondents will prepare and submit a Specified Work Report to the USEPA for review and final approval. The report will summarize the results of the site characterization activities and will update the CSM. The format and potential content of the Specified Work Report will be agreed upon with USEPA prior to its submittal.

6.0 SCOPE OF WORK

To address the data gaps as identified in Section 3.2 and presented in Figure 5, the following site characterization scope of work is proposed:

- Determine viability, ownership, and construction details of PWOs;
- Acquire access from the property owners for all proposed drilling and sampling locations;
- Install new groundwater monitoring wells;
- Conduct groundwater sampling at the newly installed monitoring wells; at existing PWOs within the identified data gap areas; and at existing PWOs that are in the vicinity of the upgradient GCOU boundary;
- Collect soil and groundwater samples from geotechnical borings; and
- Conduct water quality and soil sample analysis and reporting.

The data collected during the performance of these tasks will be used to further evaluate and assess the following within the GCOU:

- The nature and extent of chromium in groundwater;
- The fate and transport of chromium within the subsurface;
- Physical characteristics of the subsurface resources; and
- Potential source areas of chromium in soil and groundwater.

Following the data evaluation, the resultant findings will be used to update the preliminary CSM presented in the DCER. Specific details relating to the implementation of the site characterization are described in the following sections.

6.1 RATIONALE

6.1.1 New Groundwater Monitoring Wells

The Respondents propose to install up to 13 new groundwater monitoring wells within the GCOU, in areas where existing PWOs do not exist or do not meet the acceptance criteria. The objective of the new well installation is to allow for the collection of additional water quality data to address data gaps identified in Section 3.2 and presented on Figure 5. Specifically, the data collected from these monitoring wells will be used to develop a more complete and contemporaneous water quality and potentiometric dataset; supplement the existing groundwater monitoring network; further define the extent of chromium-impacted groundwater; and assess groundwater impacts from potential chromium sources.

6.1.2 *Geotechnical Soil Borings*

The Respondents propose to install five geotechnical borings within the GCOU from which soil and groundwater data will be collected. The data collected from these borings will be used to:

- Perform soil geochemical testing to further evaluate the fate and transport characteristics of chromium in groundwater and in the vadose zone;
- Evaluate geochemical conditions in selected areas suspected to have elevated chromium concentrations and in selected areas thought to represent background conditions;
- Evaluate chromium concentrations in the saturated zone and the vadose zone immediately above the saturated zone. Soil samples may also be taken at the interface of significant lithologic changes, if encountered; and
- Characterize the fate and transport mechanisms influencing the occurrence and distribution of chromium within in the GCOU.

Two geotechnical borings will be advanced in areas anticipated to represent background conditions and three geotechnical borings will be advanced within areas suspected to be impacted with chromium. Proposed geotechnical boring locations are depicted in Figures 5 though 8. The location, proposed depth, and anticipated depth to groundwater for the geotechnical borings is summarized in Table 3.

6.2 *IMPLEMENTATION*

The following subsections present details regarding the advancement of up to 18 borings including 5 borings to collect geotechnical and geochemical information and up to 13 borings to be used for the installation of new groundwater monitoring wells. This section also provides the details for permitting, pre-field activities, monitoring well construction, and handling of IDW.

6.2.1 *Pre-Field Activities*

In preparation of the field activities, the following tasks will be performed:

- On-site coordination and access agreements, as necessary, will be obtained;
- Necessary permits will be acquired; and
- Subsurface clearance will be performed by a geophysical contractor.

All field activities will be performed in accordance with the USEPA reviewed *HASP* (ERM, 2011d). Details of each pre-field activity are described in the following subsections.

6.2.1.1 *Site Use/On-Site Coordination and Access Agreements*

Coordination and planning activities to be completed prior to fieldwork include:

- Identifying specific locations for soil boring and monitoring well installation through interaction with property owners and determining what locations will require municipal access agreements and which locations will require private owner consent agreements;
- Marking final proposed soil boring locations;
- Determining space requirements for vehicles and equipment;
- Identifying possible locations for stockpiling materials and for staging work vehicles and equipment;
- Determining safety and security requirements during field mobilization;
- For public right-of-way locations, coordinating traffic control and encroachment activities; and
- Supporting the Respondents in securing access agreements from private property owners to install select groundwater monitoring wells.

6.2.1.2 *Permitting*

Permits required by local and state agencies will be obtained prior to implementing field activities. Prior field activities in this area have encroached upon the jurisdiction of the cities of Burbank and Glendale and the County of Los Angeles. In order to complete proposed field activities, the following permits from local municipal and county agencies are anticipated:

- "No Parking" Permits from the Glendale Department of Public Works, Burbank Department of Public Works, and the Los Angeles Department of Transportation;
- Lane and Street Closure Permits from the Glendale Department of Public Works, Burbank Department of Public Works, and the Los Angeles Bureau of Street Services;
- Encroachment and Excavation Permits from the City of Glendale Department of Public Works, Burbank Department of Public Works, and Los Angeles Department of Public Works; and
- Monitoring Well Construction Permits from the County of Los Angeles Department of Public Health.

6.2.1.3 Subsurface Clearance

ERM will contact USA at least 48 hours prior to the initiation of all intrusive activities and coordinate with USA member companies to locate underground facilities in proximity to planned well/borehole locations. The investigation locations will also be cleared for subsurface utilities by a private utility-locating company. Additionally, boring locations will be manually cleared using a hand-auger or air vacuum methods to a depth of at least 5 feet bgs. If attempts to manually clear the boring locations are unsuccessful, optional locations will be explored.

6.2.2 Drilling Technique

Relatively shallow monitoring well and geotechnical soil borings (less than 140 feet in depth) are anticipated to be installed using the hollow stem auger (HSA) drilling technique. The decision to use HSA is based on the proposed depths of the borings, geotechnical sampling requirements, and the likely geology to be encountered. Deeper monitoring wells and geotechnical soil borings (greater than 140 feet in depth) are anticipated to be installed using a mud-rotary or sonic drilling method, respectively. Mud-rotary drilling may be used during monitoring well installation deeper than 140 feet bgs or if refusal is met using HSA drilling technique. Sonic drilling methods may be employed for the geotechnical borings that are to be advanced deeper than 140 feet bgs or if refusal is met using HSA drilling technique.

6.2.2.1 *Hollow Stem Auger*

A CME 95 HSA drilling rig or equivalent, equipped with 8-inch outer diameter augers, will be used to initially drill the shallow groundwater monitoring wells. Following the initial borehole advancement, the monitoring well borings will be over-drilled using 10-inch outer diameter augers in preparation for well casing installation. If based on results of drilling the shallow groundwater monitoring wells, it is determined that the mud-rotary drilling technique is more appropriate for drilling deeper wells, the drilling technique will be changed to mud-rotary.

The shallow geotechnical soil borings are anticipated to be drilled to depth using the 8-inch outer diameter augers.

6.2.2.2 *Sonic*

The deep geotechnical soil borings are anticipated to be drilled and sampled using the sonic drilling method. Sonic drilling is a continuous sampling technique that alternately advances concentric hollow-drill stems using rotation in conjunction with axial vibration of the drill stem. Depending on the lithology encountered, this method may be used for faster drilling and can also provide good soil sample quality with an accurate representation of the subsurface stratigraphy.

In circumstances where the sonic-drilling technique will be used to advance the geotechnical soil borings, the soil samples collected for physical property testing will be collected using a split-spoon sampling device outfitted with stainless steel rings. The split-spoon sampler will be attached to the sonic drill stem and driven into the native, undisturbed soil ahead of the drill bit using the drill-rig down pressure. No sonic vibration will be introduced when collecting the discreet soil samples for physical properties testing.

6.2.2.3 *Mud-Rotary*

The mud-rotary technique would be the preferred method for advancing the deep monitoring wells; however this method has the disadvantage of providing poor soil sample quality. The mud rotary drilling technique involves the use of drilling fluid. The drilling fluid suspends and removes cuttings from the borehole. The drill cuttings are carried to the surface in the drilling fluid and are mechanically removed using a mechanical separation process.

6.2.3 *Geological Logging*

Soil samples will be collected during HSA drilling using an 18-inch-long, California-modified, split-spoon soil sampler. Soil samples will be collected by driving the sampler into native soil below the auger head using a 140-pound hammer with a 30-inch drop. The approximate water table elevation at each drilling location will be estimated prior to the start of drilling based on regional data. Samples will be collected at 10-foot intervals above the estimated water table interface and then continuously starting at a depth equal to approximately 10 ft above the estimated water table to the total depth of the boring. The soil samples will be reviewed for lithologic description and field screened using a photoionization detector.

The geologist will describe the soil on the boring log according to the Unified Soil Classification System (USCS), per American Society for Testing and Materials (ASTM) Methods D-1452, D-2487, and D-2488. A geologist will provide continuous on-site supervision during the drilling, construction, and development of the groundwater monitoring wells. In addition, the geologist will direct the drilling contractor as to the final depths of the borings according to discussions with the project technical representatives. At least three soil samples will be collected for physical grain size analysis at each boring location where core samples are collected.

The sonic drilling technique by its nature provides for continuous soil recovery and sampling. Soil samples will be collected using five-foot long polyethylene bags inserted in the drive casing before borehole advancement. Soil samples will be collected by driving the drill casing into native soil using axial vibration and rotation. Samples will be continuously collected and lithologically logged using the USCS classification method to total depth. The soil will also be field-screened using a photoionization detector. A visual record of the stratigraphy from the borehole will be prepared by placing the collected samples into new "chip trays" in sequential order. The "chip trays" will be labeled according to depth with indelible ink and will be photographed and reviewed in preparation for well construction and installation.

Soil cuttings will be collected for geological logging during mud-rotary drilling after they are lifted to the surface and separated from the drilling fluid at the shaker table, which is the last part in the borehole circulation system. The on-site geologist will use a fine mesh sieve or strainer to collect the cuttings while allowing the excess drilling fluid to fall away. Borehole cuttings will be collected at approximately 10-foot intervals for characterization using the USCS nomenclature. A visual record of the stratigraphy from the borehole will be prepared in the same manner as described above for sonic drilling.

6.2.4 *Geophysical Logging*

Upon completion of drilling, geophysical logging of the boreholes completed using mud-rotary drilling techniques will be performed and will consist of the following suite of logs:

- Spontaneous potential log;
- 16-inch short normal and 64-inch long normal resistivity logs;
- Guard resistivity log;
- Natural gamma-ray log; and
- Caliper log.

The logging will be conducted by an experienced subcontractor under the direction of ERM.

6.2.5 *Geotechnical Soil Boring Soil Sample Analytical Methods*

Three soil samples from each geotechnical boring will be analyzed by Test America, Inc. (Test America), a National Environmental Laboratory Accreditation Program-certified laboratory. One soil sample will be selected for analysis from the vadose zone just above the estimated water table; one from the sample interval intersecting the water table (capillary fringe); and one from the first saturated zone sample interval and analyzed for the following methods:

- Metals including aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium (total), cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, selenium, strontium, silver, sodium, thallium, tin, titanium, vanadium, and zinc using Digestion of Soil by USEPA Method 3050B followed by Method 6020A ICP/Mass Spectrometry.
- Hexavalent chromium using USEPA Method 3060A – Alkaline Digestion followed by Method 7199 IC. In addition, USEPA Method 1312 Synthetic Precipitation Leaching Procedure (SPLP) Extraction followed by Method 7199 IC for hexavalent chromium will be used. The SPLP will be prepared using 2:1, 5:1, and 10:1 liquid to solid ratios.
- Total organic carbon (TOC) using USEPA Method 9060A.

- pH using USEPA Method 9045D.
- ORP using USEPA Method 9045D combined with ASTM Method D1498-93 or equivalent SM2580B.
- Acid Volatile Sulfides using USEPA 821/R-91-100 without Simultaneously Extracted Metals (SEMs).
- Hexavalent Chromium Available Reducing Capacity (USEPA/540.5-94/505).
- Attenuation Testing using EPA/530-SW-87-006.

Three soil samples from each geotechnical boring will be analyzed by PTS Laboratories. As mentioned above, one soil sample will be selected for analysis from the vadose zone, one from the capillary fringe, and one from the saturated zone and analyzed for the following method:

- Hydraulic Conductivity Package using:
  - Grain Size Analysis using ASTM D422
  - Native-state permeability to water (hydraulic conductivity), vertical or horizontal orientation, grain density, dry bulk density, total porosity, air-filled porosity, and total pore fluid saturation (reported as water only) using American Petroleum Institute (API) Method RP40;
  - Moisture content using ASTM Method D2216; and
  - Hydraulic conductivity using USEPA Method 9100 (saturated zone only).

Additional analyses may also be added following consultation and agreement with USEPA. Each soil sample will be analyzed for the specified test methods listed with the exception of the attenuation testing for soils; this test will only be performed on samples with the highest 10% of hexavalent chromium results using USEPA Method 3060A – Alkaline Digestion followed by Method 7199 IC. Additional soil samples may also be taken for intervals with significant lithologic changes.

6.2.6 *Groundwater Monitoring Well Construction*

The monitoring wells will be constructed of 4-inch diameter, Schedule 40 polyvinyl chloride blank casing; slotted 0.020-inch factory cut well screen, and No. 3 sand filter pack. The sand pack will be placed around the well casing from the bottom of the borehole to approximately 2 feet above the screened interval in each well. A 3-foot bentonite seal, at a minimum, will be placed in the borehole annulus above the sand pack, and the remaining annulus will be sealed with cement/bentonite grout. Monitoring well screens will likely be approximately 40 feet in length with approximately 10 feet of screen above the encountered water level (Table 2). Final well depths and screen placement will be determined based on the hydrogeologic conditions encountered during drilling. The Respondents will notify and consult with USEPA field representatives regarding the design details of the well installation. The Respondents understand that USEPA representatives may conduct site visits as fieldwork progresses and may be involved in determining well construction design, but fieldwork will not be delayed if USEPA field representatives are not present or not available to provide input during well installation.

The wells will be completed at grade, fitted with a locking cap, and enclosed within a traffic-rated well vault. Monitoring well construction will be performed in accordance with field methods and procedures described in the FSP.

6.2.7 *Groundwater Monitoring Well Development*

At a minimum of 72 hours after the groundwater monitoring well is installed, a supervised pump crew will perform well development. Well development will be conducted by bailing, swabbing, and pumping the wells as follows:

1. Bail groundwater monitoring wells of all sediment collected at the bottom during the installation process;
2. Swab groundwater monitoring wells using a small 3- to 4-inch-diameter swab;
3. Record total volume of water removed during development along with the confirmed final depth of the developed hole; and
4. Pump groundwater monitoring wells using a 3- to 4-inch submersible pump for final development and field quality parameters including temperature, pH, turbidity, and specific conductivity.

Each step will be repeated until the discharge water is free of sediment (<5 Nephelometric Turbidity Units) and groundwater parameters have stabilized or 10 bore volumes have been removed.

6.2.8 *Investigation-Derived Waste*

IDW will consist primarily of soil, water, and spent drilling fluids. IDW will be collected and placed in appropriately labeled Department of Transportation-approved 55-gallon steel drums, Baker tanks, or a lined roll off bin. Storage containers will be stored at a previously agreed upon location until they are ready to be disposed of at a California-licensed disposal facility. IDW will be disposed in less than 90 days.

Once all waste has been collected in drums and field activities concluded, drums will be sampled for waste profiling. Representative composite soil, groundwater, and drilling fluid samples will be collected from waste drums and bins, and delivered to a California-licensed analytical laboratory for analysis. Analysis for disposal purposes is expected to include the following:

- VOCs using USEPA Method 8260B;
- Semivolatile organic compounds using USEPA Method 8270C;
- Title 22 Metals using USEPA Method 6010B/7471A;
- pH using method SM4500-HB; and
- Flashpoint using Method 1010.

The waste profiling analyses may be modified based on the requirements of the receiving disposal facility. Wastes will be manifested and disposed of at an appropriately-licensed waste disposal facility (i.e., approved by USEPA to accept CERCLA waste) and in accordance with USEPA's off-site rule. IDW disposal activities will be performed in accordance with procedures described in the FSP (ERM, 2011b).

6.2.9 *Groundwater Monitoring Well Survey*

In order to obtain accurate groundwater elevation data and evaluate water quality data geographically, the new groundwater monitoring wells will be surveyed to a datum consistent with the existing monitoring wells. A California-registered surveyor, under supervision of a responsible field representative, will perform the surveying. The surveyor will use State Plane North American Datum 1983 (NAD 83) California Zone V and North American Vertical Datum of 1988 (NAVD 88).
A series of control points or monuments will be established for use in surveying the locations. The majority of control points will consist of permanent features, but installation of monuments may be necessary. To determine accurate groundwater elevations, the necessary precision for vertical survey coordinates of monitoring wells will be 0.01 foot. Horizontal coordinates will also be measured to an accuracy of 0.1 foot.

Prior to the wellhead survey, permanent markings will be applied to the well monument and casing/sounding port to provide reference points for the surveyors and to enable consistent future measurements. Groundwater monitoring wells will be surveyed for their horizontal location. Vertical elevations will be surveyed at three points: (1) the top of the monitoring well vault; (2) top of the well casing or sounding port; and (3) the ground surface. The ground surface will preferably be surveyed at the northern side of the well, but can be modified if the surface is uneven relative to the well.

Groundwater monitoring well surveying activities will be performed in accordance with field methods and field procedures described in the FSP (ERM, 2011b).

6.3 GROUNDWATER SAMPLING FOR NEW AND EXISTING WELLS

Once the new wells have been installed, developed, allowed to equilibrate, and surveyed, water levels will be measured and groundwater samples will be collected from the new monitoring wells and select existing monitoring wells. Upon completion of the initial sampling proposed and an analysis of the site characterization data, the monitoring wells may be used for longer term monitoring to support water quality monitoring goals of the GCOU.

Groundwater sample collection procedures for the wells will be performed in accordance with the FSP (ERM, 2011b).

6.3.1 Water Level Measurements

Water level measurements will be collected from groundwater monitoring wells and before each monitoring well is sampled. All field meters will be calibrated according to manufacturer's guidelines and specifications before and after each day of use in the field. The water level sounding equipment will be decontaminated before and after use in each well. The depth to water will be measured from a marked point on the top of the well casing prior to purging and after groundwater samples have been collected from each monitoring well. The water levels will be measured with a hand-held, electronic water level indicator graduated to 0.01-foot increments and recorded on the field logbooks. Water level measurements will be taken until two consecutive readings agree to within 0.01 foot of one another. The depth-to-groundwater data and time of measurement will be recorded in the field logbook and water level measurement field form. Water level measurements will be collected in accordance with the field methods and procedures described in the FSP (ERM, 2011b).

6.3.2 *Groundwater Monitoring Well Purging and Rationale*

All monitoring wells will be purged prior to sampling to remove water from the well and filter pack that may not be representative of groundwater conditions in the surrounding formation. Low flow purging and sampling, proposed for the monitoring wells, will be performed in accordance with the *Low-Flow (Minimal Drawdown) Groundwater Sample Procedures* by Puls and Barcelona (USEPA, 1996). Low-flow sampling has been selected as an appropriate sampling method given its well documented benefits versus traditional 3-well volume purging, including but not limited to: a significant reduction in sampling waste consistent with USEPA Region 9 Greener Cleanups Policy; results of sampling provide a more accurate representation of the groundwater formation; and sample results are more consistent between sampling events.

In keeping with recommended low flow sampling procedures, the pump intake will be set to the middle of the saturated well screen. This is done to minimize the entrainment of any solids that are typically found near well bottoms. Purging will continue until field parameters are stable as described in Section 6.3.3. The volume of groundwater purged will be measured using a digital flow meter or by tracking the volume in a 5-gallon bucket.

Existing wells will be purged in accordance with the procedures described in the FSP (ERM, 2011b).

All purge water generated during groundwater sampling activities will be collected, managed, and disposed of in accordance with the procedures described in the FSP (ERM, 2011b).

6.3.3 *Groundwater Monitoring Well Field Parameters*

Field parameters to be measured in the monitoring wells sampled using low flow techniques will be collected with a flow cell equipped with probes to monitor the following field parameters; temperature, pH, conductivity, dissolved oxygen (DO), ORP and turbidity. During well purging, groundwater is passed through the flow cell and the sample parameters are displayed on a digital readout. Sample collection is performed once water quality is stable. In accordance with *Low-Flow (Minimal Drawdown) Groundwater Sample Procedures* (USEPA, 1996), water quality is considered stable if for three consecutive field measurements: temperature range is no more than +/- 1 ° C; pH varies by no more than 0.2 pH units; and specific conductance, DO, ORP and turbidity readings are within 10 percent of their average.

The field parameters to be measured in the existing wells will be collected in accordance with field methods and procedures described in the FSP (ERM, 2011b).

All probes will be thoroughly rinsed with distilled water prior to and between any measurements at each sample location.

6.3.4 *Groundwater Monitoring Well Sampling*

The process for the collection of samples using low flow techniques involves maintaining the pumping rate for purging and sampling at less than 500 milliliters per minute to reduce the potential for volatilization of VOCs or disturbance of sediments in the well casing.

Groundwater sample collection at the existing monitoring wells will be performed in accordance with field methods and procedures described in the FSP.

In addition, QA/QC samples will be collected during groundwater sampling according to the procedures outlined the Groundwater FSP and the USEPA approved *QAPP* (ERM, 2011e).

6.3.5 *Analytical Methods*

Groundwater samples collected will be transported under ERM CoC procedures and analyzed by Test America, Inc., a National Environmental Laboratory Accreditation Program-certified laboratory located in Santa Ana, California.

The following methods will be used to analyze groundwater samples collected:

- Dissolved metals including aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium (total), cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc will be analyzed using USEPA Method 200.8 Inductively Coupled Plasma (ICP)/Mass Spectrometry after being field filtered to 0.45 microns.
- Dissolved metals including boron, calcium, iron, magnesium, potassium, strontium, sodium, tin, and titanium will be analyzed using USEPA Method 200.7 ICP/Atomic Emission Spectrometry after being field filtered to 0.45 microns.

- Hexavalent chromium will be analyzed using USEPA Method 7199-IC after being field filtered to 0.45 microns.
- pH will be measured using USEPA Method 9040C.
- Oxidation Reduction Potential (ORP) will be measured using Standard Method 2580B.
- Dissolved oxygen (DO) will be measured using Standard Method 4500–O G.
- Sulfate, bromide, chloride, fluoride, nitrate, nitrite, and ortho-phosphate will be analyzed using USEPA Method 300.0.
- Dissolved organic carbon will be analyzed using USEPA Method 9060A after being field filtered to 0.45 micron.
- Divalent iron will be analyzed using Standard Method 3500-Fe B.4.c.
- Total alkalinity will be analyzed using USEPA Method 310. 1 or equivalent SM2320.
- Total dissolved solids (TDS) will be measured using USEPA Method 160.1 or equivalent SM2540C.
- Total suspended solids (TSS) will be measured using USEPA Method 160.2 or equivalent SM2540D.
- VOC Scan will be conducted using USEPA Method 8260 + tentatively identified compounds (TICS).

6.3.6 QA/QC

During groundwater sampling activities, QA/QC procedures will be followed that will ensure that the project's data needs for completeness, comparability, representativeness, accuracy, and precision are achieved. These QA/QC procedures are described in the FSP (ERM, 2011b) and the QAPP (ERM, 2011e).

7.0 *DELIVERABLES AND SCHEDULE*

The SOW identified major deliverables anticipated under the SWP field program. The deliverables as specified in the SOW are:

Task 1 – Planning Deliverables

- DCER including Preliminary CSM (ERM, 2011a) (Draft submitted to USEPA 6 September 2011)
- SWP
- SAP which includes the FSP (ERM, 2011b) and QAPP (ERM, 2011e)
- Draft HASP (ERM, 2011d) (Draft submitted to USEPA 24 August 2011)

Task 2 – Community Involvement Deliverables

- Community Involvement Plan – If directed by the USEPA.

Task 3 – Specified Work Deliverables

- Specified Work Report

These documents will be submitted to USEPA in draft and final form in accordance with the schedule provided in the SOW. The deliverable schedule is summarized in Figure 9.

8.0 REFERENCES

California Department of Public Health (CDPH). 2000. Glendale Treatment Plant Drinking Water Permit. August.

CDM. 2009. *Extraction Well Field Evaluation Results, Glendale Operable Unit.* December.

CH2M HILL. 2005. *Final Technical Memorandum, Burbank and Glendale Operable Units, Focused Chromium Trend Study.* June.

CH2M Hill. 2007. *2006 Report, San Fernando Valley Basin, Groundwater Monitoring Program, Los Angeles County, California.* December.

CH2M Hill. 2009. *2007 Report, San Fernando Superfund Sites, Groundwater Monitoring Program, Los Angeles County, California.* July.

ERM. 2010. *Field Sampling Plan for the Focused Feasibility Study*, *Glendale Operable Unit - Area 2, San Fernando Valley Superfund Sites.* October.

ERM. 2011a. *Data Evaluation and Evaluation Report (DCER)*, *Glendale Chromium Operable Unit - Area 2, San Fernando Valley Superfund Sites.* August.

ERM. 2011b. *Draft Field Sampling Plan (FSP)* , *Glendale Chromium Operable Unit - Area 2, San Fernando Valley Superfund Sites.* September.

ERM. 2011c. *Draft Focused Feasibility Study Work Plan Addendum*, *Glendale Operable Unit - Area 2, San Fernando Valley Superfund Sites.* September.

ERM. 2011d. *Draft Health and Safety Plan for Site Characterization*. (HASP) , *Glendale Chromium Operable Unit - Area 2, San Fernando Valley Superfund Sites.* August.

ERM. 2011e. *Draft Quality Assurance Project Plan (QAPP)* , *Glendale Chromium Operable Unit - Area 2, San Fernando Valley Superfund Sites.* September.

James M. Montgomery Consulting Engineers, Inc. 1992. *Remedial Investigation of Groundwater Contamination in the San Fernando Valley, Remedial Investigation Report.* December.

Los Angeles Department of Water and Power (LADWP). 1983. *Groundwater Quality Management Plan, San Fernando Valley Basin*. July.

Los Angeles Regional Water Quality Control Board. 2002. *Chromium VI Investigation: San Fernando Valley Phase 1 Inspection*. November.

ULARA. 2007. *Annual Report, Upper Los Angeles River Watermaster*. May.

ULARA. 2010. *Annual Report, Upper Los Angeles River Watermaster.* May.

ULARA. 2011. *Annual Report, Upper Los Angeles River Watermaster.* May.

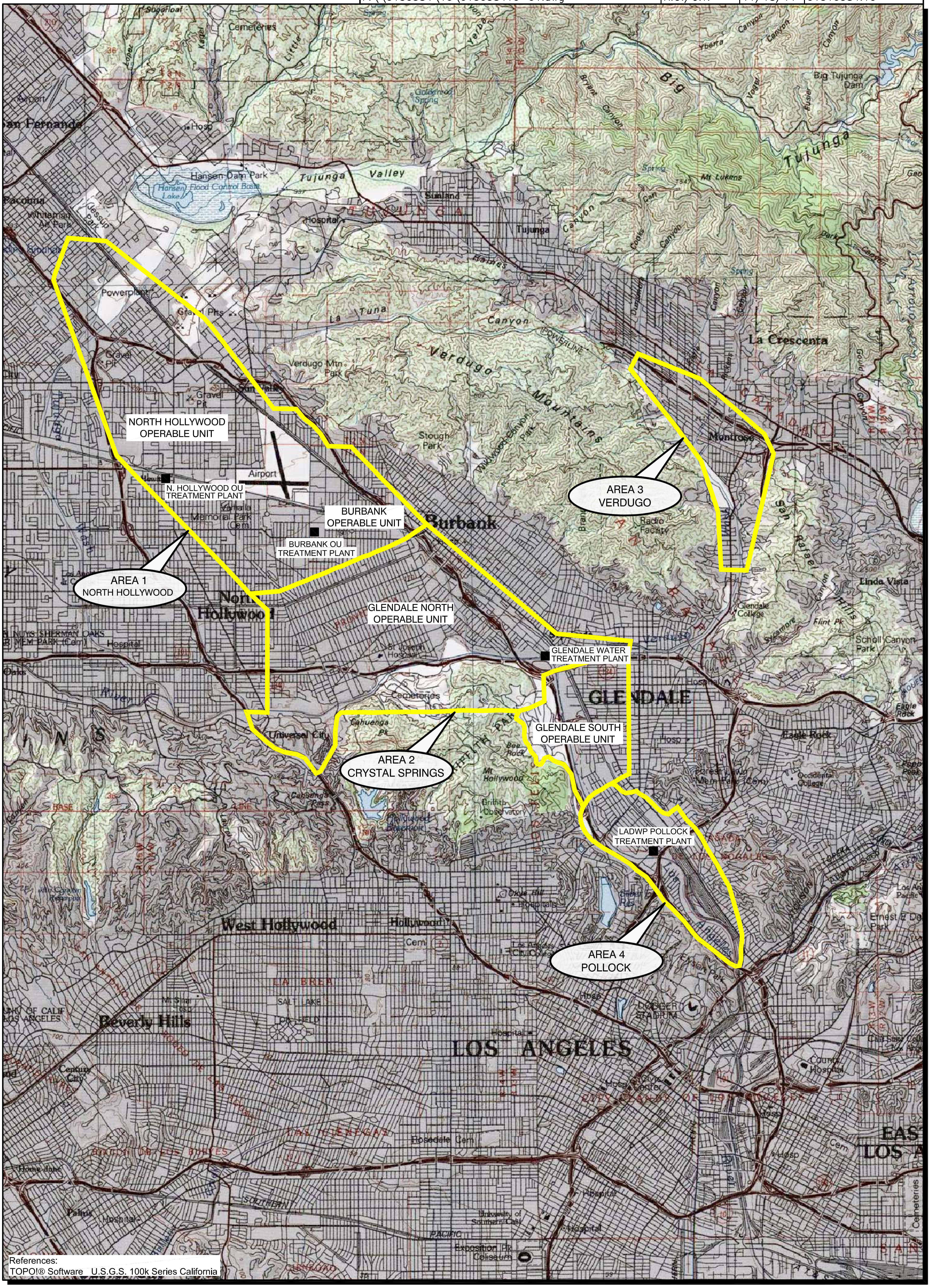
U.S. Environmental Protection Agency (USEPA). 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA.*

USEPA. 1996. *Low-Flow (Minimal Drawdown) Groundwater Sample Procedures*.

USEPA. 2008a. *First Five-Year Review Report for San Fernando Valley – Area 2 Superfund Site, Los Angeles County, California*.

Figures

CAD File:	Drawn By:	Date:	Project No.
F:\\0130384\10\013038410-01.dwg	R.O./C.T.	11/18/11	01310384.10



N

1" = 8000'

0 4000' 8000' 16,000' 24,000'

Figure 1
Site Location Map
Glendale Chromium Operable Unit
San Fernando Valley Superfund Site
Los Angeles County, California

ERM 11/11

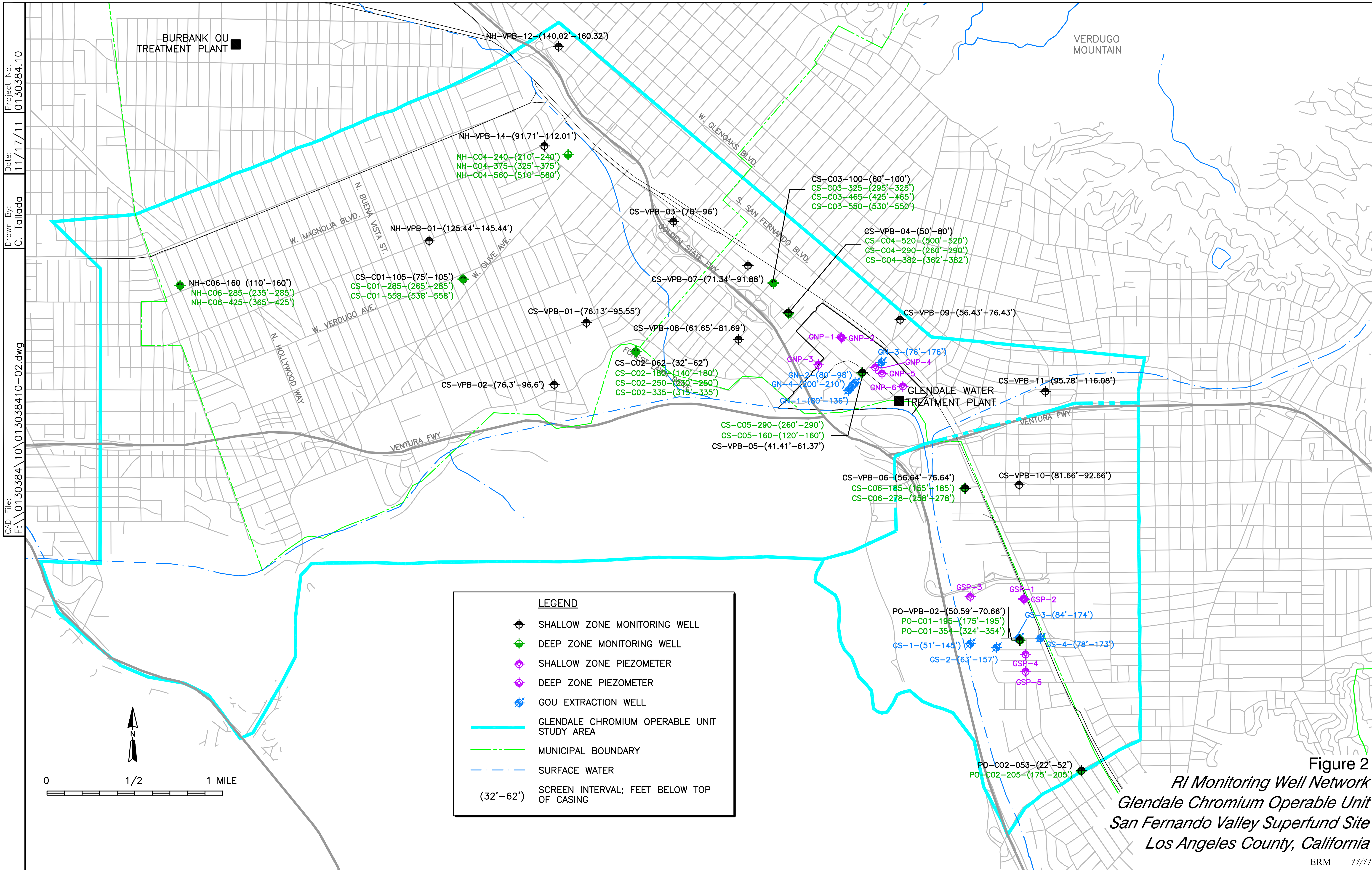


Figure 2
RI Monitoring Well Network
Glendale Chromium Operable Unit
San Fernando Valley Superfund Site
Los Angeles County, California

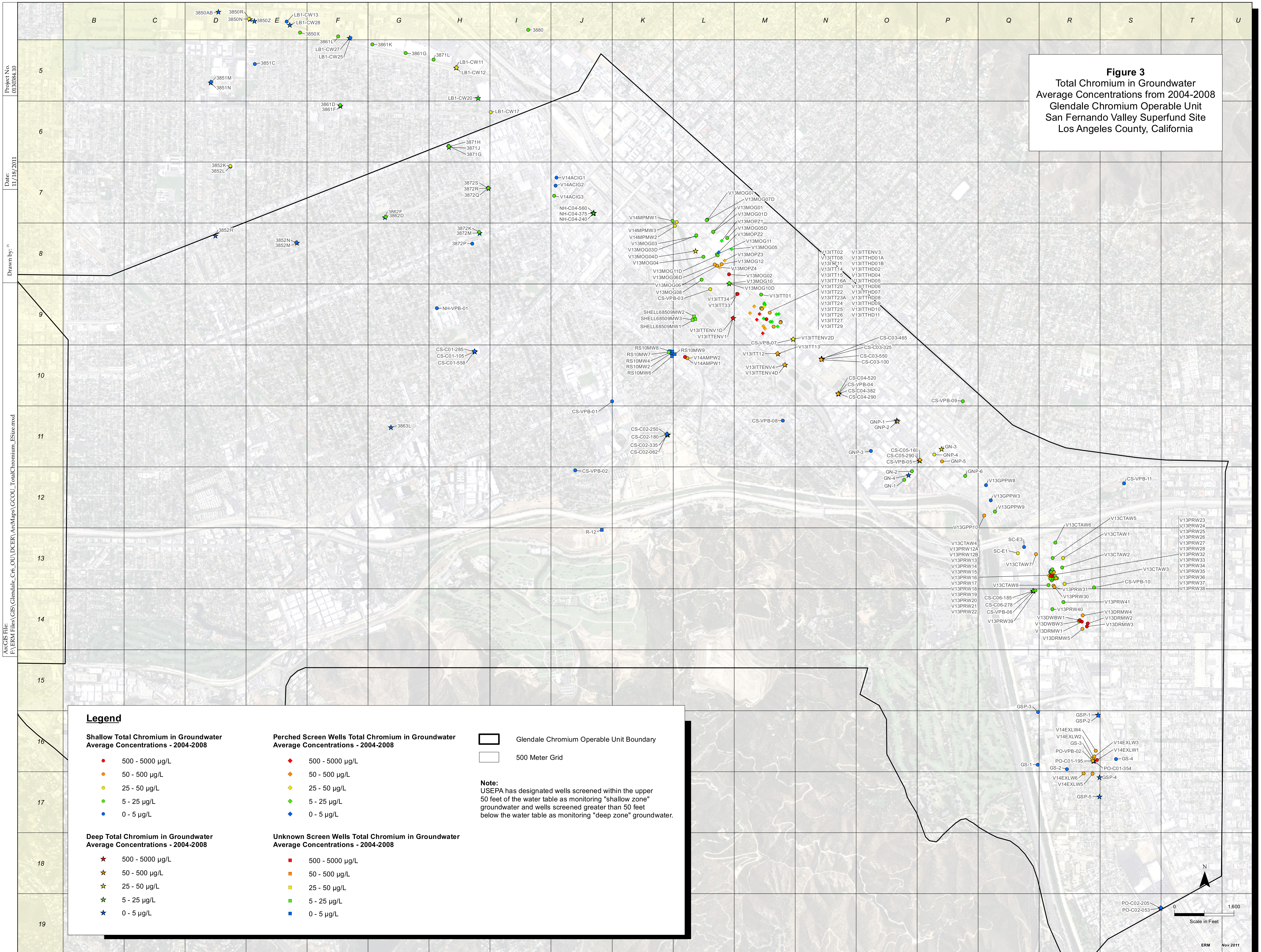


Figure 3
Total Chromium in Groundwater
Average Concentrations from 2004-2008
Glendale Chromium Operable Unit
San Fernando Valley Superfund Site
Los Angeles County, California
Project No. 0130384.10
Date: 11/18/2011
Drawn by: JA
ArcGIS File: F:\ERM Files\GIS\Glendale_Cr6_OU\DCER\ArcMaps\GCOU_TotalChromium_ESize.mxd
Legend
Shallow Total Chromium in Groundwater Average Concentrations - 2004-2008
500 - 5000 µg/L
50 - 500 µg/L
25 - 50 µg/L
5 - 25 µg/L
0 - 5 µg/L
Perched Screen Wells Total Chromium in Groundwater Average Concentrations - 2004-2008
500 - 5000 µg/L
50 - 500 µg/L
25 - 50 µg/L
5 - 25 µg/L
0 - 5 µg/L
Deep Total Chromium in Groundwater Average Concentrations - 2004-2008
500 - 5000 µg/L
50 - 500 µg/L
25 - 50 µg/L
5 - 25 µg/L
0 - 5 µg/L
Unknown Screen Wells Total Chromium in Groundwater Average Concentrations - 2004-2008
500 - 5000 µg/L
50 - 500 µg/L
25 - 50 µg/L
5 - 25 µg/L
0 - 5 µg/L
Glendale Chromium Operable Unit Boundary
500 Meter Grid
Note:
USEPA has designated wells screened within the upper 50 feet of the water table as monitoring "shallow zone" groundwater and wells screened greater than 50 feet below the water table as monitoring "deep zone" groundwater.
N
0
1,600
Scale in Feet
ERM
Nov 2011

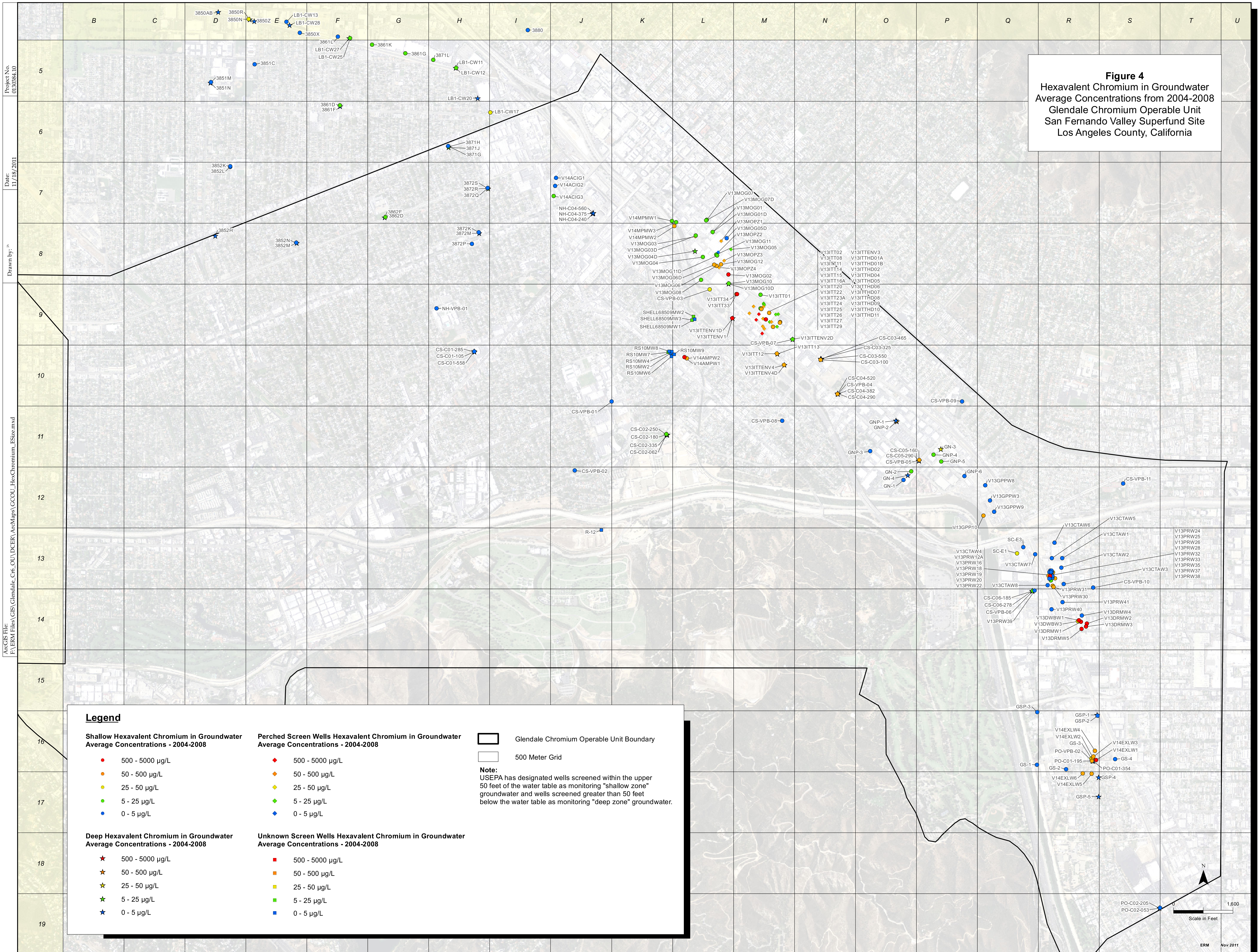
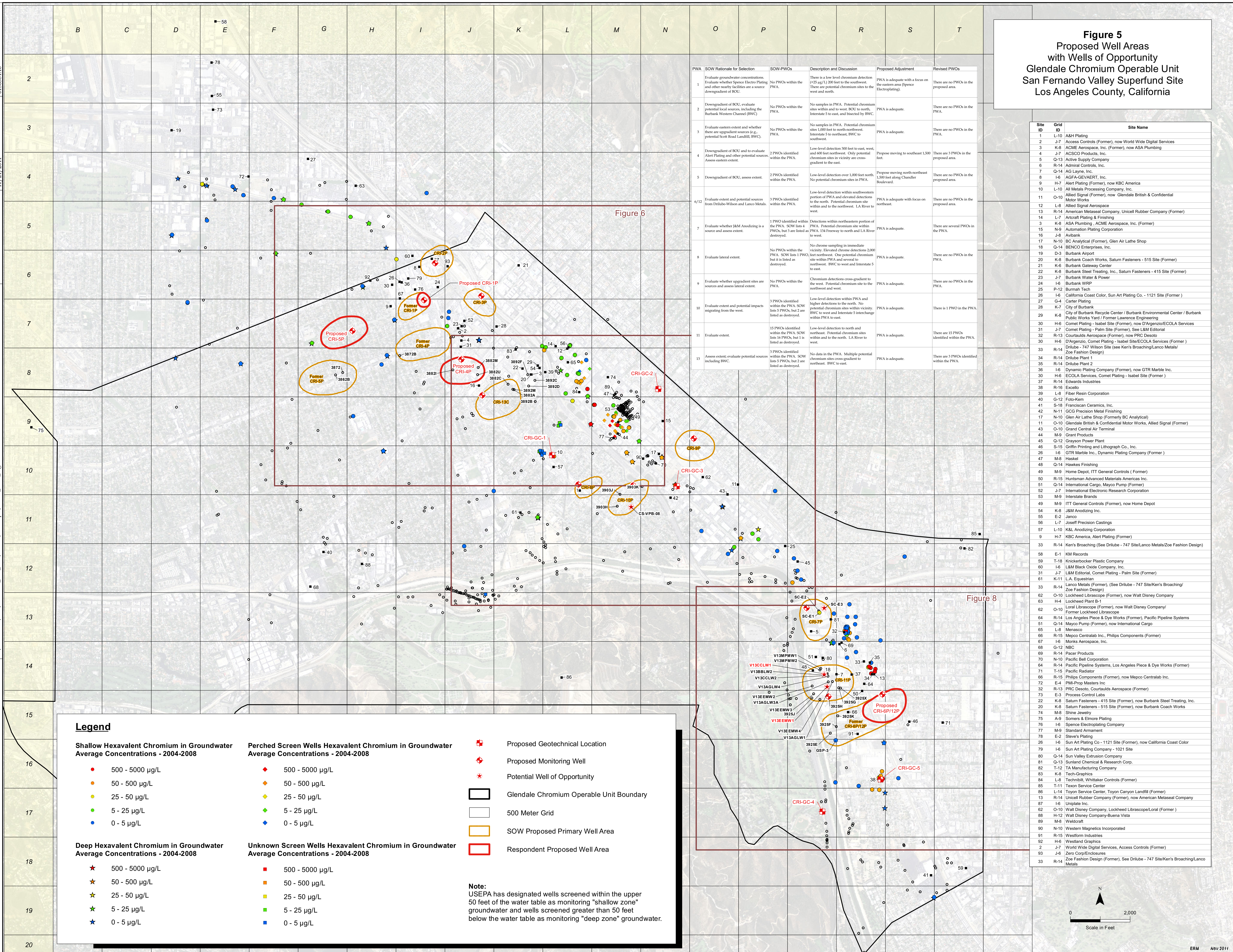


Figure 4
Hexavalent Chromium in Groundwater
Average Concentrations from 2004-2008
Glendale Chromium Operable Unit
San Fernando Valley Superfund Site
Los Angeles County, California
Project No. 0130384.10
Date: 11/18/2011
Drawn by:
ArcGIS File: F:\ERM Files\GIS\Glendale_Cr6_OU\DCER\ArcMaps\GCOU_HexChromium_ESize.mxd
Legend
Shallow Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008
500 - 5000 µg/L
50 - 500 µg/L
25 - 50 µg/L
5 - 25 µg/L
0 - 5 µg/L
Perched Screen Wells Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008
500 - 5000 µg/L
50 - 500 µg/L
25 - 50 µg/L
5 - 25 µg/L
0 - 5 µg/L
Deep Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008
500 - 5000 µg/L
50 - 500 µg/L
25 - 50 µg/L
5 - 25 µg/L
0 - 5 µg/L
Unknown Screen Wells Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008
500 - 5000 µg/L
50 - 500 µg/L
25 - 50 µg/L
5 - 25 µg/L
0 - 5 µg/L
Glendale Chromium Operable Unit Boundary
500 Meter Grid
Note:
USEPA has designated wells screened within the upper 50 feet of the water table as monitoring "shallow zone" groundwater and wells screened greater than 50 feet below the water table as monitoring "deep zone" groundwater.
N
0
1,600
Scale in Feet
ERM
Nov 2011

Figure 5
Proposed Well Areas
with Wells of Opportunity
Glendale Chromium Operable Unit
San Fernando Valley Superfund Site
Los Angeles County, California



PWA	SOW Rationale for Selection	SOW-PWOs	Description and Discussion	Proposed Adjustment	Revised PWOs
1	Evaluate groundwater concentrations. Evaluate whether Spence Electro Plating and other nearby facilities are a source downgradient of BOU.	No PWOs within the PWA.	There is a low level chromium detection (<25 µg/L) 200 feet to the southwest. There are potential chromium sites to the west and north.	PWA is adequate with a focus on the eastern area (Spence Electroplating).	There are no PWOs in the proposed area.
2	Downgradient of BOU, evaluate potential local sources, including the Burbank Western Channel (BWC)	No PWOs within the PWA.	No samples in PWA. Potential chromium sites within and to west. BOU to north, Interstate 5 to east, and bisected by BWC.	PWA is adequate.	There are no PWOs in the PWA.
3	Evaluate eastern extent and whether there are upgradient sources (e.g., potential Scott Road Landfill, BWC).	No PWOs within the PWA.	No samples in PWA. Potential chromium sites 1,000 feet to north-northwest. Interstate 5 to northeast, BWC to southwest.	PWA is adequate.	There are no PWOs in the PWA.
4	Downgradient of BOU and to evaluate Alert Plating and other potential sources. Assess eastern extent.	2 PWOs identified within the PWA.	Low-level detection 300 feet to east, west, and 600 feet northwest. Only potential chromium sites in vicinity are cross-gradient to the east.	Propose moving to southeast 1,500 feet.	There are 3 PWOs in the proposed area.
5	Downgradient of BOU, assess extent.	2 PWOs identified within the PWA.	Low-level detection over 1,000 feet north. No potential chromium sites in PWA.	Propose moving north-northeast 1,500 feet along Chandler Boulevard.	There are no PWOs in the proposed area.
6/12	Evaluate extent and potential sources from Drilube-Wilson and Lanco Metals.	3 PWOs identified within the PWA.	Low-level detection within southwestern portion of PWA and elevated detections to the north. Potential chromium site within and to the northwest. LA River to west.	PWA is adequate with focus on northeast.	There are no PWOs in the proposed area.
7	Evaluate whether J&M Anodizing is a source and assess extent.	1 PWO identified within the PWA. SOW lists 4 PWOs, but 3 are listed as destroyed.	Detections within northeastern portion of PWA. Potential chromium site within PWA. 134 Freeway to north and LA River to west.	PWA is adequate.	There are several PWOs in the PWA.
8	Evaluate lateral extent.	No PWOs within the PWA. SOW lists 1 PWO, but it is listed as destroyed.	No chrome sampling in immediate vicinity. Elevated chrome detections 2,000 feet northwest. One potential chromium site within PWA and several to northwest. BWC to west and Interstate 5 to east.	PWA is adequate.	There are no PWOs in the PWA.
9	Evaluate whether upgradient sites are sources and assess lateral extent.	No PWOs within the PWA.	Chromium detections cross-gradient to the west. Potential chromium site to the northwest and west.	PWA is adequate.	There are no PWOs in the PWA.
10	Evaluate extent and potential impacts migrating from the west.	3 PWOs identified within the PWA. SOW lists 5 PWOs, but 2 are listed as destroyed.	Low-level detection within PWA and higher detections to the north. No potential chromium sites within vicinity. BWC to west and Interstate 5 interchange within PWA to east.	PWA is adequate.	There is 1 PWO in the PWA.
11	Evaluate extent.	15 PWOs identified within the PWA. SOW lists 16 PWOs, but 1 is listed as destroyed.	Low-level detection to north and northeast. Potential chromium sites within and to the north. LA River to west.	PWA is adequate.	There are 15 PWOs identified within the PWA.
13	Assess extent; evaluate potential sources including BWC.	3 PWOs identified within the PWA. SOW lists 5 PWOs, but 2 are listed as destroyed.	No data in the PWA. Multiple potential chromium sites cross-gradient to northeast. BWC to east.	PWA is adequate.	There are 3 PWOs identified within the PWA.

Site ID	Grid ID	Site Name
1	L-10	A&H Plating
2	J-7	Access Controls (Former), now World Wide Digital Services
3	K-8	ACME Aerospace, Inc. (Former), now ASA Plumbing
4	J-7	ACSCO Products, Inc.
5	Q-13	Active Supply Company
6	R-14	Admiral Controls, Inc.
7	Q-14	AG Layne, Inc.
8	I-6	AGFA-GEVAERT, Inc.
9	H-7	Alert Plating (Former), now KBC America
10	L-10	All Metals Processing Company, Inc.
11	O-10	Allied Signal (Former), now Glendale British & Confidential Motor Works
12	L-8	Allied Signal Aerospace
13	R-14	American Metaseal Company, Unicell Rubber Company (Former)
14	L-7	Artcraft Plating & Finishing
3	K-8	ASA Plumbing , ACME Aerospace, Inc. (Former)
15	N-9	Automation Plating Corporation
16	J-8	Avibank
17	N-10	BC Analytical (Former), Glen Air Lathe Shop
18	Q-14	BENCO Enterprises, Inc.
19	D-3	Burbank Airport
20	K-8	Burbank Coach Works, Saturn Fasteners - 515 Site (Former)
21	K-6	Burbank Gateway Center
22	K-8	Burbank Steel Treating, Inc., Saturn Fasteners - 415 Site (Former)
23	J-7	Burbank Water & Power
24	I-6	Burbank WRP
25	P-12	Burmah Tech
26	I-6	California Coast Color, Sun Art Plating Co. - 1121 Site (Former)
27	G-4	Carter Plating
28	K-7	City of Burbank
29	K-8	City of Burbank Recycle Center / Burbank Environmental Center / Burbank Public Works Yard / Former Lawrence Engineering
30	H-6	Comet Plating - Isabel Site (Former), now D'Argenzio/ECOLA Services
31	J-7	Comet Plating - Palm Site (Former), See L&M Editorial
32	R-13	Courtaulds Aerospace (Former), now PRC Desoto
30	H-6	D'Argenzio, Comet Plating - Isabel Site/ECOLA Services (Former)
33	R-14	Drilube - 747 Wilson Site (see Ken's Broaching/Lanco Metals/ Zoe Fashion Design)
34	R-14	Drilube Plant 1
35	R-14	Drilube Plant 2
36	I-6	Dynamic Plating Company (Former), now GTR Marble Inc.
30	H-6	ECOLA Services, Comet Plating - Isabel Site (Former)
37	R-14	Edwards Industries
38	R-16	Excello
39	L-8	Fiber Resin Corporation
40	G-12	Foto-Kem
41	S-18	Franciscan Ceramics, Inc.
42	N-11	GCG Precision Metal Finishing
17	N-10	Glen Air Lathe Shop (Formerly BC Analytical)
11	O-10	Glendale British & Confidential Motor Works, Allied Signal (Former)
43	O-10	Grand Central Air Terminal
44	M-9	Grant Products
45	Q-12	Grayson Power Plant
46	S-15	Griffin Printing and Lithograph Co., Inc.
26	I-6	GTR Marble Inc., Dynamic Plating Company (Former)
47	M-8	Haskel
48	Q-14	Hawkes Finishing
49	M-9	Home Depot, ITT General Controls (Former)
50	R-15	Huntsman Advanced Materials Americas Inc.
51	Q-14	International Cargo, Mayco Pump (Former)
52	J-7	International Electronic Research Corporation
53	M-9	Interstate Brands
49	M-9	ITT General Controls (Former), now Home Depot
54	K-8	J&M Anodizing Inc.
55	E-2	Janco
56	L-7	Joseff Precision Castings
57	L-10	K&L Anodizing Corporation
9	H-7	KBC America, Alert Plating (Former)
33	R-14	Ken's Broaching (See Drilube - 747 Site/Lanco Metals/Zoe Fashion Design)
58	E-1	KM Records
59	T-18	Knickerbocker Plastic Company
60	I-6	L&M Black Oxide Company, Inc.
31	J-7	L&M Editorial, Comet Plating - Palm Site (Former)
61	K-11	L.A. Equestrian
33	R-14	Lanco Metals (Former), (See Drilube - 747 Site/Ken's Broaching/ Zoe Fashion Design)
62	O-10	Lockheed Librascope (Former), now Walt Disney Company
63	H-4	Lockheed Plant B-1
62	O-10	Loral Librascope (Former), now Walt Disney Company/ Former Lockheed Librascope
64	R-14	Los Angeles Piece & Dye Works (Former), Pacific Pipeline Systems
51	Q-14	Mayco Pump (Former), now International Cargo
65	L-8	Menasco
66	R-15	Mepco Centralab Inc., Philips Components (Former)
67	I-6	Monks Aerospace, Inc.
68	G-12	NBC
69	R-14	Pacer Products
70	N-10	Pacific Bell Corporation
64	R-14	Pacific Pipeline Systems, Los Angeles Piece & Dye Works (Former)
71	T-15	Pacific Radiator
66	R-15	Philips Components (Former), now Mepco Centralab Inc.
72	E-4	PMI-Prop Masters Inc
32	R-13	PRC Desoto, Courtaulds Aerospace (Former)
73	E-3	Process Control Labs
22	K-8	Saturn Fasteners - 415 Site (Former), now Burbank Steel Treating, Inc.
20	K-8	Saturn Fasteners - 515 Site (Former), now Burbank Coach Works
74	M-8	Shine Jewelry
75	A-9	Somers & Elmore Plating
76	I-6	Spence Electroplating Company
77	M-9	Standard Armament
78	E-2	Steve's Plating
26	I-6	Sun Art Plating Co - 1121 Site (Former), now California Coast Color
79	I-6	Sun Art Plating Company - 1021 Site
80	Q-14	Sun Valley Extrusion Company
81	Q-13	Sunland Chemical & Research Corp.
82	T-12	TA Manufacturing Company
83	K-8	Tech-Graphics
84	L-8	Technibilt, Whittaker Controls (Former)
85	T-11	Texon Service Center
86	L-14	Toyon Service Center, Toyon Canyon Landfill (Former)
13	R-14	Unicell Rubber Company (Former), now American Metaseal Company
87	I-6	Uniplate Inc.
62	O-10	Walt Disney Company, Lockheed Librascope/Loral (Former)
88	H-12	Walt Disney Company-Buena Vista
89	M-8	Weldcraft
90	N-10	Western Magnetics Incorporated
91	R-15	Westform Industries
92	H-6	Westland Graphics
2	J-7	World Wide Digital Services, Access Controls (Former)
93	J-6	Zero Corp/Enclosures
33	R-14	Zoe Fashion Design (Former), See Drilube - 747 Site/Ken's Broaching/Lanco Metals

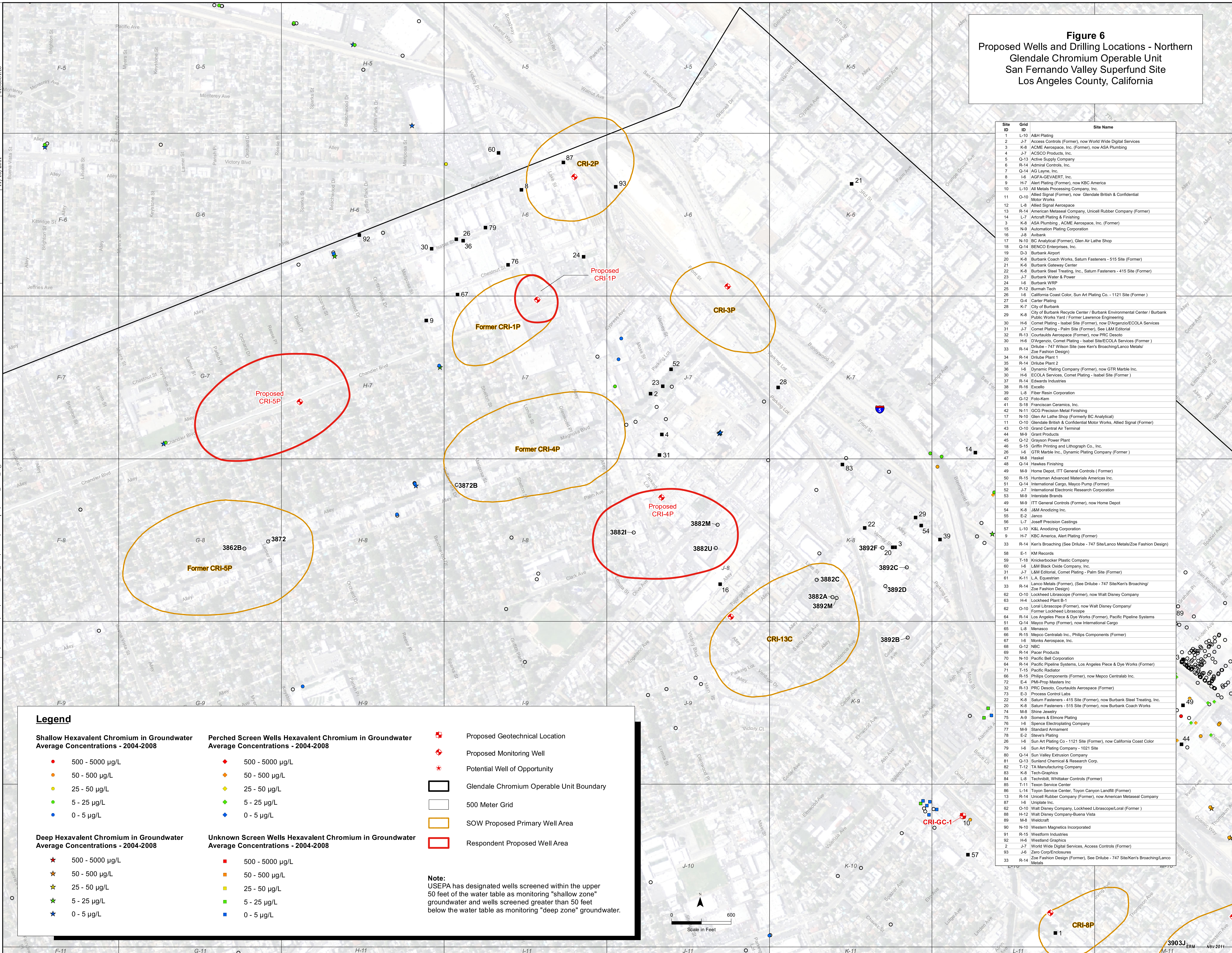
Project No. 0130884.10

Date: 11/16/2011

Drawn by:

ArcGIS File: F:\ERM Files\GIS\Glendale_Cr6_OU\DCER\ArcMaps\DCER_SWP_Figure6.mxd

Figure 6
Proposed Wells and Drilling Locations - Northern Glendale Chromium Operable Unit
San Fernando Valley Superfund Site
Los Angeles County, California



Site ID	Grid ID	Site Name
1	L-10	A&H Plating
2	J-7	Access Controls (Former), now World Wide Digital Services
3	K-8	ACME Aerospace, Inc. (Former), now ASA Plumbing
4	J-7	ACSCO Products, Inc.
5	Q-13	Active Supply Company
6	R-14	Admiral Controls, Inc.
7	Q-14	AG Layne, Inc.
8	I-6	AGFA-GEVAERT, Inc.
9	H-7	Alert Plating (Former), now KBC America
10	L-10	All Metals Processing Company, Inc.
11	O-10	Allied Signal (Former), now Glendale British & Confidential Motor Works
12	L-8	Allied Signal Aerospace
13	R-14	American Metaseal Company, Unicell Rubber Company (Former)
14	L-7	Artcraft Plating & Finishing
3	K-8	ASA Plumbing , ACME Aerospace, Inc. (Former)
15	N-9	Automation Plating Corporation
16	J-8	Avibank
17	N-10	BC Analytical (Former), Glen Air Lathe Shop
18	Q-14	BENCO Enterprises, Inc.
19	D-3	Burbank Airport
20	K-8	Burbank Coach Works, Saturn Fasteners - 515 Site (Former)
21	K-6	Burbank Gateway Center
22	K-8	Burbank Steel Treating, Inc., Saturn Fasteners - 415 Site (Former)
23	J-7	Burbank Water & Power
24	I-6	Burbank WRP
25	P-12	Burmah Tech
26	I-6	California Coast Color, Sun Art Plating Co. - 1121 Site (Former)
27	G-4	Carter Plating
28	K-7	City of Burbank
29	K-8	City of Burbank Recycle Center / Burbank Environmental Center / Burbank Public Works Yard / Former Lawrence Engineering
30	H-6	Comet Plating - Isabel Site (Former), now D'Argenzio/ECOLA Services
31	J-7	Comet Plating - Palm Site (Former), See L&M Editorial
32	R-13	Courtaulds Aerospace (Former), now PRC Desoto
30	H-6	D'Argenzio, Comet Plating - Isabel Site/ECOLA Services (Former)
33	R-14	Drilube - 747 Wilson Site (see Ken's Broaching/Lanco Metals/ Zoe Fashion Design)
34	R-14	Drilube Plant 1
35	R-14	Drilube Plant 2
36	I-6	Dynamic Plating Company (Former), now GTR Marble Inc.
30	H-6	ECOLA Services, Comet Plating - Isabel Site (Former)
37	R-14	Edwards Industries
38	R-16	Excello
39	L-8	Fiber Resin Corporation
40	G-12	Foto-Kem
41	S-18	Franciscan Ceramics, Inc.
42	N-11	GCG Precision Metal Finishing
17	N-10	Glen Air Lathe Shop (Formerly BC Analytical)
11	O-10	Glendale British & Confidential Motor Works, Allied Signal (Former)
43	O-10	Grand Central Air Terminal
44	M-9	Grant Products
45	Q-12	Grayson Power Plant
46	S-15	Griffin Printing and Lithograph Co., Inc.
26	I-6	GTR Marble Inc., Dynamic Plating Company (Former)
47	M-8	Haskel
48	Q-14	Hawkes Finishing
49	M-9	Home Depot, ITT General Controls (Former)
50	R-15	Huntsman Advanced Materials Americas Inc.
51	Q-14	International Cargo, Mayco Pump (Former)
52	J-7	International Electronic Research Corporation
53	M-9	Interstate Brands
49	M-9	ITT General Controls (Former), now Home Depot
54	K-8	J&M Anodizing Inc.
55	E-2	Janco
56	L-7	Joseff Precision Castings
57	L-10	K&L Anodizing Corporation
9	H-7	KBC America, Alert Plating (Former)
33	R-14	Ken's Broaching (See Drilube - 747 Site/Lanco Metals/Zoe Fashion Design)
58	E-1	KM Records
59	T-18	Knickerbocker Plastic Company
60	I-6	L&M Black Oxide Company, Inc.
31	J-7	L&M Editorial, Comet Plating - Palm Site (Former)
61	K-11	L.A. Equestrian
33	R-14	Lanco Metals (Former), (See Drilube - 747 Site/Ken's Broaching/ Zoe Fashion Design)
62	O-10	Lockheed Librascope (Former), now Walt Disney Company
63	H-4	Lockheed Plant B-1
62	O-10	Loral Librascope (Former), now Walt Disney Company/ Former Lockheed Librascope
64	R-14	Los Angeles Piece & Dye Works (Former), Pacific Pipeline Systems
51	Q-14	Mayco Pump (Former), now International Cargo
65	L-8	Menasco
66	R-15	Mepco Centralab Inc., Philips Components (Former)
67	I-6	Monks Aerospace, Inc.
68	G-12	NBC
69	R-14	Pacer Products
70	N-10	Pacific Bell Corporation
64	R-14	Pacific Pipeline Systems, Los Angeles Piece & Dye Works (Former)
71	T-15	Pacific Radiator
66	R-15	Philips Components (Former), now Mepco Centralab Inc.
72	E-4	PMI-Prop Masters Inc
32	R-13	PRC Desoto, Courtaulds Aerospace (Former)
73	E-3	Process Control Labs
22	K-8	Saturn Fasteners - 415 Site (Former), now Burbank Steel Treating, Inc.
20	K-8	Saturn Fasteners - 515 Site (Former), now Burbank Coach Works
74	M-8	Shine Jewelry
75	A-9	Somers & Elmore Plating
76	I-6	Spence Electroplating Company
77	M-9	Standard Armament
78	E-2	Steve's Plating
26	I-6	Sun Art Plating Co - 1121 Site (Former), now California Coast Color
79	I-6	Sun Art Plating Company - 1021 Site
80	Q-14	Sun Valley Extrusion Company
81	Q-13	Sunland Chemical & Research Corp.
82	T-12	TA Manufacturing Company
83	K-8	Tech-Graphics
84	L-8	Technibilt, Whittaker Controls (Former)
85	T-11	Texon Service Center
86	L-14	Toyon Service Center, Toyon Canyon Landfill (Former)
13	R-14	Unicell Rubber Company (Former), now American Metaseal Company
87	I-6	Uniplate Inc.
62	O-10	Walt Disney Company, Lockheed Librascope/Loral (Former)
88	H-12	Walt Disney Company-Buena Vista
89	M-8	Weldcraft
90	N-10	Western Magnetics Incorporated
91	R-15	Westform Industries
92	H-6	Westland Graphics
2	J-7	World Wide Digital Services, Access Controls (Former)
93	J-6	Zero Corp/Enclosures
33	R-14	Zoe Fashion Design (Former), See Drilube - 747 Site/Ken's Broaching/Lanco Metals

Legend

Shallow Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008
- 500 - 5000 µg/L
- 50 - 500 µg/L
- 25 - 50 µg/L
- 5 - 25 µg/L
- 0 - 5 µg/L

Deep Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008
- 500 - 5000 µg/L
- 50 - 500 µg/L
- 25 - 50 µg/L
- 5 - 25 µg/L
- 0 - 5 µg/L

Perched Screen Wells Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008
- 500 - 5000 µg/L
- 50 - 500 µg/L
- 25 - 50 µg/L
- 5 - 25 µg/L
- 0 - 5 µg/L

Unknown Screen Wells Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008
- 500 - 5000 µg/L
- 50 - 500 µg/L
- 25 - 50 µg/L
- 5 - 25 µg/L
- 0 - 5 µg/L

- Proposed Geotechnical Location
- Proposed Monitoring Well
- Potential Well of Opportunity
- Glendale Chromium Operable Unit Boundary
- 500 Meter Grid
- SOW Proposed Primary Well Area
- Respondent Proposed Well Area

Note:
USEPA has designated wells screened within the upper 50 feet of the water table as monitoring "shallow zone" groundwater and wells screened greater than 50 feet below the water table as monitoring "deep zone" groundwater.

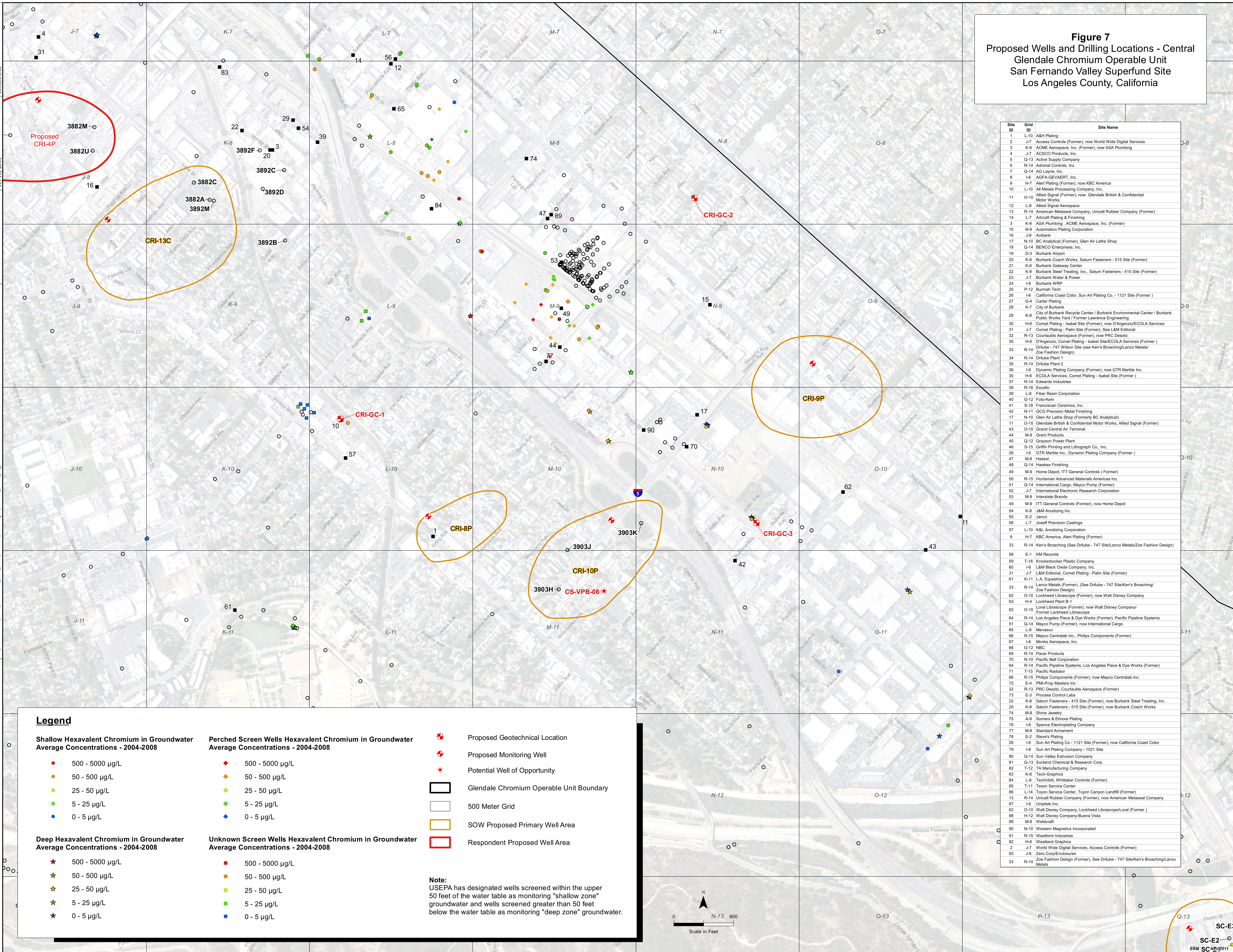


Figure 7

Proposed Wells and Drilling Locations - Central
Glendale Chromium Operable Unit
San Fernando Valley Superfund Site
Los Angeles County, California

Site ID	Grid ID	Site Name
1	L-10	A&H Plating
2	J-7	Access Controls (Former), now World Wide Digital Services
3	K-8	ACME Aerospace, Inc. (Former), now ASA Plumbing
4	J-7	ACSCO Products, Inc.
5	Q-13	Active Supply Company
6	R-14	Admiral Controls, Inc.
7	Q-14	AG Layne, Inc.
8	I-6	AGFA-GEVAERT, Inc.
9	H-7	Alert Plating (Former), now KBC America
10	L-10	All Metals Processing Company, Inc.
11	O-10	Allied Signal (Former), now Glendale British & Confidential Motor Works
12	L-8	Allied Signal Aerospace
13	R-14	American Metaseal Company, Unicell Rubber Company (Former)
14	L-7	Artcraft Plating & Finishing
3	K-8	ASA Plumbing , ACME Aerospace, Inc. (Former)
15	N-9	Automation Plating Corporation
16	J-8	Avibank
17	N-10	BC Analytical (Former), Glen Air Lathe Shop
18	Q-14	BENCO Enterprises, Inc.
19	D-3	Burbank Airport
20	K-8	Burbank Coach Works, Saturn Fasteners - 515 Site (Former)
21	K-6	Burbank Gateway Center
22	K-8	Burbank Steel Treating, Inc., Saturn Fasteners - 415 Site (Former)
23	J-7	Burbank Water & Power
24	I-6	Burbank WRP
25	P-12	Burmah Tech
26	I-6	California Coast Color, Sun Art Plating Co. - 1121 Site (Former)
27	G-4	Carter Plating
28	K-7	City of Burbank
29	K-8	City of Burbank Recycle Center / Burbank Environmental Center / Burbank Public Works Yard / Former Lawrence Engineering
30	H-6	Comet Plating - Isabel Site (Former), now D'Argenzio/ECOLA Services
31	J-7	Comet Plating - Palm Site (Former), See L&M Editorial
32	R-13	Courtaulds Aerospace (Former), now PRC Desoto
30	H-6	D'Argenzio, Comet Plating - Isabel Site/ECOLA Services (Former)
33	R-14	Drilube - 747 Wilson Site (see Ken's Broaching/Lanco Metals/ Zoe Fashion Design)
34	R-14	Drilube Plant 1
35	R-14	Drilube Plant 2
36	I-6	Dynamic Plating Company (Former), now GTR Marble Inc.
30	H-6	ECOLA Services, Comet Plating - Isabel Site (Former)
37	R-14	Edwards Industries
38	R-16	Excello
39	L-8	Fiber Resin Corporation
40	G-12	Foto-Kem
41	S-18	Franciscan Ceramics, Inc.
42	N-11	GCG Precision Metal Finishing
17	N-10	Glen Air Lathe Shop (Formerly BC Analytical)
11	O-10	Glendale British & Confidential Motor Works, Allied Signal (Former)
43	O-10	Grand Central Air Terminal
44	M-9	Grant Products
45	Q-12	Grayson Power Plant
46	S-15	Griffin Printing and Lithograph Co., Inc.
26	I-6	GTR Marble Inc., Dynamic Plating Company (Former)
47	M-8	Haskel
48	Q-14	Hawkes Finishing
49	M-9	Home Depot, ITT General Controls (Former)
50	R-15	Huntsman Advanced Materials Americas Inc.
51	Q-14	International Cargo, Mayco Pump (Former)
52	J-7	International Electronic Research Corporation
53	M-9	Interstate Brands
49	M-9	ITT General Controls (Former), now Home Depot
54	K-8	J&M Anodizing Inc.
55	E-2	Janco
56	L-7	Joseff Precision Castings
57	L-10	K&L Anodizing Corporation
9	H-7	KBC America, Alert Plating (Former)
33	R-14	Ken's Broaching (See Drilube - 747 Site/Lanco Metals/Zoe Fashion Design)
58	E-1	KM Records
59	T-18	Knickerbocker Plastic Company
60	I-6	L&M Black Oxide Company, Inc.
31	J-7	L&M Editorial, Comet Plating - Palm Site (Former)
61	K-11	L.A. Equestrian
33	R-14	Lanco Metals (Former), (See Drilube - 747 Site/Ken's Broaching/ Zoe Fashion Design)
62	O-10	Lockheed Librascope (Former), now Walt Disney Company
63	H-4	Lockheed Plant B-1
62	O-10	Loral Librascope (Former), now Walt Disney Company/ Former Lockheed Librascope
64	R-14	Los Angeles Piece & Dye Works (Former), Pacific Pipeline Systems
51	Q-14	Mayco Pump (Former), now International Cargo
65	L-8	Menasco
66	R-15	Mepco Centralab Inc., Philips Components (Former)
67	I-6	Monks Aerospace, Inc.
68	G-12	NBC
69	R-14	Pacer Products
70	N-10	Pacific Bell Corporation
64	R-14	Pacific Pipeline Systems, Los Angeles Piece & Dye Works (Former)
71	T-15	Pacific Radiator
66	R-15	Philips Components (Former), now Mepco Centralab Inc.
72	E-4	PMI-Prop Masters Inc
32	R-13	PRC Desoto, Courtaulds Aerospace (Former)
73	E-3	Process Control Labs
22	K-8	Saturn Fasteners - 415 Site (Former), now Burbank Steel Treating, Inc.
20	K-8	Saturn Fasteners - 515 Site (Former), now Burbank Coach Works
74	M-8	Shine Jewelry
75	A-9	Somers & Elmore Plating
76	I-6	Spence Electroplating Company
77	M-9	Standard Armament
78	E-2	Steve's Plating
26	I-6	Sun Art Plating Co - 1121 Site (Former), now California Coast Color
79	I-6	Sun Art Plating Company - 1021 Site
80	Q-14	Sun Valley Extrusion Company
81	Q-13	Sunland Chemical & Research Corp.
82	T-12	TA Manufacturing Company
83	K-8	Tech-Graphics
84	L-8	Technibilt, Whittaker Controls (Former)
85	T-11	Texon Service Center
86	L-14	Toyon Service Center, Toyon Canyon Landfill (Former)
13	R-14	Unicell Rubber Company (Former), now American Metaseal Company
87	I-6	Uniplate Inc.
62	O-10	Walt Disney Company, Lockheed Librascope/Loral (Former)
88	H-12	Walt Disney Company-Buena Vista
89	M-8	Weldcraft
90	N-10	Western Magnetics Incorporated
91	R-15	Westform Industries
92	H-6	Westland Graphics
2	J-7	World Wide Digital Services, Access Controls (Former)
93	J-6	Zero Corp/Enclosures
33	R-14	Zoe Fashion Design (Former), See Drilube - 747 Site/Ken's Broaching/Lanco Metals

Legend

Shallow Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008

- 500 - 5000 µg/L
- 50 - 500 µg/L
- 25 - 50 µg/L
- 5 - 25 µg/L
- 0 - 5 µg/L

Deep Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008

- 500 - 5000 µg/L
- 50 - 500 µg/L
- 25 - 50 µg/L
- 5 - 25 µg/L
- 0 - 5 µg/L

Perched Screen Wells Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008

- 500 - 5000 µg/L
- 50 - 500 µg/L
- 25 - 50 µg/L
- 5 - 25 µg/L
- 0 - 5 µg/L

Unknown Screen Wells Hexavalent Chromium in Groundwater Average Concentrations - 2004-2008

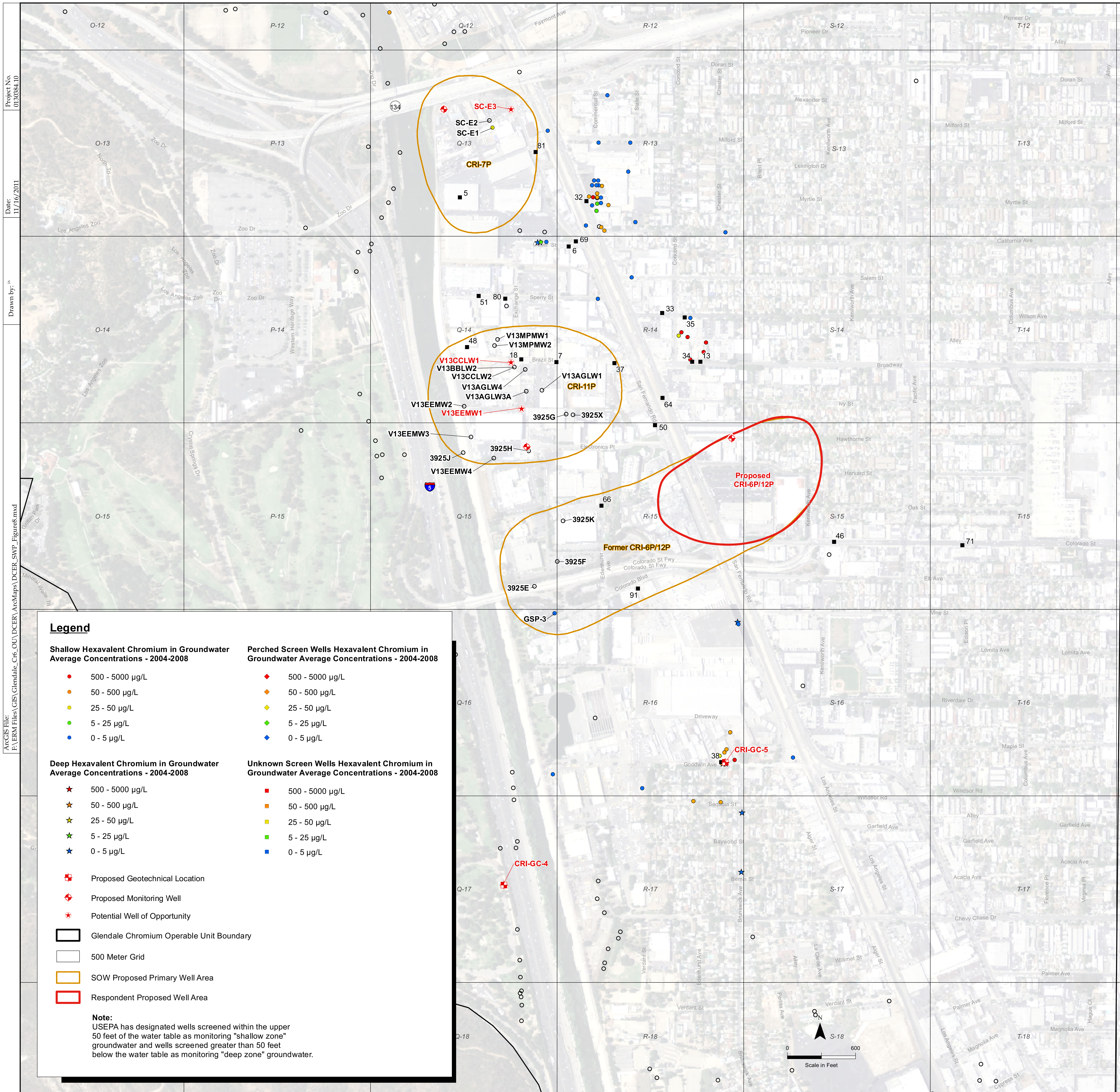
- 500 - 5000 µg/L
- 50 - 500 µg/L
- 25 - 50 µg/L
- 5 - 25 µg/L
- 0 - 5 µg/L

- Proposed Geotechnical Location
- Proposed Monitoring Well
- Potential Well of Opportunity
- Glendale Chromium Operable Unit Boundary
- 500 Meter Grid
- SOW Proposed Primary Well Area
- Respondent Proposed Well Area

Note:
USEPA has designated wells screened within the upper 50 feet of the water table as monitoring "shallow zone" groundwater and wells screened greater than 50 feet below the water table as monitoring "deep zone" groundwater.

Project No. 0130384.10
Date: 11/16/2011
Drawn by:
ArcGIS File: F:\ERM Files\GIS\Glendale_Cr6_OU\DCER\ArcMaps\DCER_SWP_Figure7.mxd

Figure 8
Proposed Wells and Drilling Locations - Southern Glendale Chromium Operable Unit
San Fernando Valley Superfund Site
Los Angeles County, California



Site ID	Grid ID	Site Name
1	L-10	A&H Plating
2	J-7	Access Controls (Former), now World Wide Digital Services
3	K-8	ACME Aerospace, Inc. (Former), now ASA Plumbing
4	J-7	ACSCO Products, Inc.
5	Q-13	Active Supply Company
6	R-14	Admiral Controls, Inc.
7	Q-14	AG Layne, Inc.
8	I-6	AGFA-GEVAERT, Inc.
9	H-7	Alert Plating (Former), now KBC America
10	L-10	All Metals Processing Company, Inc.
11	O-10	Allied Signal (Former), now Glendale British & Confidential Motor Works
12	L-8	Allied Signal Aerospace
13	R-14	American Metaseal Company, Unicell Rubber Company (Former)
14	L-7	Artcraft Plating & Finishing
3	K-8	ASA Plumbing , ACME Aerospace, Inc. (Former)
15	N-9	Automation Plating Corporation
16	J-8	Avibank
17	N-10	BC Analytical (Former), Glen Air Lathe Shop
18	Q-14	BENCO Enterprises, Inc.
19	D-3	Burbank Airport
20	K-8	Burbank Coach Works, Saturn Fasteners - 515 Site (Former)
21	K-6	Burbank Gateway Center
22	K-8	Burbank Steel Treating, Inc., Saturn Fasteners - 415 Site (Former)
23	J-7	Burbank Water & Power
24	I-6	Burbank WRP
25	P-12	Burmah Tech
26	I-6	California Coast Color, Sun Art Plating Co. - 1121 Site (Former)
27	G-4	Carter Plating
28	K-7	City of Burbank
29	K-8	City of Burbank Recycle Center / Burbank Environmental Center / Burbank Public Works Yard / Former Lawrence Engineering
30	H-6	Comet Plating - Isabel Site (Former), now D'Argenzio/ECOLA Services
31	J-7	Comet Plating - Palm Site (Former), See L&M Editorial
32	R-13	Courtaulds Aerospace (Former), now PRC Desoto
30	H-6	D'Argenzio, Comet Plating - Isabel Site/ECOLA Services (Former)
33	R-14	Drilube - 747 Wilson Site (see Ken's Broaching/Lanco Metals/ Zoe Fashion Design)
34	R-14	Drilube Plant 1
35	R-14	Drilube Plant 2
36	I-6	Dynamic Plating Company (Former), now GTR Marble Inc.
30	H-6	ECOLA Services, Comet Plating - Isabel Site (Former)
37	R-14	Edwards Industries
38	R-16	Excello
39	L-8	Fiber Resin Corporation
40	G-12	Foto-Kem
41	S-18	Franciscan Ceramics, Inc.
42	N-11	GCG Precision Metal Finishing
17	N-10	Glen Air Lathe Shop (Formerly BC Analytical)
11	O-10	Glendale British & Confidential Motor Works, Allied Signal (Former)
43	O-10	Grand Central Air Terminal
44	M-9	Grant Products
45	Q-12	Grayson Power Plant
46	S-15	Griffin Printing and Lithograph Co., Inc.
26	I-6	GTR Marble Inc., Dynamic Plating Company (Former)
47	M-8	Haskel
48	Q-14	Hawkes Finishing
49	M-9	Home Depot, ITT General Controls (Former)
50	R-15	Huntsman Advanced Materials Americas Inc.
51	Q-14	International Cargo, Mayco Pump (Former)
52	J-7	International Electronic Research Corporation
53	M-9	Interstate Brands
49	M-9	ITT General Controls (Former), now Home Depot
54	K-8	J&M Anodizing Inc.
55	E-2	Janco
56	L-7	Joseff Precision Castings
57	L-10	K&L Anodizing Corporation
9	H-7	KBC America, Alert Plating (Former)
33	R-14	Ken's Broaching (See Drilube - 747 Site/Lanco Metals/Zoe Fashion Design)
58	E-1	KM Records
59	T-18	Knickerbocker Plastic Company
60	I-6	L&M Black Oxide Company, Inc.
31	J-7	L&M Editorial, Comet Plating - Palm Site (Former)
61	K-11	L.A. Equestrian
33	R-14	Lanco Metals (Former), (See Drilube - 747 Site/Ken's Broaching/ Zoe Fashion Design)
62	O-10	Lockheed Librascope (Former), now Walt Disney Company
63	H-4	Lockheed Plant B-1
62	O-10	Loral Librascope (Former), now Walt Disney Company/ Former Lockheed Librascope
64	R-14	Los Angeles Piece & Dye Works (Former), Pacific Pipeline Systems
51	Q-14	Mayco Pump (Former), now International Cargo
65	L-8	Menasco
66	R-15	Mepco Centralab Inc., Philips Components (Former)
67	I-6	Monks Aerospace, Inc.
68	G-12	NBC
69	R-14	Pacer Products
70	N-10	Pacific Bell Corporation
64	R-14	Pacific Pipeline Systems, Los Angeles Piece & Dye Works (Former)
71	T-15	Pacific Radiator
66	R-15	Philips Components (Former), now Mepco Centralab Inc.
72	E-4	PMI-Prop Masters Inc
32	R-13	PRC Desoto, Courtaulds Aerospace (Former)
73	E-3	Process Control Labs
22	K-8	Saturn Fasteners - 415 Site (Former), now Burbank Steel Treating, Inc.
20	K-8	Saturn Fasteners - 515 Site (Former), now Burbank Coach Works
74	M-8	Shine Jewelry
75	A-9	Somers & Elmore Plating
76	I-6	Spence Electroplating Company
77	M-9	Standard Armament
78	E-2	Steve's Plating
26	I-6	Sun Art Plating Co - 1121 Site (Former), now California Coast Color
79	I-6	Sun Art Plating Company - 1021 Site
80	Q-14	Sun Valley Extrusion Company
81	Q-13	Sunland Chemical & Research Corp.
82	T-12	TA Manufacturing Company
83	K-8	Tech-Graphics
84	L-8	Technibilt, Whittaker Controls (Former)
85	T-11	Texon Service Center
86	L-14	Toyon Service Center, Toyon Canyon Landfill (Former)
13	R-14	Unicell Rubber Company (Former), now American Metaseal Company
87	I-6	Uniplate Inc.
62	O-10	Walt Disney Company, Lockheed Librascope/Loral (Former)
88	H-12	Walt Disney Company-Buena Vista
89	M-8	Weldcraft
90	N-10	Western Magnetics Incorporated
91	R-15	Westform Industries
92	H-6	Westland Graphics
2	J-7	World Wide Digital Services, Access Controls (Former)
93	J-6	Zero Corp/Enclosures
33	R-14	Zoe Fashion Design (Former), See Drilube - 747 Site/Ken's Broaching/Lanco Metals

Figure 9
Specified Work Schedule
Glendale Chromium Operable Unit

ID	Task Name	Duration	Start	Finish
1	**GCOU Specified Work**	**650 days**	**Mon 3/7/11**	**Sat 12/15/12**
2	**Administrative**	**650 days**	**Mon 3/7/11**	**Sat 12/15/12**
3	AOC Effective Date	1 day	Mon 3/7/11	Mon 3/7/11
4	Contractor Notification to EPA	30 days	Tue 3/8/11	Wed 4/6/11
5	Project Coordinator Notification to EPA	30 days	Tue 3/8/11	Wed 4/6/11
6	Payment of Past Response Cost	0 days	Wed 4/6/11	Wed 4/6/11
7	Financial Assurance	0 days	Wed 4/6/11	Wed 4/6/11
8	**Biweekly Internal Status Calls**	**617 days**	**Tue 4/5/11**	**Tue 12/11/12**
54	**Monthly EPA Status Report - Internal Review**	**611 days**	**Sun 4/10/11**	**Mon 12/10/12**
76	**Monthly EPA Status Report**	**611 days**	**Fri 4/15/11**	**Sat 12/15/12**
98				
99	**TASK 1 - Planning Deliverables**	**291 days**	**Mon 3/7/11**	**Thu 12/22/11**
100	**DRAFT Data Compilation and Evaluation Report (DCER)**	**184 days**	**Mon 3/7/11**	**Tue 9/6/11**
125	Draft DCER to EPA	0 days	Tue 9/6/11	Tue 9/6/11
126	EPA Comments on Draft DCER	48 days	Wed 9/7/11	Mon 10/24/11
127	EPA Conference Call on Draft DCER	0 days	Tue 9/20/11	Tue 9/20/11
128	**Final DCER**	**30 days**	**Tue 10/25/11**	**Wed 11/23/11**
132	Final DCER to EPA	0 days	Wed 11/23/11	Wed 11/23/11
133	**Draft Specified Work Plan (SWP)**	**75 days**	**Sun 7/10/11**	**Thu 9/22/11**
137	Draft SWP EPA Update Call with EPA	0 days	Fri 9/16/11	Fri 9/16/11
138	Draft SWP to EPA	0 days	Thu 9/22/11	Thu 9/22/11
139	EPA Comments on Draft SWP	32 days	Fri 9/23/11	Mon 10/24/11
140	EPA Conference Call on Draft SWP	0 days	Thu 10/6/11	Thu 10/6/11
141	**Final SWP**	**30 days**	**Wed 10/26/11**	**Thu 11/24/11**
145	Final SWP to EPA	0 days	Thu 11/24/11	Thu 11/24/11
146	EPA Approval of Final SWP	4 days	Fri 11/25/11	Mon 11/28/11
147	**Draft Sampling and Analysis Plan (SAP)**	**60 days**	**Tue 7/26/11**	**Fri 9/23/11**
151	Draft SAP to EPA	0 days	Fri 9/23/11	Fri 9/23/11
152	EPA Comments on Draft SAP	52 days	Sat 9/24/11	Mon 11/14/11
153	EPA Conference Call on Draft SAP	0 days	Wed 11/30/11	Wed 11/30/11

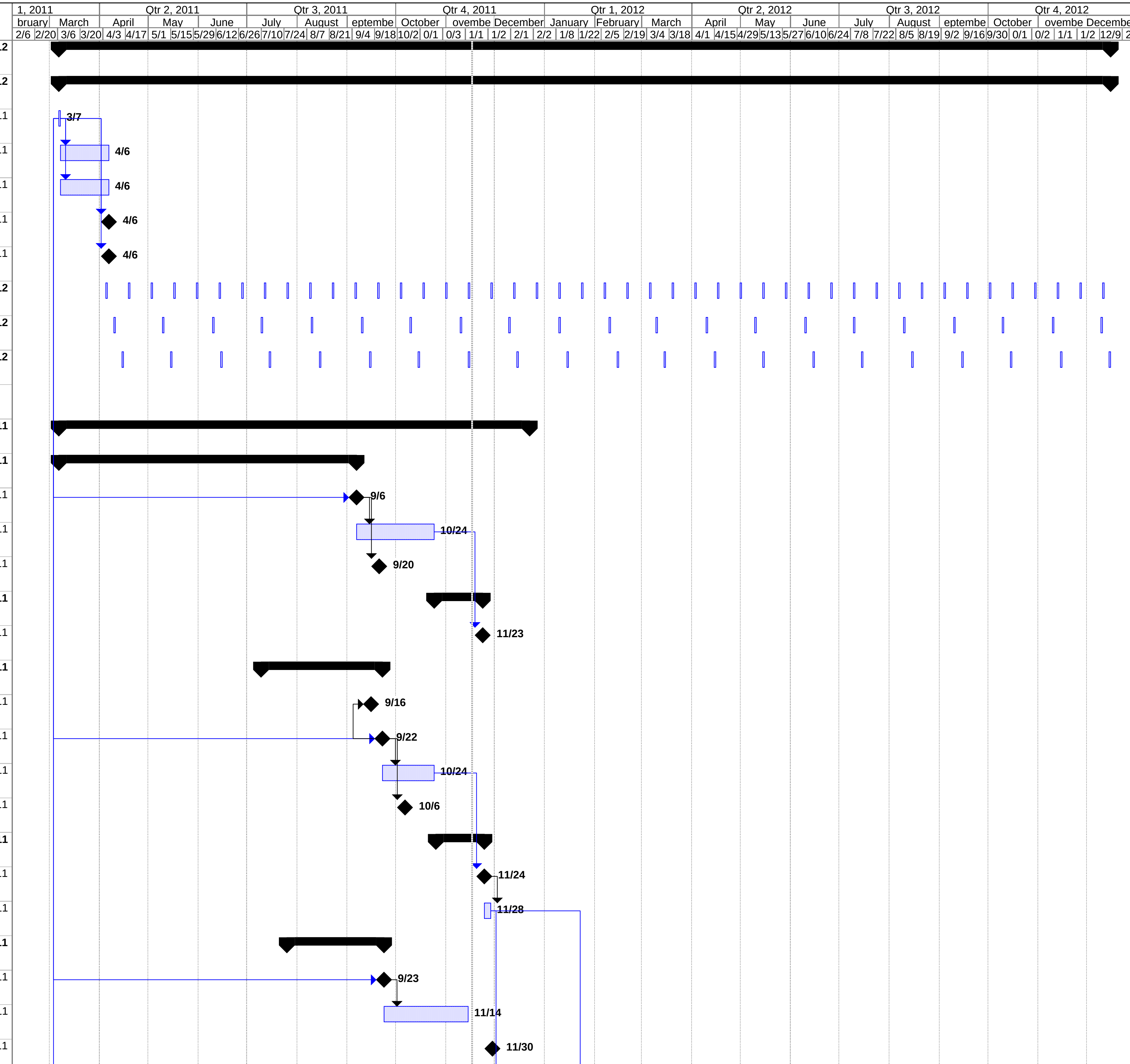
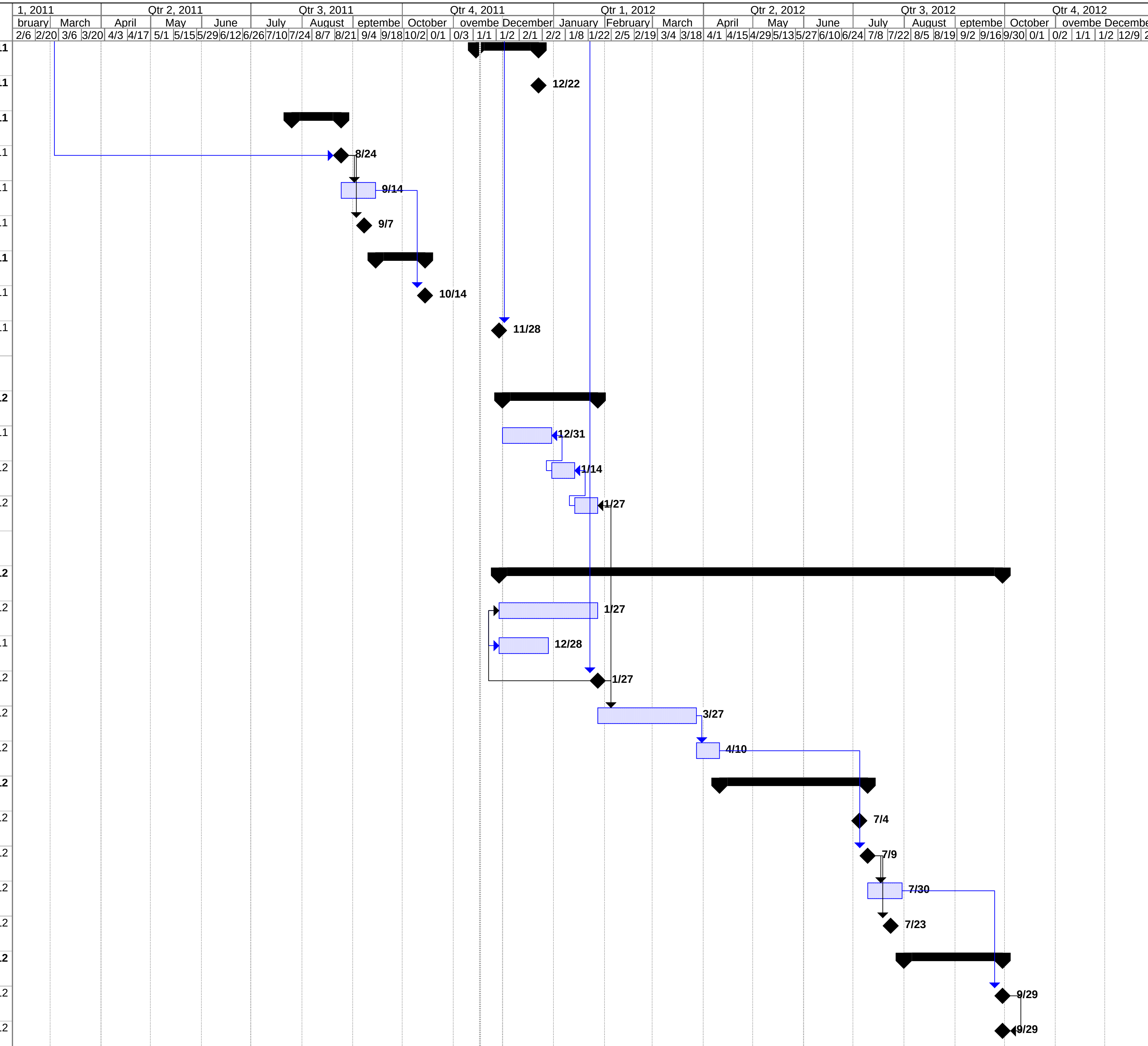


Figure 9
Specified Work Schedule
Glendale Chromium Operable Unit

ID	Task Name	Duration	Start	Finish
154	**Final SAP**	**38 days**	**Tue 11/15/11**	**Thu 12/22/11**
160	**Final SAP to EPA**	**0 days**	**Thu 12/22/11**	**Thu 12/22/11**
161	**Draft Health & Safety Plan (HASP)**	**30 days**	**Tue 7/26/11**	**Wed 8/24/11**
165	Draft HASP to EPA	0 days	Wed 8/24/11	Wed 8/24/11
166	EPA Comments on Draft HASP	21 days	Thu 8/25/11	Wed 9/14/11
167	EPA Conference Call on Draft HASP	0 days	Wed 9/7/11	Wed 9/7/11
168	**Final HASP**	**30 days**	**Thu 9/15/11**	**Fri 10/14/11**
172	Final HASP to EPA	0 days	Fri 10/14/11	Fri 10/14/11
173	Planning Deliverables Complete and Approved	0 days	Mon 11/28/11	Mon 11/28/11
174				
175	**TASK 2 - Community Involvement**	**58 days**	**Thu 12/1/11**	**Fri 1/27/12**
176	Draft Community Notification Flier	30 days	Thu 12/1/11	Sat 12/31/11
177	EPA Comments on Draft Community Notification Flier	14 days	Sat 12/31/11	Sat 1/14/12
178	Finalize Community Notification Flier and Deliver	14 days	Sat 1/14/12	Fri 1/27/12
179				
180	**Task 3 - Specified Work Deliverables**	**306 days**	**Tue 11/29/11**	**Sat 9/29/12**
181	Field Investigation Support Tasks	60 days	Tue 11/29/11	Fri 1/27/12
182	Proof of Insurance	30 days	Tue 11/29/11	Wed 12/28/11
183	Initiate Monitoring Well Installation (dependent on obtaining access)	0 days	Fri 1/27/12	Fri 1/27/12
184	Install, Develop, and Sample New Monitoring Wells	60 days	Sat 1/28/12	Tue 3/27/12
185	New MW Sample Analysis and Validation	14 days	Wed 3/28/12	Tue 4/10/12
186	**Draft Specified Work Report (SWR)**	**90 days**	**Wed 4/11/12**	**Mon 7/9/12**
194	EPA Conference Call on Pre-Draft SWR	0 days	Wed 7/4/12	Wed 7/4/12
195	Draft SWR to EPA	0 days	Mon 7/9/12	Mon 7/9/12
196	EPA Comments on SWR	21 days	Tue 7/10/12	Mon 7/30/12
197	EPA Conference Call on Draft SWR	0 days	Mon 7/23/12	Mon 7/23/12
198	**Final SWR**	**60 days**	**Wed 8/1/12**	**Sat 9/29/12**
202	Final SWR to EPA	0 days	Sat 9/29/12	Sat 9/29/12
203	SWR Complete and Approved	0 days	Sat 9/29/12	Sat 9/29/12



Tables

Table 1 Proposed Drilling Location, Vicinity Wells, and Potential Wells of Opportunity Glendale Chromium Operable Unit

PWA #	Northing & Easting	Vicinity Well IDs	Vicinity Well Location with Respect to PWA	Surface Elevation (ft amsl)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft bgs) & Date	Potential Wells[1] of Opportunity
1	378982, 378294	3872Q	200 ft West of PWA	572.73	453.78	118.95 - 2005	
		3872R	200 ft West of PWA	578.12	468.4	109.72 - 2007	
2	3783401, 378383	LB1-CW17	825 ft West of PWA	593.87	453.01	140.86 - 2005	
		NH-VBP-12	740 ft East of PWA	618.64	474.59	144.05 - 2009	
3	3783002, 378874	V14ACIG1	700 ft West of PWA	573.01	473.1	99.9 - 2008	
		V14ACIG2	875 ft West of PWA	571.9	470.89	101.01 - 2008	
4	3782411, 378674	3872B	Western Portion of PWA	564.39	477.2	87.19 - 1957	
		3882B	115 ft East of PWA	567.3	513.5	53.8 - 1949	
		V14ACIG3	150 ft East of PWA	570.7	468.8	101.95 - 2008	
5	3782736, 377699	3872	Eastern Portion of PWA	572.31	553.9	18.41 - 1937	
		3862	525 ft West of PWA	574.44	558.4	16.04 - 1942	
		NH-VPB-01	900 ft South of PWA	561.77	454.24	104.89 - 2010	
6	3778954, 382956	GSP-3	SW Portion of PWA	427.16	411.43	15.73 - 2009	
		V13EEMW4	630 ft North of PWA	431.83	413.21	18.62 - 2007	
7	3779848, 382188	CS-C06-185	300 ft South of PWA	459.1	418.8	36.89 - 2010	SC-E3
		CS-VPB-06	300 ft South of PWA	459.19	417.47	37.97 - 2010	
8	3781118, 379861	3893D	615 ft South of PWA	487.43	443	44.43 - 1948	
		V14AMPW1	1275 ft North of PWA	504.95	441.29	63.66 - 2010	
9	3781569, 381024	CS-C03-465	450 ft West of PWA	492.76	431.39	56.74 - 2010	
		3903	730 ft West of PWA	491.07	462.9	28.17 - 1934	
		V13WEM1A	900 ft West of PWA	493.88	450.75	43.13 - 1996	
10	3781094, 380441	CS-VPB-08	Southern Portion of PWA	485.79	431.67	51.38 - 2010	CS-VBP-08
		3893D	430 ft West of PWA	487.43	443	44.43 - 1948	
11	3779040, 382405	V13AGLW3A	Central Portion of PWA	441.38	413.77	27.61 - 2008	V13EEMW1
		V13MPMW1	Northern Portion of PWA	443.67	419.57	24.1 - 2000	V13CCLW1
12	3778954, 382956	GSP-3	SW Portion of PWA	427.16	411.43	15.73 - 2009	
		V13EEMW4	630 ft North of PWA	431.83	413.21	18.62 - 2007	
13	3782064, 379557	3882C	NE Portion of PWA	540.2	519	21.2 - 1937	JMAMW-1
		3882H	200 ft West of PWA	534.09	497.1	36.99 - 1950	
		3892B	500 ft East of PWA	527.93	476	51.93 - 1952	

Notes

1 - If they meet the acceptance criteria, , the PWOs will be sampled in lieu of installing a new monitoring wells

Abbreviations:

amsl = Above mean sea level ft = Feet

bgs = Below ground surface PWA = Proposed well area

Table 2 Proposed Groundwater Well Drilling Locations and Details
Glendale Chromium Operable Unit

PWA #	Figure # / Grid #	Northing & Easting	Location Description	Surface Elevation (ft amsl)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft bgs)	Proposed Well Screen (ft bgs)	Proposed Well Depth (ft bgs)
1	6 / I-7	3782982, 378301	LA County MTA R-O-W - Abandoned Tracks 900 Block Chandler Blvd. City of Burbank County of Los Angeles	579	460	119	110 to 150	155
2	6 / I-6	3783396, 378387	City of Burbank Lot Near 2 West Burbank Blvd. City of Burbank County of Los Angeles	583	465	118	110 to 150	155
3	6 / J-6	3783016, 378860	City Street - Abandoned Near 100 S. Front Street City of Burbank County of Los Angeles	576	470	106	95 to 135	140
4	6 / J-8	3782392, 378697	City Street - North Side Near 231 W. Orange Grove Avenue City of Burbank County of Los Angeles	562	492	70	60 to 100	105
5	6 / H-7	3782672, 377549	City Street - South Side Near 1600 Chandler Blvd. City of Burbank County of Los Angeles	580	455	125	115 to 155	160
6	8 / R-15	3778953, 382960	City Street - South Side Near 703 Hawthorne Street City of Glendale County of Los Angeles	476	395	81	70 to 110	115
7	8 / Q-13	3779858, 382196	City Street - North Side Near 4560 Doran Street City of Los Angeles County of Los Angeles	445	425	20	10 to 50	55
8	7 / L-10	3781112, 379875	City Alley Behind 1851 Victory Blvd. City of Glendale County of Los Angeles	490	438	52	45 to 85	90
9	7 / O-9	3781558, 381013	City Street - South Side Near 1006 Winchester Ave City of Glendale County of Los Angeles	515	453	62	55 to 95	100
10	7 / M-10	3781084, 380434	City Street - South Shoulder Near 500 Western Avenue City of Glendale County of Los Angeles	488	435	53	45 to 85	90
11	8 / Q-15	3778932, 382465	City Street - South Side 4585 Electronics Place City of Los Angeles County of Los Angeles	436	416	20	10 to 50	55

Table 2 Proposed Groundwater Well Drilling Locations and Details
Glendale Chromium Operable Unit

PWA #	Figure # / Grid #	Northing & Easting	Location Description	Surface Elevation (ft amsl)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft bgs)	Proposed Well Screen (ft bgs)	Proposed Well Depth (ft bgs)
12	8 / R-15	3778953, 382956	City Street - South Side Near 703 Hawthorne Street City of Glendale County of Los Angeles	476	395	81	150 to 190	195
13	6 / J-8	3782049, 378885	City Street - North Side Near 262 West Tujunga Avenue City of Burbank County of Los Angeles	534	475	59	50 to 90	95

Note:

Locations, elevations, and depths are approximate based upon available data. Upon completion of the well, a survey will be completed to determine actual m

If PWOs meet the acceptance criteria, , the PWOs will be sampled in lieu of installing a new monitoring wells

Abbreviations:

amsl = Above mean sea level
bgs = Below ground surface
ft = Feet
PWA = Proposed well area
PWO = Proposed well of opportunity

Table 3 Proposed Geotechnical Soil Boring Locations and Details Glendale Chromium Operable Unit

Boring #	Figure # / Grid #	Northing & Easting	Location Description	Surface Elevation (ft amsl)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft bgs)	Proposed Boring Depth (ft bgs)
GC-1	7 / L-10	3781408, 379595	City Street Cul-de-sac 264 Spazier Avenue City of Burbank County of Los Angeles	505	441	64	125
GC-2	7 / N-8	3782089, 380681	City Street North Shoulder 1047 Allen Avenue City of Glendale County of Los Angeles	535	463	72	135
GC-3	7 / N-10	3781088, 380865	City Street North Shoulder 1539 Flower Street City of Glendale County of Los Angeles (near Griffith Manor Park)	481	430	51	115
GC-4	8 / Q-17	3777765, 382350	Parking Lot Griffith Park Crystal Springs Picnic Area City of Los Angeles County of Los Angeles	405	388	17	80
GC-5	8 / R-16	3778050, 382999	City Street East Shoulder 4658 Brunswick Avenue City of Los Angeles County of Los Angeles	448	382	66	130

Note: Locations, elevations, and depths are approximate based upon available data. Upon completion of the well, a survey will be completed to determine actual locations, elevations, and depths.

Abbreviations:
amsl = Above mean sea level
bgs = Below ground surface
ft = Feet

Table 4 - Data Analysis Summary
Glendale Chromium Operable Unit

Parameter	Matrix	Method:	Notes/Comments
VOCs	Groundwater	EPA 8260B + TICs	VOCs can be co-contaminants with chromate. Some, such as aromatic hydrocarbons can attenuate Cr VI through abiotic or biotic reduction.
Metals (Dissolved)	Groundwater	EPA 200.8 ICP/MS (Filtered to 45 microns)	Metals play a role in the fate and transport of COCs. Cr VI migration can be slowed by calcium, Zinc etc. Other minerals such as iron (reduced) can attenuate Cr VI or some organics.
		EPA 200.7 ICP/AES (Filtered to 45 microns)	
Hexavalent Chromium	Groundwater	EPA 218.6 (Filtered to 45 microns)	Cr VI can be trapped in soil pores or can bind to soil and represent a low-level on-going source to groundwater contamination.
Divalent Iron	Groundwater	SM 3500-Fe B.4.c	Divalent iron is incompatible with Cr VI. They have the potential to react rapidly and, in certain conditions, reduce Cr VI to Cr III.
Nitrate/ Nitrite	Groundwater	EPA 300.0/ SM 4500	Nitrate and nitrite can be indicative of biological conditions. High levels of nitrate in the presence of some organics would favor nitrate reducing conditions which are near aerobic conditions.
Anions[1]	Groundwater	EPA 300.0/ SM 4500	Anions will react with and attenuate chromium.
Alkalinity (Total)	Groundwater	EPA 310.1/SM 2320	Alkalinity is an indicator of pH buffering.
DOC	Groundwater	EPA 9060A	DOC is an indicator of potential biological reduction of chromium.
Dissolved Oxygen	Groundwater	SM 4500-O G	Dissolved oxygen is another indicator of redox state (oxidizing or reducing).
ORP	Groundwater	SM 2580B	ORP correlates to the form of Cr VI. Under reducing conditions chromium is present as the immobile Cr III.
pH	Groundwater	SM 9040C	pH is one of the primary factors influencing the fate and transport of metals.
TDS	Groundwater	EPA 160.1/SM 2540C	TDS measures the solute loading of groundwater and is an indicator of general water quality.
TSS	Groundwater	EPA 160.2/SM 2540D (Filtered to 45 microns)	Suspended solids can promote the sorption of chromium and can inhibit migration.
Metals (dissolved)	Soil	EPA 3050B & 6020A ICP-MS	Metals play a role in the fate and transport of COCs. Cr VI migration can be slowed by calcium, Zinc etc. Other minerals such as iron (reduced) can attenuate Cr VI or some organics.
Hexavalent Chromium	Soil	EPA 3060A & 7199 IC	Cr VI can be trapped in soil pores or can bind to soil and represent a low-level on-going source to groundwater contamination.
		EPA 1312 SPLP & 7199 IC, liquid:solid of 2:1, 5:1, 10:1	
Attenuation Testing	Soil	EPA/530-SW-87-006	A solution is added to a volume of soil and the adsorption is measured.
Hexavalent Chromium Available Reducing Capacity	Soil	EPA/540.5-94/505	Estimates how much Cr VI will attenuate. Uses Walkley-Black method for determining soil organic carbon (Bartlett and James, 1988).
ORP	Soil	EPA 9045D and ASTM D1498-93/SM2580B	ORP is a primary predictor of the fate and transport of Cr VI and of organics.
pH	Soil	EPA 9045D	The pH can control the mobility of many cationic metals.
Acid Volatile Sulfides	Soil	EPA 821/R-91-100	Sulfides will react with and attenuate chromium.
TOC	Soil	EPA 9060A	TOC is an indicator of potential biological reduction of chromium.
Physical Properties Suite	Soil	ASTM D422 (Particle size distribution) API RP40 (various[2]) ASTM D2216 (Moisture content) EPA 9100 (Hydraulic Conductivity)	Hydraulic conductivity is important to understanding the fate and transport of Cr VI.

Notes:

[1] Chloride, Fluoride, Phosphate, and Sulfate

[2] API RP40 - Grain density, total porosity, pore fluid saturations, intrinsic permeability, and air permeability (native state)

Abbreviations:

API = American Petroleum Institute
ASTM = American Standard Testing and Materials
COC = Compound of concern
DOC = Dissolved organic carbon
EPA = U.S. Environmental Protection Agency
ICP/AES = Inductively Coupled Plasma/Atomic Emission Spectroscopy
ICP/MS = Inductively Coupled Plasma/Mass Spectroscopy
ORP = Oxidation reduction potential
SM = Standard Method
SPLP = Synthetic Precipitation Leaching Procedure
TDS = Total dissolved solids
TICs = Tentatively identified compounds
TOC = Total organic carbon
TSS = Total suspended solids
VOCs = Volatile organic compounds

Appendix A

San Fernando Valley (Area 2) Superfund Site, Glendale Chromium Operable Unit, Specified Work, Statement of Work

San Fernando Valley (Area 2) Superfund Site
Glendale Chromium Operable Unit

Specified Work
Statement of Work

1. Purpose

The purpose of this Statement of Work (SOW) is to describe investigations of groundwater and soil geochemical properties to be conducted by potentially responsible parties (referred to herein as Respondents) at the San Fernando Valley (SFV) Superfund Site (Area 2), Glendale Chromium Operable Unit (GCOU). The SOW involves the investigation and study of hexavalent chromium in groundwater at specified locations in Area 2 (Crystal Springs) of the SFV Superfund Sites.

This SOW sets forth the framework and requirements for performing data collection and analysis and as necessary the installation of specified groundwater monitoring wells and borings, conducting geochemical testing and preparing a Conceptual Site Model, referred to herein as the "Specified Work."

This SOW identifies activities to better identify and understand the nature and extent of hexavalent chromium contamination in the GCOU. It furthermore recognizes that a Focused Feasibility Study (FFS) for updating the existing Glendale Operable Unit (GOU) interim volatile organic compound (VOC) remedy is also being conducted. The FFS also involves supplemental characterization of groundwater conditions for VOCs as well as emerging chemicals including hexavalent chromium. Work under this SOW and the FFS will be coordinated, therefore, by EPA and the respective respondents to avoid any duplication of effort.

The Specified Work shall be conducted in accordance with an agreed to enforcement mechanism with regard to Respondents' obligations, this SOW, and relevant EPA guidance (see the References Section for a partial list of guidance).

2. Site Background

The SFV Superfund Sites are located in the eastern portion of the SFV between the San Gabriel and Santa Monica Mountains. There are four separate areas comprising the San Fernando Superfund Sites: Area 1 (North Hollywood and Burbank), Area 2 (Crystal Springs), Area 3 (Verdugo; removed from the National Priorities List (NPL) in 2004), and Area 4 (Pollock).

In 1980, after finding organic chemicals in the groundwater of the San Gabriel Valley, the California Department of Health Services (DHS) requested all major groundwater users to conduct tests for the presence of certain industrial chemicals in the water they were serving. The test results revealed volatile organic compounds (VOCs) in the groundwater beneath large areas of the SFV. The primary chemicals of concern (COCs) were the solvents trichloroethene (TCE) and tetrachloroethene (PCE), widely used in a variety of industries including metal plating, machinery degreasing, and dry cleaning.

The Federal Maximum Contaminant Level (MCL) for drinking water is 5 parts per billion (ppb) or micrograms per liter (μg/L) for each of these two VOCs. (Concentration units of ppb and μg/L are equivalent in describing concentrations of contaminants in groundwater.) The state of California (State) Primary MCL for drinking water is also 5 ppb for TCE and PCE. Other VOCs in the SFV have also been detected above the federal and/or State MCLs. The water agencies of the SFV closely monitor the quality of drinking water delivered to residents. The water must meet all federal and state requirements and be safe to drink.

In 1984, EPA proposed the SFV Superfund Sites (Areas 1 through 4) for inclusion on the NPL. The original boundaries of the four Areas were based on drinking water well fields that were known to contain VOCs in 1984. In 1986, the four Areas were included on the NPL as individual Superfund Sites. EPA coordinates the work on the four sites and has identified specific operable units within the sites for the purpose of implementing interim remedies.

EPA is currently focusing its efforts on five operable units (OUs) within Areas 1 and 2 of the SFV Superfund Sites to accelerate investigation and cleanup of the areas. EPA has signed interim Records of Decision (RODs) and implemented interim remedies for four OUs in the SFV: North Hollywood OU (1987 and 2009) and Burbank OU (1989) within Area 1, and Glendale North and South OUs (1993) within Area 2. The North Hollywood OU Interim Remedy began operating in 1989, and the Burbank OU interim remedy has been operational since 1996. The Interim Remedy in the Glendale North and South OUs began partial operation in August 2000 and achieved full operation capacity in June 2002.

A pump-and-treat approach was selected as the interim remedy for both Glendale OUs. There are four groundwater extraction wells in the Glendale North OU (GNOU) and four groundwater extraction wells in the Glendale South OU (GSOU). Groundwater is pumped from both the GNOU and GSOU wells to a combined 5,000 gallon per minute treatment plant located between the two extraction well fields. The treatment plant is owned and operated by the City of Glendale, and the treated water is incorporated into the City's water supply system. The groundwater treatment system started operation in 2000.

The 2008 Five-Year Review Report for Area 2 (First Five-Year Review Report For San Fernando Valley - Area 2 Superfund Site, Los Angeles County, California, September 2008) found that the interim remedy is generally functioning as designed. However, operational issues resulting from the presence of chromium and other "emerging contaminants" (ECs) have impacted the remedy and resulted in a limited loss of plume capture. The impact of ECs on the interim remedy is one of the tasks being addressed in the FFS in the GOU.

The GCOU was established in 2007 after a 4-year chromium study conducted by the Los Angeles Regional Water Quality Control Board (LARWQCB) and funded by EPA (LARWQCB, 2002a and 2002b), and a subsequent EPA evaluation (CH2M HILL, 2005). The study and evaluation revealed total and hexavalent chromium above the MCL of 50 ppb total dissolved chromium in areas of groundwater throughout the eastern SFV and a large number of potential chromium sources. A MCL for hexavalent chromium has not been established by the State or EPA. The goal of the GCOU is to select an appropriate regional remedy for chromium in groundwater in Area 2. Specific known and suspected chromium sources are also being investigated and cleaned up under the direction of LARWQCB, the California Department of Toxic Substances Control (DTSC) and EPA.

Since completion of the remedial investigation for the SFV in 1992 (James M. Montgomery & Associates, Inc., 1992), EPA and other entities have continued to monitor groundwater in the eastern SFV. The monitoring program consists of periodic sampling of over 500 groundwater wells located throughout the eastern portion of the SFV by EPA, municipal water purveyors, and potentially responsible parties. Data generated from these sampling events are used to estimate and map the extent of TCE, PCE, nitrate, and chromium in groundwater.

At many sampling locations in Area 2 where both total chromium and hexavalent chromium data are available, their reported concentrations are approximately equal. This is because hexavalent chromium is the dominant dissolved chromium species in many of the groundwater samples. Chromium concentrations exceeding 5 ppb are present in shallow groundwater in Area 2 within a general geographic subset of the TCE and PCE concentrations. Chromium concentrations in groundwater decrease rapidly with depth, and are infrequently detected above the total chromium MCL at depths greater than 100 feet below the water table.

The timing of chromium releases to groundwater at most of the facilities under investigation is difficult to precisely identify, but releases likely began with the build-up of the post-World War II aerospace industry in the valley. Historical chromium concentration data for SFV groundwater samples are often limited to relatively few sampling events, or are limited spatially to dense clusters of monitoring wells near the facilities under investigation. The limited distribution of chromium data in some parts of Area 2 complicates efforts to adequately estimate hexavalent chromium concentrations in groundwater and to estimate future impacts on groundwater extraction wells used as the Interim Remedy in the Glendale-North and -South OUs.

The Respondents shall implement the following tasks for completion of the Specified Work:

- Task 1 – Planning
- Task 2 – Community Involvement
- Task 3 – Site Characterization

3. Task 1 – Planning

3.1 Scope of Specified Work

The Specified Work scope shall include evaluating existing data, preparing a preliminary conceptual site model (CSM), Work Plan and associated planning and control documents, investigating groundwater with existing wells and installing and sampling a maximum of 13 new monitoring wells in 13 preliminarily proposed groundwater data collection areas. The data collection areas will be refined during data evaluation and following preparation and review of the CSM. In addition, the Specified Work will include installation of up to five soil borings and geochemical testing, and the preparation of an updated CSM.

Based on the data compilation and review by the Respondents to date, preliminary locations have been identified where additional groundwater data collection is recommended to estimate the distribution of hexavalent chromium in groundwater within the GCOU (Attachment A). Where appropriate and acceptable to EPA, the Respondents will use existing wells to evaluate groundwater quality in the groundwater data collection areas. If existing wells are not available, Respondents will install and sample up to thirteen new monitoring wells to evaluate groundwater quality. Attachment B identifies the preliminary groundwater data collection areas and discusses the rationale for each area. These locations may be modified to optimize data collection based on further review of existing data and preparation and review of a preliminary CSM.

In addition, the Respondents will advance up to 5 soil borings to perform soil geochemical testing to further evaluate the fate and transport characteristics of hexavalent chromium in groundwater and in the vadose zone. Specific locations for the soil borings will be identified in the Specified Work Plan as the Respondents shall evaluate existing geochemical data collected within the GCOU. A maximum of five soil borings will be advanced as part of the Specified Work, with three in elevated concentration areas and two in background areas (Attachment B).

The proposed groundwater data collection areas include the following two categories:

1. Category 1: groundwater data would be used to estimate the extent of hexavalent chromium generally within the GCOU and north of the two rows of groundwater extraction systems (the GN and GS wells, respectively). There are up to 12 primary data collection areas proposed.

2. Category 2: where collection of additional groundwater data is necessary to further delineate contamination in Category 1 data collection areas that show elevated hexavalent chromium concentrations (exceeding 5 ppb). One such contingency data collection area has been identified (refer to Attachments A and B).

A maximum of five boring locations would be installed to evaluate geochemical conditions both in selected hexavalent chromium elevated concentration areas and in background areas. Samples from these borings will be used to evaluate hexavalent chromium concentrations in the saturated zone and the vadose zone immediately above the saturated zone. Soil samples from borings in the background areas will be used to characterize the hexavalent chromium attenuative capacity of the geologic formations in the GCOU.

The CSM will be updated based on the results of the field investigation undertaken as part of the Specified Work and the CSM will be used to: (1) develop a general understanding of the Area 2 Site to evaluate potential risks to human health and the environment and (2) assist in identifying and setting priorities for future activities to be conducted at the Area 2 Site. The CSM should include either a pictorial or graphic representation of site dynamics as illustrated in Figure 2-2 of the *EPA RI/FS Guidance (Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, October 1988)*. The CSM identifies:

- Potential sources of hexavalent chromium,
- Media affected by hexavalent chromium,
- Release mechanisms and potential fate/transport of hexavalent chromium in groundwater, and
- Actual and potential human and environmental receptors.

The Specified Work includes the collection of one water sample from each of the selected existing and newly installed well or wells located in the data collection areas at least one month after completion of well installation and development, as applicable, and, as feasible, concurrent with a basinwide sampling event in the San Fernando Valley. Future activities identified by the updated CSM, and routine sampling of these and other wells is not included in the Specified Work.

When finalizing the specific aspects of the Specified Work, the Respondents will meet with EPA to discuss all project planning decisions and special concerns associated with the Area 2 Site. The following activities will be performed by the Respondents as a function of the project planning process.

3.2 Data Evaluation

The Respondents shall compile and evaluate the existing data and submit the comprehensive evaluation and preliminary CSM to EPA. This submission, the Data Compilation and Evaluation Report, is the first deliverable listed in the schedule for major deliverables in Section 6 below. Data consist of two types, primary data and secondary data. Primary data are data collected directly by the investigator, in this case the Respondents, during an investigative process. Primary data collection is necessary when an investigator cannot find the data needed in secondary sources. Secondary data are collected or generated by a party other than the investigator prior to or during the investigative process. Existing data are expected to be secondary data. Evaluating existing data is necessary to confirm the scope of the Specified Work and to avoid duplication of previous activities. Furthermore, data are ultimately needed to:

- Identify which existing wells are available and suitable for use in the Specified Work,
- Characterize the GCOU to the extent necessary to support subsequent decisions, and
- Define the risk posed by hexavalent chromium and other contaminants in groundwater within the GCOU.

The types of existing data that should be compiled and evaluated include:

- Historical data gathered during the RI for the SFV Superfund Sites, feasibility studies for the four interim remedies currently in place in Areas 1 and 2, various Respondent facility-specific investigations relevant to chromium concentrations in groundwater in Area 2, and monitoring data for the SFV Superfund Sites and data generated as part of the FFS. A groundwater database that includes available groundwater quality and pumping data for the SFV reported to EPA since approximately 1980 is available upon request. Document review should include, but not be limited to, the following reports: the SFV RI Report (James M. Montgomery & Associates, 1992), the LARWQCB SFV chromium investigation reports (LARWQCB 2002a and 2002b) and EPA (CH2M HILL, 2005), and the 2008 Area 2 Five-Year Review Report (EPA, 2008).
- Identification and general information on potential hexavalent chromium source areas (properties) throughout the GCOU to assess the potential of these to be impacting Area 2 groundwater,

- Historical data prepared in response to chromium investigations overseen by LARWQCB and the California Department of Toxic Substances Control, as available in electronic format (e.g., available via GeoTracker, Envirostor, etc.).
- Historical and aerial photographs,
- Regional geology, hydrology, meteorology, and ecology,
- Demographic and land use information,
- Location of sensitive environmental areas and surface water use on or near the site,
- Location, construction, status, and accessibility of supply wells.

Respondents shall have access to the current, calibrated groundwater model for the Glendale Operable Unit, developed by CH2M HILL on behalf of EPA. EPA will provide the Respondents with the data inputs that EPA, in its sole discretion, deems necessary for the Respondents to accomplish the specific tasks delineated in this SOW. EPA will not release, and will be under no obligation to release, any confidential files, data, records or other information, or any files, data, records or other information subject to any applicable privilege.

3.3 Project Planning

Once the Respondents have collected and analyzed existing data and prepared the preliminary CSM, the Specified Work scope described in Section 3.1 including the locations of existing wells, up to 13 new monitoring wells, and 5 soil borings, will be refined as necessary. Other project planning activities include developing a work plan, designing a data collection program and identifying health and safety protocols. These tasks are described below since they result in the development of specific required deliverables described in Section 3.4. The Respondents shall meet with EPA regarding the planning activities described in this section before drafting of the planning deliverables identified in Section 3.4.

3.4 Planning Deliverables

At the conclusion of the project planning phase, the Respondents shall submit a Specified Work Plan (SWP), a Sampling and Analysis Plan (SAP) and a Health and Safety Plan (HSP). The SWP and SAP must be reviewed and approved by EPA prior to the initiation of field activities, and are described below.

3.4.1 Specified Work Plan

The Respondents shall prepare and submit a draft SWP to EPA for review and approval. The SWP shall be developed in conjunction with the SAP and the HSP, although each plan may be delivered under separate cover. The SWP shall document the decisions and evaluations completed during planning including an evaluation of existing site data. The main body of the SWP shall identify and describe the tasks required to conduct the Specified Work, a comprehensive description of the work to be performed, the methodologies to be used, the rationale for performing the required activities, and a corresponding schedule and cost for completion.

Specifically, the SWP shall state the problem(s) and potential problem(s) posed by the Area 2 Site and the objectives of the Specified Work. Furthermore, the SWP shall include a site background summary providing a site description; the geographic location of the site; the site physical setting; a detailed history of previous site activities; a description of previous response actions that have been conducted at the site by local, state, federal, or private parties; and a summary of existing data in terms of physical and chemical characteristics of the contaminants identified, and their distribution among environmental media at the site.

The major part of the SWP shall be a detailed description of the tasks to be performed, information needed for each task, information to be produced during and at the conclusion of each task, and a description of the work products that will be submitted to EPA. The work products shall include the following:

- Deliverables set forth in the remainder of this SOW;
- Schedule for each of the required activities; and
- Project Management Plan (PMP), including a data management plan (e.g., requirements for project management systems and software, minimum data requirements, data format, and backup data management), monthly progress reports to EPA, and meetings and presentations to EPA at the conclusion of each major phase of the Specified Work.

3.4.2 Sampling and Analysis Plan

In accordance with the schedule included in Section 6, Respondents shall prepare and submit to EPA for approval a draft SAP. The SAP shall ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols. The SAP consists of a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP) and shall be prepared in accordance with the following EPA guidance:

- "Guidance on Systematic Planning using the Data Quality Objectives Process," (QA/G-4) EPA/240/B-06/001, February 2006,
- "EPA Region IX Sampling and Analysis Plan Guidance and Template, Version 2" (April 2000 (R9QA/002.1))
- "EPA Requirements for Quality Assurance Project Plans (QA/R5)" (EPA/240/B-01/003, March 2001) and FSP Project Plans (QA/G-5)" (EPA/600/R-02/009, December 2002)

The FSP shall define in detail the sampling and data gathering methods that will be used on the project. The FSP shall include: descriptions of sampling objectives; sample locations and frequencies; numbers and types of samples (including quality control [QC] samples); sampling equipment and equipment decontamination procedures; sampling and data collection methods; sample labeling; sample packaging and shipment; sample analysis; well construction; well development procedures; management of drill cuttings, well development water, purge water produced during sampling, and other investigation-derived wastes; field documentation requirements; and planned uses of the data. The FSP shall be written so that a field sampling team, unfamiliar with the site, would be able to gather the required information.

The QAPP shall describe the project objectives and organization, functional activities, data quality objectives (DQOs), and quality assurance and quality control (QA/QC) protocols that will be used to achieve the desired DQOs. The DQOs shall, at a minimum, reflect use of analytical methods for obtaining data of sufficient quality to meet National Contingency Plan requirements as identified at 40 CFR 300 *et seq.* In addition, the QAPP shall address sampling procedures; sample custody; analytical procedures; data reduction; data validation procedures to ensure that reported data are accurate and defensible; personnel qualifications; data management; procedures that will be used to enter, store, correct, manipulate, and analyze data; protocols for transferring data to EPA in electronic format; document control procedures; and preservation of records (in accordance with Section XIV of the Order, Records Retention).

The DQOs shall also reflect the methods to collect physical data such as, but not limited to, groundwater levels, lithologic data, borehole geophysical survey data, aquifer test data, geodetic survey data for sample locations, etc. The Respondents shall enable field personnel to be available for EPA QA/QC training and orientation where applicable.

Respondents shall be prepared to demonstrate to EPA's satisfaction that each laboratory they may use is qualified to conduct the proposed work. This includes use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs in the approved QAPP for the site. The laboratory must have and follow an approved QA program.

Respondents shall only use laboratories that have documented Quality Assurance Programs that comply with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs," (American National Standard, January 5, 1995) and "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01-002, March 2001) or equivalent documentation as determined by EPA. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program (NELAP) as meeting the Quality System requirements. If the laboratory is not in the EPA Contract Laboratory Program (CLP), a laboratory QA program plan must be submitted for EPA review and approval. EPA may require that Respondents submit detailed information to demonstrate that the laboratory is qualified to conduct the work, including information on personnel qualifications, equipment, and material specifications. Respondents will provide assurances that EPA has access to laboratory personnel, equipment and records, and during sample collection, transportation, and analysis activities.

After EPA review, EPA may direct the Respondents to prepare a Final SAP that satisfactorily addresses EPA's comments.

3.4.3 Health and Safety Plan

The Respondents shall prepare and submit a Draft HSP for EPA review. It should be noted that EPA does not approve the Respondents' HSP, but rather EPA reviews it to verify that all necessary elements are included, and that the HSP provides for the protection of human health and the environment. Although EPA does not approve HSPs, the Respondents shall prepare and submit a final HSP that addresses EPA's comments. The HSP shall be written so that field personnel, unfamiliar with the site and hazards, will be able to perform all work tasks in a safe manner. The HSP shall identify potentially hazardous operations and exposures and prescribe appropriate protective measures for onsite workers, the surrounding community, and the environment. The HSP shall include a detailed site description accompanied by site maps and the results of previous sampling activities. The HSP shall also include, at a minimum, the 11 elements described in Appendix B of the EPA RI/FS Guidance, such as a health and safety risk analysis, a description of monitoring and personal protective equipment, medical monitoring, and site control. The HSP must also conform to the Respondents' health and safety program, which in turn must comply with *Occupational Safety and Health Administration (OSHA) OSHA Code of Federal Regulations (CFR) Title 29, Section 1910.120 and California (Cal)/OSHA California Code of Regulations (CCR) Title 8, Article 109, Section 5192 Hazardous Waste Operations and Emergency Response (HAZWOPER).*

4. Task 2 – Community Involvement

If directed to do so by EPA, the Respondents shall develop and implement community involvement activities subject to approval by EPA. At EPA's discretion, EPA may elect to take the lead role and responsibility in the development and implementation of community involvement activities. The critical community involvement planning steps include conducting community interviews and developing a Community Involvement Plan (CIP). The Respondents may assist EPA, as requested by EPA, by providing information regarding the site's history, participating in public meetings, or by preparing fact sheets for distribution to the general public. In addition, the Respondents may establish a community information repository, at or near the site, to house one copy of the Administrative Record. The extent of the Respondents' involvement in community involvement activities will be at EPA's discretion. The Respondents' community involvement responsibilities, if any, will be specified in the CIP. All of the Respondents' community involvement activities will be subject to oversight by EPA.

4.1 Community Involvement Plan

If directed to do so by EPA, the Respondents shall prepare and submit a draft CIP to EPA for review and approval. At EPA's discretion, EPA may elect to prepare the CIP.

The CIP documents the history of community relations and the issues of community concern at a site. The CIP also describes the objectives of the community involvement activities and how these objectives will be met and includes a discussion of planned community interviews, fact sheets, and public meetings. Discussions with the community should be initiated during scoping as relevant information may be gathered at that time. Report preparation methods, the elements contained in a CIP, and a recommended format are included on EPA's Community Involvement Tool Kit Web page at http://www.epa.gov/superfund/community/toolkit.htm.

5. Task 3 – Specified Work

The Respondents will investigate selected areas to estimate the extent of migration of hexavalent chromium as well as changes in its physical or chemical characteristics. The investigation in the selected areas will provide an understanding of the nature and general extent of hexavalent chromium in the saturated zone and vadose zone immediately above the saturated zone and provide the parameters required for the Respondents to evaluate hexavalent chromium fate and transport within those areas.

During this phase of the Specified Work, the SWP, SAP, and HSP are implemented. Field data are collected and analyzed to provide the information required to accomplish the objectives of the study. The Respondents shall notify EPA at least 2 weeks in advance of drilling or sampling activities. The Respondents shall demonstrate that the laboratory and the type of laboratory analyses and detection limits that will be utilized during site characterization meet the specific QA/QC requirements and the DQOs of the site investigation as specified in the SAP/QAPP. In addition to the deliverables below, the Respondents shall prepare and submit monthly progress reports to EPA and participate in meetings at major points during the Specified Work.

5.1 Field Investigation

These activities will be performed by the Respondents in accordance with the SWP and the SAP. At a minimum, this shall address the items described below.

5.1.1 Implement and Document Field Support Activities

The Respondents shall initiate field support activities following approval by EPA of the SWP and SAP. Field support activities may include obtaining access to the site, scheduling, and procuring equipment, office space, laboratory services, and/or contractors. The Respondents shall notify EPA at least 2 weeks prior to initiating field support activities so that EPA may adequately schedule oversight tasks. The Respondents shall also notify EPA in writing upon completion of field support activities.

5.1.2 Characterization of Representative Sources

The physical characteristics and chemical constituents and their concentrations will be determined for two representative sources of hexavalent chromium.

Characterizing representative sources of hexavalent chromium will include assessing mobility and persistence, and characteristics important for evaluating remedial actions, including information to assess fate and transport characteristics and in-situ and other treatment technologies. As part of characterizing a representative chromium source, both groundwater and overlying vadose-zone soil contamination should be considered, which could impact groundwater in the future via leaching or saturation (if groundwater levels rise). Data will be obtained from the available existing information and the proposed soil borings and monitoring wells. In addition, determination of background geochemical conditions and chromium concentrations, based on analytical results from upgradient wells and borings, will be required.

5.1.3 Describe the Nature and Extent of Hexavalent Chromium in Groundwater

The Respondents shall gather information in the selected areas to describe the nature and general extent of hexavalent chromium in groundwater. Respondents will use the available information on facility operations (e.g., types of industrial operations, locations of storage areas, etc.) to evaluate potential additional sources of hexavalent chromium. The Respondents will implement a study program identified in the SWP or SAP to use analytical techniques sufficient to detect and quantify the concentrations of hexavalent chromium in groundwater analyzed by the Specified Work and to identify patterns of migration of hexavalent chromium. In addition, the Respondents will gather data for evaluation of fate and transport of hexavalent chromium.

New monitoring wells installed as part of the Specified Work should be constructed similarly to EPA's existing monitoring wells in the upper portion of the Upper Regional Groundwater Zone. Screened intervals should be selected to account for local historic water table fluctuations.

During the initial sampling event at borings and new wells, samples should be analyzed for a broad suite of general geochemical and redox parameters, constituents that attenuate hexavalent chromium, in addition to total chromium and hexavalent chromium. Boring samples shall also be analyzed for saturated water migration parameters and hexavalent chrome leachability. The following analyses are also required for the initial ground water sampling event at new wells:

- Nitrate, nitrite, and sulfate
- Sulfide
- Total dissolved metals
- Total organic carbon
- Total Kjeldahl nitrogen
- Ammonia
- Common cations and anions, including alkalinity and silica
- Volatile organic compounds (VOCs)

Field parameters recorded during all sampling events shall include pH, dissolved oxygen, oxygen-reduction potential (ORP), total dissolved solids, turbidity, specific conductance, and temperature.

5.2 Data Analyses

The Respondents shall perform data analyses as described below to evaluate and interpret the data collected during the field investigation.

5.2.1 Evaluate Site Characteristics

The Respondents shall analyze and evaluate the data to describe the following criteria:

1. Site physical characteristics,
2. Chromium source characteristics,
3. Nature and estimated extent of chromium in groundwater, and
4. Chromium fate and transport

Results of the site physical characteristics, identification of potential hexavalent chromium sources, and the analysis of the distribution and estimated extent of hexavalent chromium groundwater will be used to assess hexavalent chromium fate and transport. The evaluation will include discussing the estimated horizontal and vertical distribution of hexavalent chromium and the mobility and persistence of hexavalent chromium. The Respondents will make all data generated or obtained as a part of the Specified Work available to EPA.

The Specified Work data shall be presented in a format (i.e., computer compact disk or equivalent) to facilitate preparation of a baseline risk assessment (which is not included in the Specified Work). Analyses of data collected for site characterization will meet the DQOs developed in the QAPP as part of the SAP, or as revised during the Specified Work.

5.3 Data Management Procedures

The Respondents shall consistently document the quality and validity of field and laboratory data compiled during the Specified Work, as described below.

5.3.1 Document Field Activities

The Respondents shall consistently document and record information gathered during site characterization in well maintained field logs and laboratory reports. The methods of documentation will be specified in the SWP and the SAP. The Respondents will use field logs to document observations, measurements, and significant events that occur during field activities. Laboratory reports will document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies.

5.3.2 Maintain Sample Management and Tracking

The Respondents will maintain field reports, sample shipment records, analytical results, and QA/QC reports to ensure that only validated analytical data are reported and used in the baseline risk assessment, remedial investigation and development and evaluation of remedial alternatives (none of which are included in the Specified Work). Analytical results developed under the SWP shall not be included in the Specified Work Report unless accompanied by or cross-referenced to a corresponding QA/QC report. In addition, the Respondents shall establish a data security system to safeguard chain-of-custody forms and other project records to prevent loss, damage, or alteration of project documentation.

5.4 *Site Characterization Deliverables*

The Respondents shall prepare and submit a draft Specified Work report to EPA for review. The Specified Work report shall summarize the results of field activities to characterize the site, and include a Conceptual Site Model that discusses sources of contamination, nature and estimated extent of chromium contamination and fate and transport of chromium. Once EPA's comments have been addressed, the Respondents shall provide the final Specified Work report to EPA.

6. Schedule for Major Deliverables

The schedule for major deliverables is described below. The schedule for submittal of major deliverables may be revised as necessary and at EPA's discretion, in consultation with Respondents.

ACTIVITY **DUE DATE**

TASK 1 - PLANNING DELIVERABLES

Data Compilation and Evaluation Report, including the Preliminary CSM	Ninety (90) days after the effective date of the enforcement instrument.
Draft Specified Work Plan including data evaluation results	Sixty (60) days after completion of the Data Compilation and Evaluation Report
Final Specified Work Plan	Thirty (30) days after receipt of EPA comments
Draft Sampling and Analysis Plan, including the Field Sampling Plan and the Quality Assurance Project Plan	Sixty (60) days completion of the Data Compilation and Evaluation Report
Final Sampling and Analysis Plan, including the Field Sampling Plan and the Quality Assurance Project Plan	Thirty (30) days after receipt of EPA comments
Draft Health and Safety Plan	Thirty (30) days after completion of the Data Compilation and Evaluation Report
Final Health and Safety Plan	Twenty-one (21) days after receipt of EPA comments

TASK 2 - COMMUNITY INVOLVEMENT DELIVERABLES

Draft Community Involvement Plan	Ninety (90) days after EPA request
Final Community Involvement Plan	Thirty (30) days after receipt of EPA comments

TASK 3 – SPECIFIED WORK DELIVERABLES AND ACTIVITIES

Initiate Field Investigation Activities	Sixty (60) days after EPA approval of the Specified Work Plan, contingent upon obtaining permitting & access rights
Draft Specified Work Report to EPA	Ninety (90) days after completion of field investigation activities, including those implemented by the Respondents and those required of other PRPs by EPA
Final Specified Work Report to EPA	Sixty (60) days after receipt of EPA comments

7. REFERENCES

American National Standards Institute (ANSI), Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs, ANSI/ASQC E-4 1994, January 5, 1995.

California/ Occupational Safety and Health Administration (Cal/OSHA), California Code of Regulations (CCR) Title 8, Article 109, Section 5192 Hazardous Waste Operations and Emergency Response (HAZWOPER).

CH2M HILL. 2005. *Final Technical Memorandum: Burbank and Glendale Operable Units, Focused Chromium Trend Study.* June.

James M. Montgomery, Inc. 1992. *Remedial Investigation of Groundwater Contamination in the San Fernando Valley, Remedial Investigation Report.* December.

Los Angeles Regional Water Quality Control Board (LARWQCB). 2002a. *Final Chromium VI Investigation Report, San Fernando Valley, California.* August.

Los Angeles Regional Water Quality Control Board (LARWQCB). 2002b. *Results of Chromium VI Investigation – Phase I, San Fernando Valley, California.* November.

National Oil and Hazardous Substances Contingency Plan, Final Rule (National Contingency Plan), 40 CFR, Part 300 (as revised)

Occupational Safety and Health Administration (OSHA), Code of Federal Regulations (CFR) Title 29, Section 1910.120

U.S. EPA Contract Laboratory Program Statements of Work for Inorganic and Organic Analysis, U.S. EPA, Office of Emergency and Remedial Response (see http://www.epa.gov/superfund/programs/clp/ for most recent versions).

U.S. EPA First Five-Year Review Report For San Fernando Valley - Area 2 Superfund Site, Los Angeles County, California, September 2008.

U.S. EPA Office of Environmental Information. Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9 (EPA/600/R-96/084, July 2000.

U.S. EPA Office of Solid Waste and Emergency Response (OSWER). A Compendium of Superfund Field Operations Methods, Directive No. 9355.0-14, August 1987.

U.S. EPA Office of Solid Waste and Emergency Response (OSWER). Community Relations in Superfund: A Handbook, Directive No. 9230.0-3B, June 1988.

U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-10. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, U.S. EPA, Office of Emergency and Remedial Response, EPA/540/G-89/004, October 1988.

U.S. EPA Office of Solid Waste and Emergency Response (OSWER). CERCLA Compliance With Other Laws Manual, Directive Nos. 9234.1 (Part I) and 9234.1-02 (Part 2), Part I - August 1988 and Part II - August 1989.

U.S. EPA Office of Solid Waste and Emergency Response (OSWER). Guidance for Data Usability in Risk Assessment, Directive 9285.7-0, October 1990.

U.S. EPA, Office of Solid Waste and Emergency Response. Guide to Management of Investigation-Derived Wastes. Publication 9345.3-03FS, January 1992.

U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-06, February 14, 1989.

U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-05, April 25, 1988.

U.S. EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-20 July 22, 1987.

U.S. EPA Region 9 *Sampling and Analysis Plan Guidance and Template, Version 2* (April 2000 (R9QA/002.1)). Available at http://www.epa.gov/region09/qa/pdfs/sap_ot6_pvt_v2.pdf

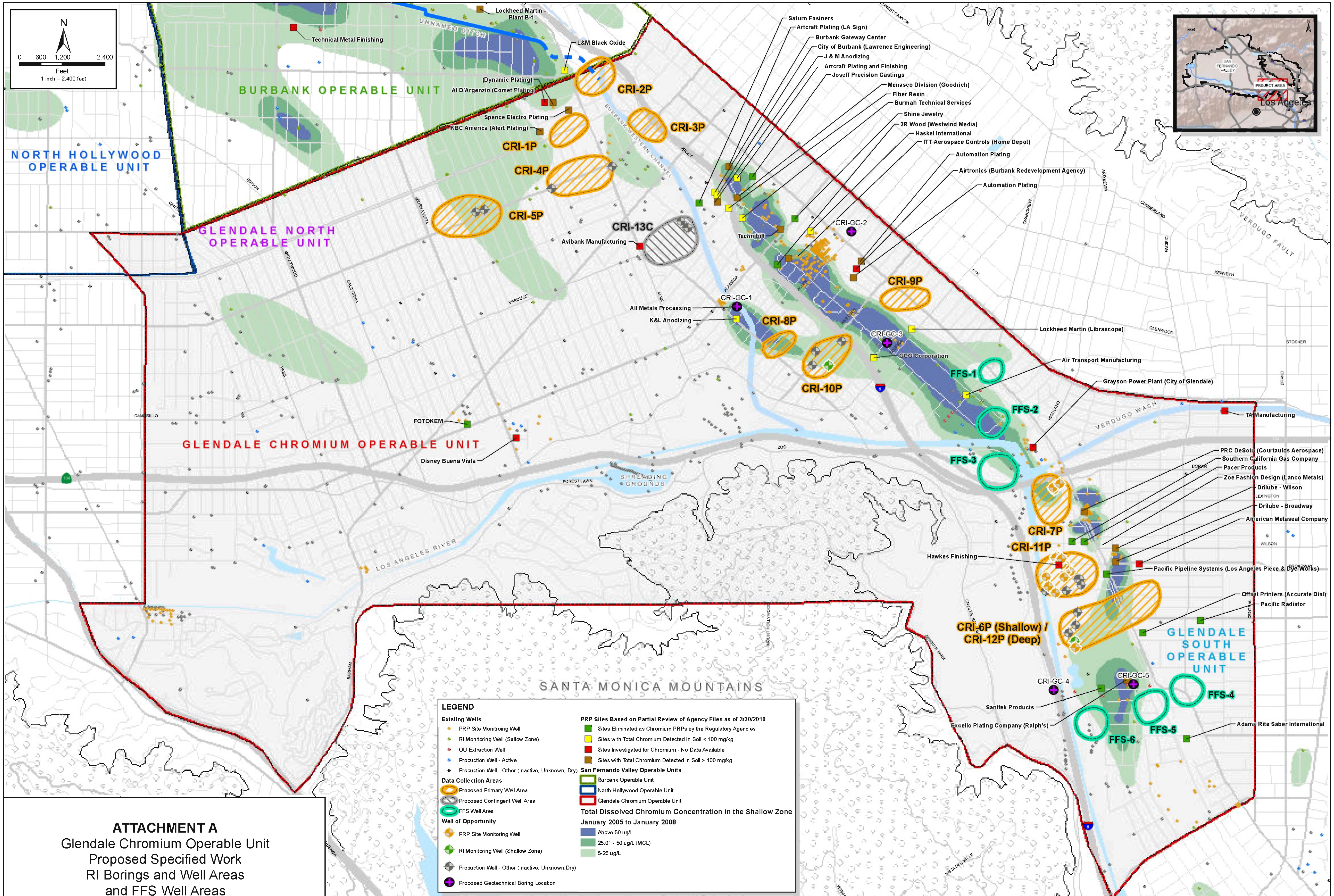
U.S. EPA Requirements for Quality Management Plans (QA/R-2, U.S. EPA, EPA/240/B-01-002, March 2001.

U.S. EPA Requirements for Quality Assurance Project Plans (QA/R-5)" (EPA/240/B-01/003, March 2001). Available at http://www.epa.gov/quality/qa_docs.html

U.S. EPA Guidance on Systematic Planning using the Data Quality Objectives Process (QA/G-4) EPA/240/B-06/001, February 2006. Available at http://www.epa.gov/quality/qa_docs.html

ATTACHMENT A

PRELIMINARY GROUNDWATER DATA COLLECTION AREA



ATTACHMENT A
Glendale Chromium Operable Unit
Proposed Specified Work
RI Borings and Well Areas
and FFS Well Areas

ATTACHMENT B

SPECIFIED WORK – PRELIMINARY LOCATIONS OF
GROUNDWATER DATA COLLECTION
AREAS AND BORINGS

ATTACHMENT B

SPECIFIED WORK – GROUNDWATER DATA COLLECTION AREAS AND BORINGS

GCOU Data Collection Area—Category 1	Potential Existing Wells in Data Collection Area	Rationale
CRI-1P	None	Evaluate groundwater concentrations. Evaluate whether Spence Electro Plating and other nearby facilities are a source, Downgradient of BOU.
CRI-2P	None	Downgradient of BOU, evaluate potential local sources, including from the Burbank Western Channel.
CRI-3P	None	Evaluate eastern extent and whether there are upgradient sources (e.g., potential Scott Road Landfill, Burbank Western Channel).
CRI-4P	2	Evaluate whether KBC (Alert) Plating is a source, downgradient of BOU, additional information of other potential sources, assess eastern extent.
CRI-5P	2	Downgradient of BOU, assess extent.
CRI-6P	3	Evaluate extent, evaluate potential sources from Drilube-Wilson and Zoe Fashion Design (Lanco Metals)
CRI-7P	4	Evaluate whether J&M is a source and assess extent
CRI-8P	1	Evaluate lateral extent.
CRI-9P	None	Evaluate whether upgradient sites are sources and assess lateral extent.
CRI-10P	5	Evaluate extent and potential impacts migrating from the west.
CRI-11P	16	Evaluate extent.
CRI-12P	None	Evaluate extent, evaluate potential sources from Drilube-Wilson and Zoe Fashion Design (Lanco

		Metals)

12 **33**

ATTACHMENT B

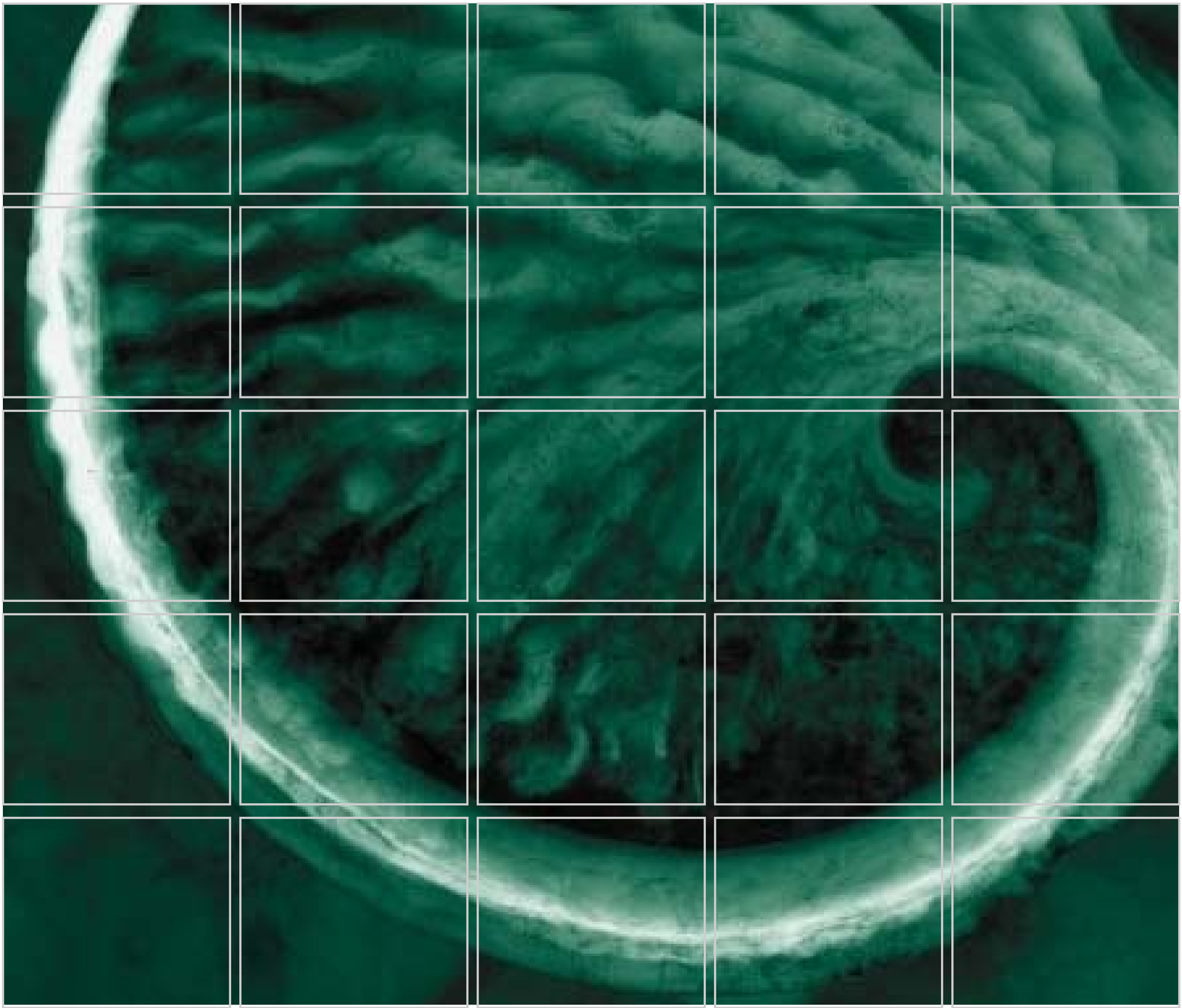
SPECIFIED WORK – GROUNDWATER DATA COLLECTION AREAS AND BORINGS

Proposed Data Collection Area—Category 2	Potential Wells of Opportunity in Proposed Data Collection Area	Rationale	Contingency Trigger
CRI-13C	5	Assess extent; evaluate potential sources including Burbank Western Channel.	Evaluate necessity during CSM update
1	**5**		

Boring No.	Potential Wells of Opportunity in Proposed Data Collection Area	Rationale
CRI-GC-1	N/A	Geochemical properties in an area of elevated chromium concentrations.
CRI-GC-2	N/A	Geochemical properties in an area of elevated chromium concentrations.
CRI-GC-3	N/A	Background geochemical properties.
CRI-GC-4	N/A	Geochemical properties in an area of elevated chromium concentrations.
CRI-GC-5	N/A	Background geochemical properties.
5		

Appendix B

Quality Management Plan



Prepared for:
Glendale Chromium
Operable Unit
Respondents Group

Quality Management Plan

Glendale Chromium Operable Unit – Area 2
San Fernando Valley Superfund Sites

November 2011

www.erm.com

ERM

Delivering sustainable solutions in a more competitive world

Glendale Chromium Operable Unit Respondents Group

Quality Management Plan

Glendale Chromium Operable Unit – Area 2
San Fernando Valley Superfund Sites

November 2011

Project No. 0130384

Mark Shibata, PHD
Quality Assurance Manager

Truong T. Mai, P.E.
Principal-in-Charge

Environmental Resources Management
2875 Michelle Drive, Suite 200
Irvine, California 92606
T: 949-623-4700
F: 949-623-4711
www.erm.com

TABLE OF CONTENTS

1.0 INTRODUCTION

This Quality Management Plan (QMP) was prepared by ERM-West, Inc. (ERM) for use on the Glendale Chromium Operable Unit (GCOU) in Glendale, California.

The objective of this QMP is to describe ERM's quality management system. The QMP is a management tool that documents ERM's system for planning, implementing, documenting, and assessing the effectiveness of activities involving environmental information collection and environmental remediation technology design, construction, and operation. As intended by the U.S. Environmental Protection Agency (USEPA), the QMP is an *umbrella document* that sets a framework for quality within the performance of individual projects by a company. The contents of the QMP include quality policies and procedures, criteria for and areas of application, and associated roles, responsibilities, and authorities.

This QMP was prepared to meet the applicable requirements of the USEPA document *USEPA Requirements for Quality Management Plans* (USEPA/240/B-01/002, March 2001; also referred to as *USEPA QA-R-2*) and ANSI/ASQ E4-2004, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*.

This QMP applies the graded approach specified in USEPA QA-R-2. The quality systems that are discussed in this QMP are intended to meet the quality objectives for the components of the GCOU project. The structure of this QMP is consistent with that specified in USEPA QA-R-2.

2.0 MANAGEMENT AND ORGANIZATION

The purpose of this section is to document the overall policy, scope, applicability, and management responsibilities for ERM's quality system.

2.1 MANAGEMENT APPROVAL

Approval of this QMP by an ERM Quality Assurance (QA) Manager and Senior Manager (Partner-in-Charge) is provided on the signature page included herein.

2.2 QUALITY ASSURANCE POLICY

Quality is a culture that permeates the ERM organization, and our quality systems provide guidelines and procedures that address each operation as a vital link in the chain of daily processes. ERM seeks to consistently provide quality services and work products to meet these guidelines and procedures. This means that each person in the organization will understand their role and responsibilities, execute them in a professional manner, and provide the self and independent review of the input provided. Each member of ERM will provide quality communication and service on our projects, and will always strive for continuous improvement. ERM management has made a commitment to institute and enhance a formal awareness, training, and measurement program to ensure quality throughout the organization.

ERM's quality assurance/quality control (QA/QC) activities form the basis for ERM's quality system. The goals of ERM's QA Policy are to help ensure that the environmental information collected by ERM and its subcontractors are of sufficient nature and quality for their intended use, and to ensure that all phases of ERM-led environmental investigation, site characterization, and remediation tasks are designed and implemented to align with the performance objectives for the project.

For all of its projects, ERM assigns a Partner-in-Charge who has ultimate responsibility for the quality of project activities and deliverables. Where applicable, ERM designates additional QC personnel to provide independent, activity-focused QA/QC checks (e.g., construction quality assurance, field data verification, laboratory data review).

2.3 PROJECT ORGANIZATION

As described above, ERM's Partner-in-Charge has final responsibility for the quality of project activities and deliverables. For the GCOU, ERM has designated a QA Manager to provide independent QA checks for these project activities and deliverables. The QA Manager reports directly to the Partner-in-Charge, and is at the same level as the Project Manager (to whom the bulk of the project team reports). Groups that will be generating, compiling, and evaluating project data report directly to the Project Manager. Because the QA Manager does not report to the Project Manager, the QA Manager's role is not influenced by the individual directing data management activities. Furthermore, the QA Manager has direct access to the Partner-in-Charge, and thus can influence the quality system for both the project and the company. The ERM project team organization chart is provided in Appendix A.

It is the Partner-in-Charge's responsibility to ensure that all project team members are informed of the quality objectives of the project, and the quality procedures to be utilized. At the beginning of each project, the Partner-in-Charge chairs a Job Opening Meeting in which this quality discussion is executed, and the QA Manager's role and authority is described in detail.

3.0 QUALITY SYSTEM COMPONENTS

The purpose of this section is to document how ERM manages its quality system, including responsibilities for implementing quality system components.

3.1 IDENTIFICATION OF QUALITY SYSTEM COMPONENTS

The major components of ERM's quality system include:

- Project planning;
- Management of change;
- Personnel training;
- Data management and data quality assessments; and
- Quality documentation.

Project work plans are reviewed, approved, and fully supported by the Partner-in-Charge. The Partner-in-Charge and Project Manager orchestrate project planning and integrate QA/QC processes into project work plans. Management of change and personnel training are the responsibility of the Partner-in-Charge. Specifically, the Partner-in-Charge assigns resources to the project, manages addition to or changes in project resources, and ensures that project resources are trained to perform their assign roles in a manner compliant with project quality objectives.

The QA Manager has responsibility over data management and data quality assessments. Data storage, tabulation, and assessment activities are completed by staff resources, as are routine QC checks for calculations and data transfer operations. The QA Manager oversees these QC checks and independently verifies that appropriate QC measures have been undertaken. Furthermore, the QA Manager has overall responsibility for ensuring that QA/QC processes are documented for future use.

3.2 *QUALITY SYSTEM TOOLS*

ERM's tools for implementing the above-referenced quality system components include:

- This QMP;
- Project-specific Quality Assurance Project Plans (QAPP, to be developed prior to site characterization);
- Job Opening Meetings (in which project QA procedures are communicated);
- Project Work Plans; and
- Quality Training (including communication of data management protocol).

4.0 PERSONNEL QUALIFICATION AND TRAINING

The purpose of this section is to document the procedures in place to ensure that personnel performing work for the project have the requisite skills.

4.1 TRAINING POLICY

It is ERM's policy to provide its management and staff with training to effectively execute their project responsibilities. This training encompasses all staff and includes, at a minimum, technical training, health and safety training, and project management training.

ERM's technical personnel have experience on a variety of projects directed by various partners of the firm. To the extent practical, each member of the technical staff has been cross-trained in more than one area of expertise. This enhances their benefit to a variety of projects, as well as their ability to provide timely and relevant support to dynamic project activities. Each professional employee is provided with training in project management, ERM's systems and controls, continuing education in technical areas of expertise, and leadership.

4.2 TRAINING PROGRAM MANAGEMENT

ERM assigns certain company officers as training directors to oversee and direct its training program. These training directors, with the help of support staff, maintain company training records and coordinate routine training programs to ensure employees are trained in a timely fashion following the onset of employment. These directors also maintain compliance with appropriate training requirements for potentially hazardous site activities.

For projects, such as the site characterization of the GCOU, the Partner-in-Charge ensures that the project is staffed with Registered Professional Engineer(s) and Geologists with specific expertise in the applicable fields of interest. Similarly, for other specialized areas (e.g., well drilling and installation, downhole geophysics, groundwater modeling), the Partner-in-Charge ensures that sufficient resources are assigned to the project or, as necessary, that appropriate subcontractors are utilized to complete these specialized steps.

5.0 PROCUREMENT OF ITEMS AND SERVICES

The purpose of this section is to document the procedures for procurement of items and services that can affect the quality of environmental project activities. For the GCOU, it is envisioned that this component would be limited to subcontractor procurement.

5.1 METHODS FOR QUALIFYING SUBCONTRACTORS

ERM maintains a stringent contractor pre-qualification and evaluation program that applies to all ERM vendors, as well as competitive bidding situations where ERM is providing bid solicitation services on behalf of project sponsors.

ERM typically develops a preliminary list of potential subcontractors and submits a pre-qualification package to evaluate their technical strength, financial health and performance, health and safety performance and experience, Workers Compensation Experience Modification Rate, and experience performing similar services at other sites. Once a subcontract is selected, ERM reviews the subcontractor's health and safety performance indicators and insurance coverage annually; ensures that contractors name project parties as additional insureds; and requires training records for all site workers to ensure they maintain certifications relevant to their work assignments.

6.0 DOCUMENTS AND RECORDS

The purpose of this section is to describe the procedure for maintaining controls for quality-related documents and records for the project.

6.1 PROJECT CONTROL REQUIREMENTS AND IMPROVEMENTS

ERM uses quality controls and feedback during project implementation to help ensure that all data or information collected are of the quality necessary to comply with applicable regulations. During the Job Opening Meeting, the Partner-in-Charge coordinates a discussion to identify quality-related documents that will be deemed as controlled documents for the purpose of the project.

6.2 DOCUMENT DATA MANAGEMENT

ERM has well-established procedures for document data management and dissemination. Office data is managed primarily in electronic format using a network platform and staff access nodes. All network users typically share information with project team members through email, server based document storage and retrieval, and document database links that allow access to the documents and data to the various team members. This system facilitates single file document management, eliminating multiple node-specific copies, and provides centralized daily backup and retrieval.

The following standard software packages are available for use by ERM personnel on this project:

- Microsoft Office software package, including Word, Excel, Access, PowerPoint, and Project;
- Adobe Acrobat;
- Internet Explorer;
- AutoCAD;
- Autodesk Land Development Desk Top;
- ArcView, and Map Info GIS capabilities; and
- Microsoft Outlook.

Additionally, personnel associated with this project have Internet access to the USEPA websites and downloadable regulations.

ERM uses a variety of commercially available data management software packages to handle environmental project requirements. On this project, ERM may use a relational database program to serve as a repository for all facility electronic data, both historical and newly generated data. In conjunction, ERM has an integrated GIS system that can be employed for spatial analysis. ERM anticipates the need for a GIS application on this project to overlay site information with graphical layers such as aerial photographs and topography. Additionally, GIS output can be used for 3-D spatial analysis and presentation, which we believe will be important in documenting the existing and primary data of the GCOU site.

The database and data handling protocol will require data quality issues to be detected early in the project. ERM has database formats on file with several major analytical laboratory chains that allow quick input and evaluation. ERM has developed quality and quantity filters that are run at the time of electronic data deliverable receipt. Additionally, individual databases can be established for various forms of project data, including documents and deliverables. It is our intent to utilize the inspection forms for certification reports where applicable to accelerate the reporting process.

The goal of ERM's approach to data management is to create a secure environment, maximize data functionality, and have it readily available to all project team members. The format of any information shared with the project team members will be flexible and can be formatted to fit almost any software.

The database protocols will include security functions that minimize the potential for loss due to accidents and mechanical failures. All database information will be backed up nightly as part of our data security plan implementation. Copies of the files will also be stored in a secure location, off site to facilitate system recovery, should it ever be necessary.

6.3 FIELD DATA MANAGEMENT

When field activities are initiated, all field activities, decisions, dimensions, site personnel, and any information pertinent to the fieldwork are documented in field log books. The information is recorded in a manner that would allow an uninformed party to reconstruct the activities in the absence of the person who logged the activities. The

Project Manager will review the field logs on a daily basis to ensure that the field tasks are executed according to approved work plans and to review and modify procedures, if needed, on a continuing basis.

During sampling activities, chain-of custody documentation is reviewed by the Project Manager to catch omissions and/or errors prior to receipt of the samples from the laboratory. When analytical reports are received from laboratories, the data are immediately reviewed for completeness.

Analytical data is typically transmitted via electronic formats that have been previously established with our subcontract laboratories. When data are tabulated, an independent peer review is conducted to ensure that the data were entered correctly from hard copies; the comparison criteria (e.g., detection limits, maximum contaminant levels, etc.) were entered at the correct value for the correct constituent; and the exceedances were correctly identified.

6.4 DOCUMENT PREPARATION AND CONTROL

All documents generated are assigned a unique control number that is printed on all figures, drawings, and text. Access to final documents, both hardcopy and electronic, is restricted to certain individuals who are responsible for storage. The electronic files are backed up on a daily basis and archived on compact disc.

ERM's approach to developing reports is to conduct a kick-off meeting prior to preparation. The primary purpose of the kick-off meeting is to discuss objectives, report/closure goals, assign tasks, and communicate schedule and cost constraints, if any. The Project Manager or task leader will then work closely with the staff to prepare a report outline, define tabulation structure, and prepare draft documents. The bulk of the draft deliverable is then prepared by the staff using the task leaders and Project Manager on an as-needed basis to steer the report development in accordance with the goals of the project.

Depending on the nature and complexity of the reports, periodic team meetings or brainstorming sessions may be held during the preparation of the reports to discuss key elements and reach consensus on important issues.

Once an initial draft is completed, the Project Manager reviews the document for accuracy and completeness. Review comments are then discussed with the staff, so that methodologies are communicated and the basis for the revisions is fully understood. In the case of a complex report, more than one preparation and review cycle may be necessary before the deliverable is ready for final review by the Partner-in-Charge and/or certifying engineer.

Production of the final deliverable is coordinated between the technical staff that works closely with support staff to ensure the deliverable is accurately reproduced by the required deadline. After reproduction of the deliverable is complete, the original documents are compared page by page (or drawing copy) with every copy that has been produced to ensure that pagination is correct and no pages or inserts are missing or duplicated.

The support staff then prepares shipping packages once all copies are proofed. Shipping packages are not sealed until the Partner-in-Charge or certifying engineer has checked that the shipping package has the appropriate documents including the correct number of copies and address for the correct receiving parties is correct.

6.5 RETENTION

It is anticipated that a significant amount of documentation will be required in executing this project. ERM will, as necessary, prepare formal project documentation in compliance with project requirements. This will include documentation of work performed and feedback on the quality processes in place to help ensure that the environmental data being collected for this project are in compliance with applicable regulations. ERM will maintain relevant project documentation in concurrence with regulatory orders or contract specifications for the GCOU project. At a minimum, hardcopy and electronic documentation will be maintained in off-site, secure storage for at least 10 years after the implementation of a remedial system.

7.0 COMPUTER HARDWARE AND SOFTWARE

The purpose of this section is to document how ERM ensures that computer hardware and software are sufficient to satisfy project objectives.

In the course of the site characterization activities, ERM anticipates that it will utilize software for data management (e.g., database, GIS, or spreadsheet software), drawing production (e.g., computer-aided drafting software), and design simulation software (e.g., groundwater modeling).

As part of its quality system, ERM utilizes standard, industry-accepted software for these functions. Management and update of office production software (e.g., databases, spreadsheets) is the responsibility of ERM's information technology support staff. Management and update of specialized software (e.g., GIS, design simulation software) is the responsibility of the specialized professionals utilizing this software.

With respect to hardware, ERM supplies its employees with functional, up-to-date hardware. This hardware is supported by ERM's information technology support group.

8.0 PLANNING

The purpose of this section is to document how individual data collection operations will be planned to ensure that the data collected are of sufficient and expected quality for their intended use.

8.1 PLANNING PROCESS

ERM anticipates that significant data collection efforts will be required to complete the GCOU scope of work. This QMP includes a description of ERM's general planning process for data collection efforts.

For its data collection efforts, ERM's process adheres to a systematic planning process called the Data Quality Objective (DQO) process as described in the USEPA guidance *Guidance on Systematic Planning Using the Data Quality Objectives Process* (USEPA QA/G-4, February 2006). The DQO process helps investigators and decision makers address the following basic questions:

- Why is data needed?
- What must the data represent?
- How will the data be used?
- How much uncertainty is acceptable?

By using the DQO process, ERM will ensure that the data collected for decision making are of the appropriate type, quantity, and quality. In addition, the DQO process:

- Ensures that only data supporting defensible decision making will be collected; and
- Allows flexibility in planning because of its iterative nature.

The DQO process is an iterative seven-step planning process to generate performance and acceptance criteria for collecting environmental data. The seven steps of the DQO process are as follows:

Step 1 - State the Problem: Define the problem that necessitates the study, identify the planning team, and examine budget and schedule;

Step 2 - Identify the Goal of the Study: State how environmental data will be used in meeting objectives and solving the problem, identify study questions, and define alternative outcomes;

Step 3 - Identify Information Inputs: Identify data and information needed to answer study questions;

Step 4 - Define the Study Boundaries: Specify the target population and characteristics of interest, define spatial and temporal limits, and scale of inference;

Step 5 - Develop Analytical Approach: Define the parameter of interest, specify the type of inference, and develop the logic for drawing conclusions from findings;

Step 6 - Specify Performance or Acceptance Criteria: Develop performance criteria for new data being collected or acceptable criteria for existing data being considered for use; and

Step 7 - Develop the Plan for Obtaining Data: Select a cost-effective Sampling and Analysis Plan to meet the performance criteria established in Step 6.

The ERM Project Manager is responsible for ensuring that data collection efforts are preceded by a thorough evaluation of DQOs, and that field personnel understand the means by which DQO adherence will be measured.

Prior to data collection efforts, a site-specific QAPP will be completed to document the following:

- Objective of the data collection effort;
- Intended use of the data to be collected;
- Plan (scope and schedule) for data collection activities;
- Analytical procedures (field and laboratory) to be utilized;
- DQO process;
- Performance criteria to be measured for data collection efforts; and
- QC samples to be collected, if any, to assess quality performance criteria.

9.0 IMPLEMENTATION OF WORK PROCESSES

The purpose of this section is to document how work processes will be implemented to ensure that data are of sufficient quality for their intended use.

9.1 WORK PROCESS PROCEDURES

The Partner-in-Charge works with the Project Manager to identify those data collection activities that require procedures to be established. Once these procedures are identified, the QA Manager reviews the project scope and provides independent input regarding the procedures to be utilized.

It is the responsibility of the Project Manager to ensure that data collection activities are conducted in accordance with approved project procedures. Typically, these procedures are described in project work plans. Where applicable, these plans will incorporate appropriate technical guidance documents and/or published methods.

Work plans will be designated as controlled documents. The documents will be dated and signed, and revisions to the documents will be made only upon approval from the Partner-in-Charge and QA Manager. Prior to mobilizing for data collection efforts, the Project Manager will verify that the most up-to-date version of the work plan is being utilized. Furthermore, the Project Manager will be responsible for collecting outdated versions of work plans and removing them from project team access.

9.2 MANAGEMENT OF PROJECT ACTIVITIES

ERM's approach to management of schedules, budgets, and scopes of work is to establish these items at the start of the project for stakeholder review and approval. From that time forward, ERM controls changes to the work by identifying changes in the project scope in a timely manner. At ERM, we strive to:

- Clearly state our understanding of the project goals;
- Carefully identify the tasks necessary to achieve the goals;

- State the assumptions on which our scope of work has been developed; and
- Estimate the level of effort required to perform the tasks needed to achieve the stated goals.

The need for changes to the scope of work is controlled using simple, yet effective project management techniques. Each team member is provided the labor estimate and scope of work that clearly defines the level of effort required and the resources allocated to complete their assignment. The Project Manager and task leader(s) maintain close day-to-day interaction with the project team members to assure adherence to the agreed scope of work, budget, and schedule and to offer guidance. Team members are equally responsible for rating their progress. We have found that projects which are behind schedule are inevitably over budget. Therefore, if a task begins to fall behind schedule, the Project Manager will immediately take corrective steps. In this way, each task leader and project team member have equal responsibility to identify changes from project assumptions so that a change in scope, approach, schedule and/or cost can be addressed with the client at the earliest opportunity.

Should a change or delay arise, the Project Manager will meet with the Partner-in-Charge to review the impact of the change or delay on the overall execution of the project. In assessing the cost and impact of changes or delays, the Project Manager will consider, among other things:

- Ways to reduce or eliminate the impact on project costs and schedule;
- The effect of the change or delay on related tasks which have been completed or which are planned to follow;
- Options that exist for reducing scope or approach to maintain the budget or for changing the cost or schedule;
- Impact on the project's overall plan or design concept;
- Availability and skills of personnel necessary to execute the change;
- Deadlines imposed by regulatory requirements or enforcement orders;
- Need for additional information (from client, investigations, or other sources); and
- Commitment of resources necessary to execute the change.

ERM personnel report to an administrative supervisor who is responsible for assuring that each employee's time is properly allocated; that no conflicts exist in the work schedule; and that the employee is being trained and utilized to the greatest extent possible. Where conflicts exist, the

Partner-in-Charge resolves the conflict with the aid of the ERM Managing Partner, if necessary. Using this approach, ERM is able to allocate resources between projects such that technical personnel are fully committed to project work. At the same time, however, ERM eliminates scheduling inefficiencies and over-commitment of individual personnel, allowing us to routinely and successfully load level across multiple, complex projects.

10.0 ASSESSMENT AND RESPONSE

The purpose of this section is to describe how ERM will assess the suitability and effectiveness of its quality system and of the data collection efforts to which the quality system applies.

10.1 QUALITY SYSTEM REVIEWS

ERM routinely reviews its quality system components to ensure that they remain suitable and effective for their intended purpose. Reviews are typically conducted at the onset of each new USEPA project in conjunction with the work plan development process. For projects extending over a period of 1 year, quality systems are reviewed at least annually to ensure system components do not need to be adjusted to account for changes in project operations.

Notably, the annual review process sets a minimum standard for reassessing the quality system components. As conditions change, ERM may reassess and revise the quality system components on an as-needed basis.

Quality system reviews are conducted by the project QA Manager who then documents findings in an assessment report. To ensure that the QA Manager is qualified to conduct the assessment, the Partner-in-Charge assigns the QA Manager role to an individual with sufficient experience in the practice areas included in the project scope of work. As described above, the QA Manager reports directly to the Partner-in-Charge, and is not responsible for the work to be completed in the project.

Following completion of a quality system review, the Partner-in-Charge reviews the results and works with the QA Manager to implement necessary changes to quality system components. Upon completion of the post-review revisions, the Partner-in-Charge works with the Project Manager to communicate the revisions.

11.0 QUALITY IMPROVEMENT

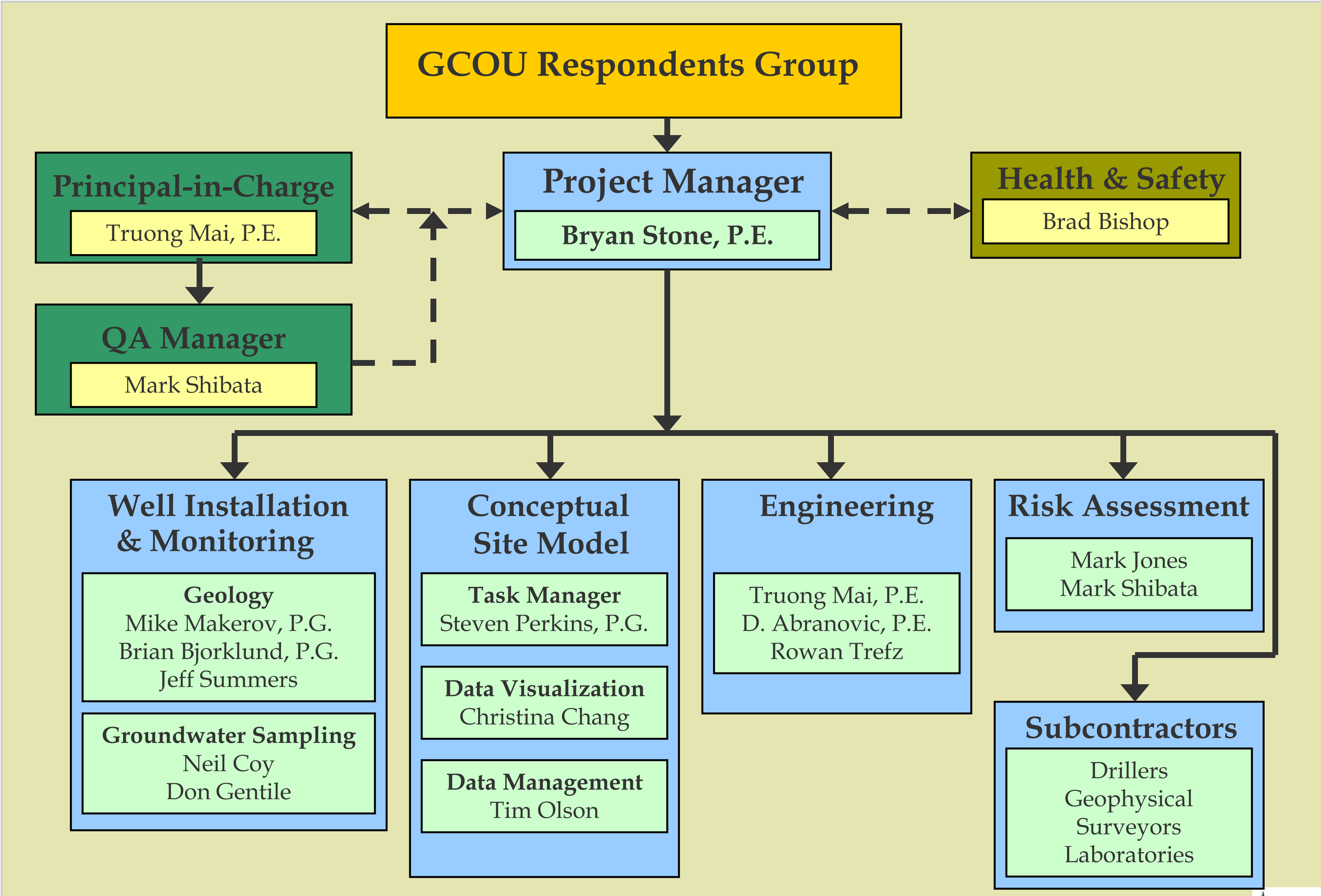
The purpose of this section is to document the process by which ERM effects improvement to its quality systems.

The Managing Partner of ERM is responsible for ensuring that conditions adverse to quality are identified as soon as reasonably practicable, and these conditions are mitigated in a timely fashion. Furthermore, it is the Managing Partner's responsibility to ensure that the mitigation steps identified are monitored to completion, and are periodically reviewed to ensure implementation is being sustained.

ERM endeavors to maintain a high-quality operation and, to that end, encourages its employees to communicate any and all ideas related to quality system concerns or improvements. ERM's management maintains an open-door policy, thus facilitating open communications between staff and management.

Appendix A

ERM Organization Chart


GCOU Respondents Group
Principal-in-Charge
Truong Mai, P.E.
Project Manager
Bryan Stone, P.E.
Health & Safety
Brad Bishop
QA Manager
Mark Shibata
Well Installation & Monitoring
Geology
Mike Makerov, P.G.
Brian Bjorklund, P.G.
Jeff Summers
Groundwater Sampling
Neil Coy
Don Gentile
Conceptual Site Model
Task Manager
Steven Perkins, P.G.
Data Visualization
Christina Chang
Data Management
Tim Olson
Engineering
Truong Mai, P.E.
D. Abranovic, P.E.
Rowan Trefz
Risk Assessment
Mark Jones
Mark Shibata
Subcontractors
Drillers
Geophysical
Surveyors
Laboratories