Report

Gloria Way Water Well Production Alternatives Analysis & East Palo Alto Water Security Feasibility Study

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Todd Engineers • Kennedy/Jenks Consultants • ESA

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City of East Palo Alto, California

TABLE OF CONTENTS

List of Tables

List of Figures

List of Appendices

EXECUTIVE SUMMARY

The City of East Palo Alto has a current water supply guarantee of 2,199 acre-feet (AF) annually from the San Francisco Public Utilities Commission (SFPUC). The City's 2010 Urban Water Management Plan (UWMP) shows a current demand of 2,200 AF rising to 2,658 AF in 2015 and 3,400 AF by 2035. Comparison of these values indicates that the City does not have adequate water supplies to support further growth and economic development. Moreover, additional guaranteed water is not available from the SFPUC. Potential methods of increasing supply or reducing demand identified in the UWMP are:

- Water conservation by customers
- Utilization of recycled water for irrigation
- Transfers
- Desalination
- Purchase of additional water rights from other jurisdictions, utilities, and private parties
- Development of local groundwater resources.

With regard to future water conservation, East Palo Alto has two important characteristics: a relatively low per capita water demand and limited outdoor irrigation. East Palo Alto already has the lowest per capita water consumption (58 gallons per day) among the 27 Bay Area Water Supply and Conservation Agency (BAWSCA) municipalities. Accordingly, the potential is limited for reducing water demand relative to available supply. In addition, there is limited opportunity for the use of recycled water. Parks and school property are typical large uses and these are limited in East Palo Alto. Nonetheless, the UWMP provides an overview of potential recycled water opportunities and potential methods to encourage recycled water use. Similarly, the UWMP outlines transfer and exchange opportunities, which are focused mostly on water shortage conditions. Desalination also is addressed in the UWMP as a potential future opportunity as other San Francisco Bay area agencies explore the feasibility of regional desalination.

At this time, the most practical method of increasing supply is development of local groundwater resources. Sand and gravel aquifer zones, inter-bedded with less permeable clay layers, are present beneath the City and wells are capable of producing several hundred gallons per minute or more. The City has an existing well, Gloria Way, that is operable but not in use because of high levels of iron and manganese in the groundwater. In addition, groundwater is available throughout the City, although comprehensive information regarding the available quantities and quality is not completely currently available. It is noted that the Palo Park Mutual Water Company, which lies within the City, has been supplying approximately 1,000 customers with groundwater from their well field since 1920.

Test pumping of the Gloria Way Well has indicated that it can provide a sustained yield of approximately 300 gallons per minute (gpm). Because of the elevated iron and manganese, a treatment facility would be required; the existing site has adequate space to accommodate such a facility. The approximate cost for the design and construction of an iron/manganese removal facility is $2,000,000.

The City's proximity to San Francisco Bay presents a risk of saline water intrusion and groundwater quality degradation if groundwater pumping results in excessive drawdown that reverses the natural groundwater flow direction toward the Bay. Land subsidence also may occur as a result of excessive drawdown. However, preliminary groundwater flow simulations indicate that drawdown and associated risks can be minimized by reducing the well pumping rate or cycling operation. Development of a groundwater management plan and implementation of a groundwater level and quality monitoring program in and around the City are key steps in ensuring that groundwater production is sustainable without significant adverse impacts.

Other potential well sites in addition to Gloria Way have been identified and evaluated. The preferred site for a second well, referred to as Pad D, is located near the intersection of Bayshore Road and Clarke Street in the Ravenswood 101 Shopping Center. Preliminary hydrogeologic evaluation indicates that a sustained pumping rate of 500 gpm is possible at Pad D, but this needs to be confirmed by drilling a test well and performing a pumping test. In addition, groundwater from this test well would be sampled and analyzed to evaluate water quality and determine if an iron and manganese treatment facility is required. Development of a groundwater supply at Pad D (including an initial test well investigation, full-scale production well, and 500-gpm iron and manganese facility) would cost approximately $3,400,000. Project construction costs would be funded through a combination of grants, loans, and City reserves. The mix of funding options has not been determined at this time.

In addition to construction costs, there will be future new operation costs. These new operational costs for the Gloria Way Well are estimated to be approximately $200,000 annually. This assumes continuous well operation at a rate of 300 gpm.

Overall project development requires further hydrogeologic and engineering evaluations as well as an environmental review. A groundwater management plan and monitoring program also need to be developed to ensure long-term sustainability of the groundwater supply, and to qualify for available funding.

Recommendations for next steps and implementation of the project are listed below:

- Groundwater management and protection is strongly recommended to ensure that the continued highest beneficial use of the finite groundwater resources is available to meet the City's demands.
- Monitoring of groundwater levels and water quality conditions should be initiated to help manage the resource and provide early warning so that land subsidence and saline water intrusion from the Bay are minimized.
- A Groundwater Monitoring Plan and a Groundwater Management Plan (GWMP) should be developed for the City to comply with State Law (AB3030, SB1938, SBx7-6,), and be eligible for State Water Funds, as well as provide guidance on development and implementation of groundwater monitoring and management activities to protect and develop the resource to ensure the continued highest beneficial use.
- The groundwater management plan and monitoring program should encompass the groundwater subbasin and include coordination with willing neighbor agencies and outreach to stakeholders.
- Further predictive analysis of the effects of pumping by the City and other groundwater subbasin users should be performed to better define potential long term impacts under

changing environmental conditions. A robust three-dimensional groundwater flow model should be constructed to assess the potential risks of impacts under various current and future pumping scenarios.

- A more refined prediction of potential land subsidence should be performed using geotechnical soil compaction models.
- Because of its relatively lower cost and City's need to develop new water supply sources in the near future, it is recommended that the City proceed with design and construction of the Gloria Way Well treatment system.
- It is recommended that operation of the Gloria Way Well system be planned and phased to allow implementation of the monitoring program and conduct of further studies. Specifically, initial pumping should be conducted at relatively low flow rates (less than the 300 gpm capacity of the well) and revised as additional studies and data indicate; this will allow limited operation of the well while minimizing the risk of adverse impacts.
- The City should proceed with the hydrogeologic investigation of Pad D as a preferred additional future well site to help augment existing supplies and meet future demands. Should Pad D be found to be untenable as a potential well site after site-specific investigation, alternative new well site(s) previously identified should be investigated.
- The Pad D hydrogeologic investigation should include drilling of a deep test boring, stratigraphic logging, depth-discrete flow testing, and depth discrete water quality sampling and testing.
- Two parcels have been identified with potential as sites for water storage tanks; these are a small portion of a property near 2415 University Avenue and a parcel at the corner of Newell and West Bayshore. Further analysis should be conducted to evaluate the feasibility of utilizing these parcels for storage facilities.
- In the near-term, the City should continue to contract water system operations to American Water Enterprises at least through the end of their current contract, at which time the feasibility of renewing the contract may be evaluated in comparison to other alternatives.
- The City should continue to identify available funds in the forms of grants or lowest interest loans for low income communities, and proceed to obtain funding to implement the recommendations of this Study.

The timeframe and costs for these recommendations are summarized in the Table below:

Table ES1. Recommended Water System Improvements
City of East Palo Alto

Recommended Improvement	Estimated Capitol Budget	Estimated Time to Complete
Groundwater Management Plan and Improved Model	**$250,000**	**12 months**
Monitoring Plan and Monitoring Well System	**$250,000**	**8 months**
Gloria Way Well Rehabilitation	**$2,000,000**	**20 months**
Pad D New Well System	**$3,400,000**	**24 months**
Additional Water Storage Site Evaluation and Feasibility Analysis	**$200,000**	**12 months**
Storage Tanks (Two 2MG Tanks)[1]	**$10,000,000**	**12 months**
Total:	**$16,100,000**	

1 - Estimated cost for 2 million gallon (MG) storage tanks assumes a deep pile system will be required for seismic stability. If pile foundations are not required storage tank costs will be lower.

1. INTRODUCTION

This report documents the Gloria Way Water Well Production Alternatives Analysis and Water Security Feasibility Study (Study) performed for the City of East Palo Alto, California (City). The Study was conducted by Todd Engineers (Todd), Alameda, California, along with Kennedy/Jenks Consultants (K/J) of Palo Alto and Environmental Science Associates (ESA) of San Francisco, California.

The City recognizes that it faces a water shortage and lack of emergency supply. The nature of the water shortage is threefold. First, the City has been using more water than its dry-year allocation of San Francisco Public Utilities District (SFPUC) supply. Second, the City lacks supplemental water to serve any proposed new projects. Third, the City currently contains no emergency storage facilities to provide water for consumption or fire suppression if the SFPUC system experiences a catastrophic disruption.

The City has obtained a US Environmental Protection Agency (USEPA) Special Water Infrastructure grant to fund a two-phased project. The primary goal of Phase I is to evaluate the feasibility and requirements for constructing a groundwater supply system for the City. The specific objectives are to:

- Determine the feasibility of maximizing the production of potable water from the Gloria Way Well site or a new well site(s) in the City. The existing Gloria Way Well has water quality issues, but potentially, it could meet about half of the shortfall. Other well sites may have better yields and water quality.
- Identify options for emergency storage in the City.
- Identify potential groundwater management and governance alternatives to help ensure a sustainable water supply.
- For the longer term, identify additional groundwater sources and sites, and prepare a groundwater development and management strategy for supplemental and emergency supply.

Environmental review and regulatory permitting will be performed after selection of the groundwater development project (Gloria Way Well or other well site). Phase II of the USEPA Special Water Infrastructure grant project will provide engineering design and construction in 2013 to move ahead with groundwater production.

In its investigation of additional supply sources, the City began by exploring rehabilitation options for the Gloria Way Well. The Gloria Way Well is an existing well that is used by the City for limited non-potable needs such as street cleaning and construction. The well, which was developed as a potable supply source, has not been used as a part of the City’s drinking water supply since the 1980s because of customer complaints about taste and odors resulting from elevated concentrations of iron and manganese in the water. By addressing these water quality concerns and reintroducing groundwater from Gloria Way Well into the City’s distribution system, Gloria Way Well can be used both for long-term water supply enhancement and emergency supply.

Rehabilitation of Gloria Way Well will assist in meeting the near-term deficit in the City’s water supply. However, additional sources will be necessary to meet the projected long-term deficit, and as part of this study, additional well sites have been considered. A preliminary screening of potential well sites has been performed to identify the most viable options. A conceptual water treatment plant layout and associated costs for a potential new well site are provided.

Storage options also have been considered to provide for additional system security during emergencies. The City's system currently lacks storage, which makes it vulnerable to outages of the SFPUC system. While the development of local groundwater supplies will decrease the vulnerability of the system, emergency storage may be considered to further improve the reliability of the system.

Note that the City is actually served by three water systems – the City of East Palo Alto's municipal water system, Palo Alto Park Mutual Water Company, and O'Connor Tract Water Company. This report focuses on the City's municipal water system, which serves most of East Palo Alto. References to the City, unless otherwise specified, refer to the municipal system and its service area.

1.1 Background and Setting

The City's current and projected water supply and demand status and general groundwater resources are summarized below. A summary of the overall groundwater conditions in and near the City is presented in the following subsection.

1.1.1 City Water Supply and Demand

The City currently receives essentially all of its potable water from the SFPUC. However, a reduction in the City's allocation has been proposed by the SFPUC. In addition, City water demand is projected to increase due to planned growth. Without the acquisition of new supply sources, the City projects a shortfall between its future water supply and demand predictions for the next 25 years.

Historical water use in East Palo Alto is summarized in the Water System Master Plan (WSMP), which was completed in October 2010, and in the 2010 Urban Water Management Plan (UWMP), which was completed in June 2011 (both reports were prepared by Integrated Resource Management, Inc.). The annual supply and demand rates cited in the two reports differ slightly, so values from both reports are cited below.

Table 1 summarizes data presented in WSMP Table 3-2 Historical Water Use (ccf) and Table 3-3 Historical Gloria Way Water Use (ccf)[1]. Whereas the WSMP presented the figures in ccf, **Table 1** presents the data in acre-feet (AF) or acre-feet per year (AFY). Annual SFPUC deliveries to the City between 1999 and 2009 ranged from 1,874 to 2,424 AF. The City currently maintains a groundwater production well, the Gloria Way Well, and a few AF of groundwater are pumped and utilized for street cleaning and construction dust-control.

Table 2 summarizes data presented in Table 4-2 East Palo Alto Historical Purchases of the 2010 UWMP. The WSMP reports water use for each water year, while the UWMP reports use by calendar year. Accordingly, there are some differences in reported annual values. However, the water use over corresponding eight-year periods reported in each Plan is similar. From the MSWP between water years 2001/2002 and 2008/2009,

[1] The WSMP and UWMP refer to Gloria Bay Well; the well is herein termed Gloria Way.

17,729 AF were used, or an average of 2,216 AFY. From the UWMP between calendar years 2002 and 2009, 17,467 AF were used, or an average of 2,183 AFY.

Future water use in East Palo Alto is also provided in the WSMP and UWMP. Again the data differ in these reports. **Table 3** summarizes data presented in Table 3-6 Projected Water Demand of the WSMP. **Table 4** summarizes the data in Table 3-8 Total Water Use of the 2010 UWMP. Finally, the UWMP summarizes future normal year supply and demand, as shown on **Table 5**. Projected 2015 water demand increases to 2,658 AFY (UWMP) or 2,728 AFY (WSP), and by 2035 water demand rises to 3,400 AFY (UWMP).

As shown on **Table 5**, non-SFPUC water sources, particularly local groundwater and recycled water (and potentially desalinated San Francisco Bay water), have the potential to be used in the future to increase the availability of potable water supplies. These sources are discussed in the UWMP, which specifies the Gloria Way Well (420 AFY) and New Groundwater Wells (1,210 AFY) as potential water supply sources. As a part of this project, the sustainability of local groundwater supply sources has been evaluated. General groundwater conditions in the City are summarized below and further evaluated in Sections 2, 3, and 4 of this Report.

1.1.2 City Groundwater Resources

Up until the 1960s, groundwater was the primary source of water supply for communities in the vicinity of East Palo Alto. Groundwater pumping during this period caused groundwater levels to drop below sea level. In turn, lowered water levels caused land subsidence and saltwater intrusion from the San Francisco Bay (Fio and Leighton, 1995). By the early to mid-1960s, surface water from the Hetch Hetchy Aqueduct became the primary source of water for the area, and groundwater pumping was significantly reduced. While groundwater still provides a portion of the water supply for the area, groundwater levels have been rising since the mid 1960s and are now at levels comparable to those of the early 1900s (Carollo, 2003).

In addition to East Palo Alto, nearby and adjacent cities including Palo Alto, Menlo Park, and Redwood City are pursuing groundwater as a supplemental and/or emergency source of water supply. Palo Alto has implemented a program to rehabilitate five existing water supply wells and construct three new wells for emergency supply. The City of Menlo Park has been investigating the potential for groundwater as a supplemental or emergency supply capable of producing 3,000 gpm; seven sites have been identified as suitable for new groundwater wells (Gnesa and Buising, 2011). A new groundwater production well is scheduled for installation at the Menlo Park Corporation Yard site in 2012 (City of Menlo Park, 2012b). In addition, Menlo Park has been considering installation of an irrigation well at Nealon Park to offset the Sharon Heights Golf and Country Club water use.

Existing reports and other data sources have been reviewed to further evaluate hydrogeology and groundwater resources beneath and adjacent to the City and to develop a hydrogeologic conceptual model, which is described in Section 2 of this report.

1.2 Phase I Project Approach and Scope

The scope for Phase I of this project includes the following tasks:

- Summarize Existing Planning and Groundwater Conditions

- Develop Hydrogeologic Conceptual Model
- Evaluate Gloria Way Well Rehabilitation
- Identify Construction Phasing and Schedule for Gloria Way Well Rehabilitation
- Provide Overview of Governance, Management Options, and Funding Sources
- Identify Other Groundwater Well Sites in East Palo Alto
- Provide Overview of Need for Emergency Storage
- Prepare Report

The hydrogeologic conceptual model documents the geologic and hydrologic conditions, properties, and processes that control groundwater flow and quality within the study area. The conceptual model forms the basis for evaluating groundwater production, well yields, and water quality related to design and operation of groundwater pumping and treatment systems.

The well system evaluation is focused on determining potential performance (flow rates and water quality), potential adverse impacts, regulatory requirements, preliminary treatment and distribution system requirements, constructability, and cost of multiple groundwater production alternatives including the existing Gloria Way Well and potential new wells at other sites in the City. Treatment alternatives to reintroduce water from Gloria Way Well into the City's distribution system are presented and preliminary design details and costs for the recommended treatment methodology provided. Other potential groundwater well locations in the City have been assessed to identify the most viable options. A conceptual water treatment plant layout and associated costs for a new well system are provided.

Governance and management alternatives necessary to support long-term operation of a groundwater system have been evaluated. Sources of funding for capital plus operation and maintenance costs are also identified. Emergency storage options and sizing recommendations for above-ground storage tanks are presented.

The remainder of this report is organized into the following sections:

- Section 2 - Hydrogeologic Conceptual Model
- Section 3 - Gloria Way Well Rehabilitation
- Section 4 - Other Potential Groundwater Sources
- Section 5 - Emergency Storage
- Section 6 - Governance, Management and Funding

Prior to evaluation of existing data and collection of new data, a Draft Quality Assurance Project Plan (QAPP) was prepared and submitted to the US EPA for approval. The US EPA provided comments on the Draft QAPP, and a final QAPP was prepared and approved by the US EPA. A copy of the QAPP is included in Appendix A.

2. Hydrogeologic Site Conceptual Model

This section presents a hydrogeologic site conceptual model of East Palo Alto and adjacent areas. The conceptual model summarizes the key conditions, aquifer properties, and processes that control groundwater flow and quality within the study area. The conceptual model forms the basis for evaluating groundwater production, well yields, and water quality related to design and operation of groundwater pumping and treatment systems.

Some of the key elements of the conceptual model are:

- Study Area, in terms of watersheds, groundwater and surface water divides, and recharge and pumping facilities; and a study period that defines the timeframe for quantification of the hydrologic conditions.
- Hydrogeologic Conditions, including the general structure of the aquifers, aquitards and other geological units, the number, areal extent and thickness of layers; and hydraulic properties including aquifer transmissivity, hydraulic conductivity, and aquifer storage coefficient.
- Hydrologic Conditions, the key processes defining the movement of water throughout the landscape including rainfall, evapotranspiration, runoff, creek flow, natural groundwater recharge, water level elevations and temporal trends, and groundwater flow. Included in these conditions is the Groundwater Sub-Basin Water Budget (balance), which quantifies rates of inflow and outflow, and change in storage of surface water and groundwater.
- Water Quality Conditions, including the concentrations and distribution of dissolved chemicals in groundwater and Hetch Hetchy water. Of particular importance is the distribution of total dissolved solids (TDS) and chloride, which are locally elevated due to the presence of brackish water, and iron and manganese, which are elevated in the City's Gloria Way Well and other wells in and adjacent to the City.
- Anthropogenic Conditions that can influence groundwater pumping and treatment system design and operation, including existing water system size layout capacity and operations, land use and availability, and other environmental conditions that could impact groundwater production systems.

2.1 Data Sources

Because there has not been significant groundwater development in the recent past and because currently there is no comprehensive active groundwater management in San Mateo County, data on hydrogeologic conditions in East Palo Alto are limited. However, we obtained and evaluated 'secondary' (existing) data from a variety of sources in order to characterize groundwater conditions and develop the hydrogeologic conceptual model. These data include regional climate and meteorological data, land use information, geophysical surveys, geologic and geophysical logs from borings and wells, well construction information, well capacities or pumping rates, aquifer hydraulic properties, limited water level elevation information, and water quality information from wells. The major sources of information for this evaluation include:

- Hydrogeologic reports published by the State of California and United States Geologic Survey, and other sources
- Well logs obtained from the California Department of Water Resources (DWR)
- Well construction information obtained from the San Mateo County Environmental Health Department
- Well construction information and hydrogeologic reports obtained from the Santa Clara Valley Water District
- Well construction and yield information from the Cities of Menlo Park and Palo Alto, California and from the Palo Alto Park Mutual Water Company
- Groundwater elevations obtained from the DWR
- Aquifer test information providing a range of aquifer hydraulic parameters including distribution of permeability
- Historical and recent groundwater quality data from wells in and adjacent to the City
- Historical well construction, pumping, water level and water quality information on the Gloria Way Well obtained from the City
- Water supply and demand projections from the UWMP and WSMP
- Water distribution system size layout and capacity information obtained from the City
- Acreage and other information on specific land parcels for potential future well system sites.

Additional data sources are listed in the References Section at the end of this report. All secondary data used in this project have been reviewed to assess data quality and potential significance to quality-related project decisions.

2.2 Study Area

The Study Area includes the City of East Palo Alto (City) and adjacent portions of Palo Alto, Menlo Park, and Atherton. This area encompasses the San Francisquito groundwater subbasin, which is further described below.

The City and adjacent areas are located in the Coast Range Physiographic Province, a region characterized by northwest-trending faults, mountain ranges, and valleys. Movement along the San Andreas, Hayward, and Calaveras faults and down warping of the area between the fault zones has formed the physiography of the San Francisco Bay area (DWR, August 1967). The City is part of the South Bay Drainage Unit, which is characterized by a broad alluvial valley sloping toward the San Francisco Bay and flanked by the Diablo Range in the East Bay and the Santa Cruz Mountains in the west (DWR, August 1967). Surface streams have flowed from the mountains and deposited sedimentary debris as alluvial fans and flood plains. These alluvial deposits compose the major aquifers of the region.

2.3 Geology and Aquifer Zones

The City overlies the confined portion of Santa Clara Valley Groundwater Basin, designated by the California Department of Water Resources (DWR) as Groundwater Basin Number 2-9.02 (DWR, 1975 and 2003). The Santa Clara Groundwater Basin occupies a structural trough between the Diablo Range on the east and the Santa Cruz Mountains on the west, extending from the northern border of Santa Clara County to Coyote Narrows.

The principal water-bearing formations of the Santa Clara Groundwater Basin are unconsolidated to semi-consolidated alluvium composed of gravel, sand, silt and clay (DWR, 2003) that generally have high permeability with most large production wells deriving their water from it (DWR 1975). The subbasin's southern portion and margins are unconfined zones, generally characterized by permeable alluvial fan deposits. A confined zone, created by an extensive clay aquitard, occurs in the subbasin's northern portion (SCVWD, 2001) dividing the water-bearing units into an upper and lower zone with the latter tapped by most local wells.

The southwestern portion of the City and surrounding cities (including northern Palo Alto, Menlo Park, Atherton, and portions of Redwood City) are underlain by unconsolidated and semi consolidated deposits of the San Francisquito alluvial fan or cone (see **Figure 1**). The alluvial fan is composed of deposits from the Santa Cruz Mountains and from San Francisco Bay. Fine-grained silts and clays were deposited during periods of rising sea levels when the area was inundated. When sea levels declined, streams eroded the fine-grained materials and deposited coarse-grained sand and gravels near the foothills and in the stream channels. The fan deposits vary in composition with distance from the head of San Francisquito Creek. Deposits near the head of the fan are characterized as poorly sorted clays and gravels, and deposits near the central portion of the fan and the active stream course are generally cleaner sands and gravels. Deposits near the terminal or distal portion of the fan consist of finer-grained silts, clays and fine sands (CH2MHill, July 1992). Relatively finer-grained materials were deposited laterally away from the stream channel course.

The alluvial deposits of the San Francisquito Cone form a wedge that generally thins near the bedrock hills and thickens toward the Bay. Review of water well logs and references indicate that the thickness of the alluvial deposits ranges from zero where bedrock crops out to over 1,000 feet nearer to the bay. The alluvial deposits tend to be thickest near and south of San Francisquito Creek and thin to the northwest (Fio and Leighton, 1995). Bedrock units compose the underlying basement complex beneath the alluvial deposits. These bedrock units are older sedimentary and igneous rocks, and are considered essentially non-water bearing. **Figure 2** shows the estimated depth to bedrock in the vicinity of the City based on borehole, seismic, and gravity data as reported by Oliver (1990) and augmented with additional borehole data in western Palo Alto.

The Pulgas Fault is a southwest dipping reverse fault that separates bedrock deposits of the foothills of the Santa Cruz Mountains on the southwest from younger alluvial deposits of the San Francisquito Cone on the northeast. The fault may impede the subsurface inflow of groundwater from the bedrock uplands (Metzger, 2002). Other smaller faults exist in the area, but are not thought to displace alluvial deposits and thereby affect groundwater flow.

The deposits underlying the northeastern portion of the City and the bay front area are an interbedded sequence of alluvial fan deposits and marine clays deposited at the distal edge of the Niles Cone Fan. The Niles Cone Fan is composed of sediments deposited westward from the Diablo Range in the East Bay into the lowlands occupied by San Francisco Bay. Beneath the northeastern portion of East Palo Alto, the distal alluvial fan deposits of the Niles Cone interfinger with distal alluvial fan deposits of the San Francisquito Cone. Studies conducted by the USGS, DWR, SCVWD, and other parties all have identified the presence and connection of aquifer zones beneath the Bay. The aquifer zones underlying the City do not end at the shoreline of San Francisco Bay; rather they extend offshore beneath the Bay and may be hydraulically connected to aquifer zones in the southeast side of the Bay including the Niles Cone in Fremont.

San Francisquito Creek has a watershed area of 45 square miles (mi^2) encompassing mountainous bedrock terrain and relatively flat alluvial fan deposits. The alluvial deposits associated with the creek are permeable and the alluvial deposition area of the creek is large (DWR, August 1967). As a result, San Francisquito Creek is an important source of recharge to groundwater. The creek is usually dry during the dry summer months from May to October.

Precipitation in the San Francisquito Cone area averages about 15 inches per year. Rainfall is greater in the higher elevations of the San Francisquito Creek drainage basin where it averages more than 40 inches per year at the highest elevations.

Southern Redwood City, Atherton, Menlo Park, East Palo Alto and northern Palo Alto are located in the San Francisquito Creek Groundwater Subbasin, which is part of the Santa Clara Valley Groundwater Subbasin (DWR, August 1967; Metzger, 2002). The San Francisquito Creek Cone encompasses approximately 22 mi^2. The Subbasin boundaries roughly correspond to the extent of the San Francisquito Creek Cone (**Figure 1**). With the exception of the southwestern boundary where faulting between bedrock and alluvial deposits impedes groundwater inflow, the Subbasin boundaries do not represent hydrogeologic barriers. Accordingly, the San Francisquito Subbasin is continuous with Belmont Subbarea on the northeast and the Santa Clara Valley Subbasin on the southeast.

Groundwater in the Subbasin is unconfined to confined. Most known production wells in the City and surrounding areas are completed in the deeper confined aquifer zones. When groundwater levels are high, deeper wells exhibit flowing artesian conditions. Artesian conditions have been encountered recently in a well on the 1990 Bay Road environmental contamination site located near the bay in the City (Rafferty, M., Personal communications, May 2012). Artesian conditions were also observed in the Santa Clara Valley Water District (SCVWD) deep multiple-completion monitoring well (Eleanor Park) drilled in Palo Alto in 2003.

The San Francisquito Creek Subbasin is composed of coarse- and fine-grained alluvial deposits of San Francisquito Creek. Thick, laterally-extensive fine-grained materials (deposited when the area was below sea level) form aquitards or confining layers, thereby producing a multiple aquifer system. The USGS (Metzger, 2002) characterized an upper unconfined zone underlain by a fine-grained Bay mud unit near the bay (the unit does not extend to the foothills in the southwest) and a deep aquifer beneath the confining layer that has two water-bearing zones. **Figure 3** shows the location of cross sections prepared in the Study Area. **Figure 4** shows a regional cross section extending from the foothills in the southwest to San Francisco Bay in East Palo Alto.

This regional cross-section, modified from the original published by the USGS, illustrates the overall stratigraphy and confining layer beneath the City.

Cross Section B-B’ (**Figure 5**) covers a smaller area with more detail and extends from Menlo Park in the west-southwest through East Palo Alto to the bay. Two downhole electrical resistivity logs plotted on the cross section show many fine-grained sands layers alternating with silts and clays in the western portion of the cross section. There is a clear increase in silts and clays in the shallow zone (zero to 300 feet below ground surface (ft-bgs)) in the east closer to the bay. In addition, a considerable thickness of alluvial material is indicated below the deepest well screens and above bedrock; the distribution and percentage of course-grained materials in this lower zone are unknown.

Cross Sections C-C’ and D-D’ (**Figures 6** and **7**) are aligned from southwest to northeast from Palo Alto to the San Francisco Bay in East Palo Alto. A similar pattern of increasing fine-grained deposits in the shallow zone near the bay is observed. The limited coarse-grained deposits in the bay lands area of East Palo likely represent gravel filled stream channels etched into a prevailing clayey surface in past geologic time and subsequently buried by younger sedimentary deposits. As a consequence, these water bearing zones have the configuration of sinuous paths with limited lateral continuity. Based on the cross sections, a higher percentage of coarse-grained deposits are observed west, south and southeast of the Gloria Way Well. The distribution and percentage of coarse-grained deposits at depth below about 500 ft-bgs are unknown.

The cross sections indicate that new wells drilled on the southwest side of the City will likely encounter higher percentages of permeable materials and may have higher yields than the Gloria Way Well. Deeper wells located to the southwest of Gloria Way encounter permeable materials below the depth of the Gloria Way Well indicating that there may be additional water bearing materials beneath the total depth of the Gloria Way Well. However, there is considerable uncertainty because there are no deeper wells northeast of the Gloria Way Well and there is a significant increase in fine-grained materials in the shallow zone to about 300 ft-bgs.

2.4 Aquifer Hydraulic Properties

Aquifer hydraulic properties are used to quantify the potential productivity and storage characteristics of water-bearing units and are necessary for predictive modeling efforts. Hydraulic conductivity describes the rate at which water can move through a permeable medium. Transmissivity is the rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient. Hydraulic conductivity times the average saturated thickness of aquifer is equal to Transmissivity. Aquifer hydraulic properties can be estimated by performing well pumping tests and measuring the well flow rate and water level drawdown in the well and adjacent wells. With the exception of the Gloria Way Well, no pumping test data are available for other wells in the City and only limited pumping test data are available in the remaining Study Area. Available aquifer hydraulic property data are provided in **Table 6**. Wells 1B2, 1D1, and 1M1 are City of Palo Alto emergency supply wells (Fio and Leighton, 1995). A well performance test conducted in the Gloria Way Well indicated a transmissivity of 2,600 gallons per day per foot (gpd/ft) (HDR, April 2004).

Wells I1 and I6 were injection wells constructed and tested to assess injection of treated wastewater for groundwater recharge and mitigation of saline water intrusion in the Palo Alto bay lands area (Hamlin, 1983 and 1985). The injection well testing also indicated a vertical hydraulic conductivity of 0.08 feet per day (ft/d) between the upper aquifer (0 to 50 ft-bgs) screened in Well I1 and the lower (40 to 55 ft-bgs) screened in I6.

Testing has been performed at the 1990 Bay Road contamination sites (located in the City's bay lands area) in the shallow zone from zero to 35 ft-bgs to determine shallow hydraulic conductivity and transmissivity. Aquifer hydraulic properties have also been estimated for the Romic Environmental Technologies Corporation contamination site, also located in the City's bay lands. Hydraulic conductivities and transmissivities have been estimated for three zones beneath the site to a depth of about 80 ft-bgs.

While a constant rate, long-term pumping test is the best method of determining transmissivity, it can also be calculated empirically based on the initial pumping rate of the well and the observed drawdown (specific capacity)[2]. These initial measurements are often recorded on driller's well logs. Review of the driller's well logs collected for the City and a 1.5 mile surrounding area indicates that specific capacity ranges from 0.2 to 400 gallons per day per foot of drawdown (gpd/ft of dd) with an average of 16. The construction and specific capacity information reported for wells in the study area are provided in **Appendix B**. Because the empirical transmissivity estimate assumes a 100 percent efficient well, the transmissivities estimated from specific capacity data are likely lower than actual values. **Figure 8** shows the specific capacity data for the larger production wells in the Study Area and a few smaller domestic wells. The figure also provides the well depth, discharge and transmissivity data from pumping tests provided in **Table 6**. Based on the range of specific capacity values, the empirically calculated transmissivity ranges from approximately 400 to 800,000 gallons per day per foot (gpd/ft) with an average of 33,000 gpd/ft. If an aquifer has a transmissivity less than 1,000 gpd/ft, it can supply only enough water for domestic wells or other low-yield uses. With a transmissivity of 10,000 gpd/ft or more, well yields are adequate for industrial and municipal purposes (Driscoll, 1986). Most other wells in the study area have higher specific capacities and estimated transmissivities than the Gloria Way Well.

There are two measurements of aquifer storage coefficients or storativities, which affect the dynamic aquifer response to transient stresses such as recharge and pumping. Measured storativities are shown on **Figure 8** and listed in **Table 6**.

2.5 Groundwater Levels and Flow

Currently there is no regional groundwater management in southern San Mateo County, and no maintenance of a centralized database of groundwater elevation measurements by either the County of San Mateo or local municipalities. Some generalized groundwater elevation and flow information has been published by the County of San Mateo, SCVWD, DWR and USGS, and is available from localized groundwater contamination sites. Groundwater elevation data from these reports have been used to develop a conceptual model of historical and current groundwater flow conditions.

Historical flow conditions in the southern subbasin have been characterized in a pair of USGS Reports (Fio and Leighton, 1995; Metzger and Fio, 1997). Under natural conditions, groundwater flow is from the edge of the basin near the bedrock uplands toward San Francisco Bay to the northeast. Groundwater levels in the San Francisquito Subbasin were near and in some areas above the ground surface (artesian) in the early 1900s.

In the early part of the 20th Century, increased pumping and periodic drought reduced groundwater levels to below sea level in the area. By the mid-1920s, an estimated 6,000 acre-feet per year (AFY) were pumped from the San Francisquito Cone. This level of pumping and below normal rainfall in the early and mid-1920s resulted in substantial drawdown of water levels below sea level (more than 90 feet below sea level in the Atherton area). By the early 1960s, groundwater extraction from the San Francisquito Cone was estimated to be about 7,500 AFY. Of this total, approximately 6,500 AFY was by pumped the City of Palo Alto and Stanford University (Sokol, 1964). This amount of pumping resulted in subsidence and significant saline intrusion in the Study Area.

Groundwater extraction from the area declined significantly after the importation of Hetch Hetchy water supplies in the 1960s. As a result, groundwater levels have been steadily increasing over much of the area. Between 1962 and 1987, groundwater levels in the City of Palo Alto rose more than 150 feet to levels comparable to those of the early 1900s (Carollo, April 2003).

Figure 9 shows groundwater elevations over time in the City of Palo Alto's Hale Well located near San Francisquito Creek adjacent to Menlo Park (see **Figure 3** for location). Prior to 1962, groundwater elevations in the well were over 140 feet below sea level. This condition allowed for brackish water from the Bay to flow inland and degrade groundwater quality. Groundwater levels recovered after regular pumping of the well stopped in 1962. The well was operated briefly during the 1988 drought (total pumping of 398 acre-feet) and an associated decline of about 16 feet was measured. After pumping stopped, water levels recovered to pre-drought levels by early 1996.

Measurements made between 1993 and 1995 by the USGS have been used to construct a groundwater elevation contour map of the study area (**Figure 10**). The generalized contours are extended to Palo Alto and East Palo Alto based on water level data in the Hale and Gloria Way wells, and a deep monitoring well located at the Romic Environmental contamination site. The contour map indicates a hydraulic gradient of 0.002 foot per foot across East Palo Alto.

2.6 Wells and Production

In order to assess current groundwater use, and identify any other inactive wells in the City that might be suitable for renewed production, water well drillers reports available from DWR were compiled for East Palo Alto, Menlo Park, Redwood City, Atherton, Palo Alto, and Stanford University. In addition, San Mateo County issues well permits and keeps an inventory of well information (current through 2005); this County well inventory also was reviewed for East Palo Alto, Menlo Park, and Atherton.

Appendix B lists available construction information for these wells. There are approximately 250 wells listed in the database. Of these, most are shallow monitoring wells at petroleum release and other contaminated sites (see Section 2.7.4 below).

In the early 1900s, most of the groundwater extraction in the area was from large capacity municipal wells, such as those operated by the City of Palo Alto and Stanford University. It is estimated that total extraction from the San Francisquito Cone was about 6,000 AFY by the mid-1920s.

With the importation of Hetch Hetchy water, groundwater pumping from these municipal wells was discontinued in the early 1960s. As the cost of imported water has increased, a number of private homeowners in the area (primarily in Atherton and Palo Alto) have installed wells, primarily for irrigation, to supplement their water supply. The installation of private wells tends to correlate with periods of drought or below average rainfall (1976 -1977 and 1987 – 1992) when concerns over rationing and water costs increase.

Generally, the most productive wells are located near San Francisquito Creek in the medial portion of the alluvial fan. Wells tend to be less productive near the bay and near the southeast and northwest edges of the subbasin (CH2MHill, July 1992; Well logs).

Well logs indicate that well yields in the San Francisquito Cone area vary from 1 to 1,800 gallons per minute (gpm), with an average yield of 130 gpm. Most of the wells drilled in the City and surrounding cities are small diameter (less than 8 inches) domestic and irrigation wells, with fewer larger diameter (10 to 30 inch) municipal and industrial wells. Generally, municipal wells with larger diameter casings yield between 100 and 1,800 gpm, with an average of 650 gpm.

Table 7 shows estimated existing and potential future groundwater use, and estimated emergency supply use in the San Francisquito Subbasin. **Figure 11** shows the locations of known or planned groundwater production wells in and adjacent to the City. The cities of Menlo Park and Palo Alto have also proposed or have already developed additional emergency short-term groundwater supplies. The total current groundwater use is estimated at approximately 2,300 AFY. An estimate of potential future groundwater use based on proposals by water purveyors, and an assumed overall 20 percent increase over current conditions, yields projected future groundwater pumping between approximately 4,500 and 4,900 AFY. Information on existing or proposed groundwater use in and around the City is discussed below.

<u>Municipal/University/Industrial Wells.</u> There is some existing municipal water use in and around East Palo Alto. The Palo Alto Park Mutual Water Company (PAPMWC) currently provides groundwater from five wells located in East Palo Alto. The PAPMWC is owned by 650 property owners (PAPMWC Website). The well field reportedly pumps about 1,300 gpm in the summer and about half this in the winter (GeoMatrix and Papadopulos, September 1989). This is equivalent to about 523 AFY.

The O'Connor Tract Cooperative Water Company operates two wells in Menlo Park. The company serves approximately 300 homes and apartments (Kelly Fergusson, personal communication). Assuming 300 connections using 250 gallons per day yields an annual production of approximately 84 AFY.

Stanford University currently uses groundwater for irrigation totaling 342 AFY (BAWSCA, May 2011).

In Menlo Park, the Veterans Hospital, St. Patrick's Seminary, Menlo College, and USGS operate larger capacity wells for irrigation, domestic, or industrial uses. The annual volume of water pumped from these wells is unknown but estimated at 500 AFY for the water balance.

<u>Potential Future Municipal Wells (Emergency and Long-Term Supply).</u> The City has one well (Gloria Way) that has been identified as a potential source of water supply. It is estimated that the well could produce between approximately 350 and 450 gpm or 564 to 735 AFY (HDR, April 2004). The City would like to increase the yield from the Gloria Way Well and/or develop additional groundwater supplies to yield 1,120 AFY.

The City of Palo Alto currently maintains seven wells for emergency standby supply (**Figure 11**) and is planning to drill up to three additional wells (Palo Alto, November 2006). Wells were last used in 1988 during the extended drought (Carollo, April 2003). It has been estimated that the wells could produce 500 AFY on a continuous basis or 1,500 AFY on an intermittent basis without causing excessive declines in groundwater levels (Carollo, April 2003).

Since 2002, the City of Menlo Park has been investigating the potential for groundwater development as a supplemental or emergency supply. An Emergency Water Supply Project is currently underway to identify alternative sites for two to three production wells. These would be capable of an emergency supply of 3,000 gpm to meet the average day demand of 1,600 gpm and fire flow of 1,500 gpm. Recently, seven sites were identified as most promising (Gnesa and Buising, November 2011). In January 2012, an exploratory boring was drilled at the Willow Road Site on the northwest corner of Willow Road and Highway 101 (actually located in East Palo Alto). In 2012 Menlo Park also requested bids for drilling a test well at the City Corporation Yard site at 333 Burgess Drive (**Figure 11**). Menlo Park is also considering installation of an irrigation well at Nealon Park to offset Sharon Heights Golf and Country Club water supply. The well would reduce the City's overall demand and provide a potential irrigation source for other nearby parks.

The City of Redwood City has also considered development of groundwater to augment groundwater supplies (Redwood City, June 2011). However, Redwood City is located near the northwestern extent of the Subbasin where alluvial deposits are thinner and more fine-grained than deposits further to the south, and thus the groundwater development in this area is less economically feasible. Nonetheless, a network of properly sited and designed wells could yield between 500 and 1,000 AFY. To date, acceptable sites have not been identified, nor have yield, schedule, and costs been confirmed. Currently (2012) Redwood City is not planning on implementing groundwater development.

The potential future use scenario presented in **Table 7** assumes supplemental groundwater development by the cities of East Palo Alto and Menlo Park. It has also been assumed that domestic use and private water company use would increase approximately 20 percent in the future. The potential future use is estimated between approximately 4,500 and 4,900 AFY.

Industrial Wells. Three industrial wells have been identified in Redwood City. Their status is unknown.

Domestic and Irrigation Wells. DWR and San Mateo County records indicate that a large number of private domestic and/or irrigation wells have been installed in the San Francisquito Cone area. The USGS performed a comprehensive survey of wells in the City of Atherton and identified at least 278 likely active wells as of 1993-1995 (Metzger and Fio, 1997). Metzger and Fio estimated the total pumping from these wells at approximately 710 AFY or about 19 percent of the City of Atherton's total water supply.

Estimating pumpage from domestic and irrigation wells in the area is difficult. It is assumed that most usage is for landscape irrigation purposes. Using the average annual pumping of 1.9 AFY per well estimated by Metzger and Fio for the Atherton area and multiplying that value by the identified domestic and irrigation wells installed since 1962 in the remaining cities (100 wells) yields approximately 190 AFY.

The combined pumping from the known existing production wells, with the potential addition of pumping by the cities of East Palo Alto, Palo Alto, Menlo Park, and potentially Redwood City, may result in future overdraft of the groundwater Subbasin. Accordingly, a water balance has been developed to estimate the potential sustainable yield of the groundwater Subbasin.

2.7 San Francisquito Subbasin Water Balance

Estimating the quantity of groundwater that can be sustainably developed from the San Francisquito Subbasin requires evaluation of all the significant inflows and outflows of water from the basin. For a particular groundwater basin, a long-term balance should exist between the quantity of water recharged to the basin and the quantity of water leaving the basin.

The major components of groundwater recharge in the San Francisquito Subbasin are:

- Percolation from landscape irrigation and leaking pipelines
- Surface water inflow including infiltration from streams and lakes
- Precipitation infiltration
- Subsurface inflow

The major components of groundwater discharge in the San Francisquito Subbasin are:

- Groundwater pumping and consumptive use
- Subsurface outflow to San Francisco Bay
- Stream baseflow

When discharge exceeds recharge, groundwater levels fall and there is a decrease in groundwater storage. This occurred in the first half of the 1900s when groundwater levels were drawn down below sea level. When recharge exceeds discharge, groundwater levels rise and there is an increase in storage. This occurred in the basin between the 1960s and the present.

Data are not available for the San Francisquito Subbasin to support a detailed evaluation of the water balance, including inflows, outflows, and change in storage. Data on groundwater extraction and groundwater levels are limited. However, a number of assumptions can be made to provide a rough estimate of groundwater recharge and discharge.

Subbasin Recharge

An estimate of annual groundwater recharge is presented in **Table 8**. For this estimate, sources of recharge include percolation from landscape irrigation, leakage of water and sewer lines, infiltration from San Francisquito Creek and Lake Lagunita, percolation of rainfall on the alluvial basin, and subsurface groundwater inflow from the upland drainage basin. Due to uncertainties, low and high estimates are provided. The results indicate a low value of annual recharge to the San Francisquito Groundwater Subbasin of approximately 5,000 acre-feet per year (AFY) and a high value of 10,000 AFY.

To estimate percolation from irrigation, the estimated volume of water supplied to each of the major water users within the subbasin was multiplied by a low (30 percent) and high (50 percent) irrigation usage percentage (BAWSCA, May 2011; Metzger and Fio, 1997). These two values were in turn multiplied by a low

(10 percent) and high (15 percent) percolation percentage. These estimations resulted in a range of irrigation return flow between approximately 1,000 and 2,700 AFY.

A range of water supply pipeline leakage losses from 3 to 5 percent of total water supplies resulted in a range of recharge from approximately 1,500 to 2,500 AFY. The range in estimated sewer line leakage losses to groundwater was estimated between approximately 250 to 1,000 AFY.

The USGS has estimated average streamflow losses from San Francisquito Creek at 1,050 AFY. After accounting for evapotranspiration, recharge to groundwater from San Francisquito Creek is estimated to average approximately 950 AFY (Metzger, 2002). This was based on streamflow gaging conducted by the USGS at 13 temporary stations between April 1996 and May 1997. The recharge value for Lake Lagunita of 700 AFY was taken from Sokol (1964).

Some portion of precipitation falling on the alluvial basin will percolate to groundwater. A reasonable estimated range of 5 to 10 percent results in annual recharge between 880 and 1,760 AFY. Precipitation will also percolate into the subsurface in the drainage basin upland. The portion of this water that moves into the alluvial groundwater basin as subsurface flow has been estimated to be between 25 and 50 percent of rainfall percolation, yielding a range of annual subsurface recharge from approximately 600 to 1,200 AFY.

Based on these estimates, the low-range amount of annual recharge to the San Francisquito Groundwater Subbasin is approximately 5,000 AFY and the high-range amount is 10,000 AFY.

Subbasin Discharge

An estimate of annual groundwater discharge is presented in **Table 9**. Basin discharge includes groundwater pumping and consumptive use, subsurface outflow, and outflow to stream baseflow.

Consumptive use is estimated as 95 percent of groundwater extraction (2,329 AFY) or approximately 2,213 AFY. Discharge also occurs to San Francisco Bay and to adjacent groundwater subbasins as groundwater outflow. This subsurface outflow can be estimated as shown in **Table 9**.

The amount of discharge to the bay and adjacent subbasins has a high degree of uncertainty but was estimated using Darcy's Law (Q = L x T x i). The parameter values used in this estimate are listed in the table. Around 700 AFY is estimated to discharge to San Francisco Bay under current conditions. This estimate is approximate and should be re-evaluated using a better predictive tool, such as a Subbasin-wide three-dimensional groundwater flow model that accounts for all recharge and discharge sources. Similarly, potential groundwater discharge (baseflow) to the lower San Francisquito Creek has not been quantified, but may occur during periods of high groundwater and low streamflow.

Total discharge from both groundwater pumping-consumptive use and subsurface outflow is around 2,900 AFY.

The water balance evaluation indicates that estimated recharge (5,000 to 10,000 AFY) currently exceeds *known* discharge (2,900 AFY); however, the limited available groundwater level data (e.g., Figure 9) indicates that groundwater levels and storage are relatively stable. This suggests that the low estimate of inflows may be more reliable and/or that subsurface outflow is greater to the bay and to the lower portions of streams. Based on these estimates it is apparent that additional groundwater could be extracted through wells for irrigation and potable supply. However, the projected future groundwater use within the groundwater Subbasin is expected to increase considerably (see **Table 7)** if Redwood City, Menlo Park, and the City all develop additional groundwater supplies. Moreover, emergency short-term use of groundwater by Menlo Park and Palo Alto would further stress the resource. As additional groundwater is developed, basin management is recommended to monitor and manage groundwater conditions; to minimize potential impacts on other wells, streams and associated habitat; and to avoid subsidence and saline water intrusion.

2.8 Groundwater Quality

Historical and recent groundwater quality data collected for the Study Area are summarized in **Appendix C**. The water quality data have been obtained from San Mateo County, the SCVWD, and from nearby water companies, along with historical quality from the Gloria Way Well.

Natural groundwater quality within the San Francisquito Cone varies spatially and with depth. Shallow groundwater tends to be similar in composition to recharge water (surface water, precipitation, imported water). Deeper groundwater varies in composition as a result of contact and residence time with formation sediments (Metzger, 2002).

In general, groundwater in the San Francisquito Subbasin tends to be somewhat hard (i.e., high in calcium carbonate) with levels of chloride, iron, manganese, specific conductance, and TDS that exceed secondary MCLs in some wells. Elevated levels of these constituents make groundwater undesirable for potable use for aesthetic rather than health reasons and thus secondary MCLs apply. Aesthetic concerns include problems with soap lathering, taste, odor, and plumbing/clothing staining. Primary MCLs are health-based water quality criteria.

Generally, groundwater in the area is acceptable for both potable and irrigation uses. However, consumers may find untreated groundwater to be less desirable when compared with Hetch Hetchy water. Groundwater from wells operated by the O’Connor Tract Cooperative Water Company in Menlo Park meets all drinking water quality standards without the need for additional treatment. Groundwater from wells operated by the PAPMWC in East Palo Alto is chlorinated and blended to meet drinking water standards. Water quality in the PAPMWC wells varies with depth of construction. It is noted that many residences served by these private companies have in-home water softeners to address water hardness.

The City’s Gloria Way Well exhibits significantly higher conductance, alkalinity, hardness, total dissolved solids (TDS), and chloride when compared with Hetch Hetchy water. Historical and recent sampling confirms that the manganese concentration is consistently above the secondary maximum contaminant level (MCL) of 0.05 milligrams per liter (mg/L).

2.8.1 TDS

TDS (total dissolved solids or the sum of dissolved anions and cations in water) is used as a general representation of inorganic water quality. TDS reflects the effect of many water quality influences, including surface sources (e.g., nitrate from fertilizer) and subsurface sources (e.g., mixing with deep groundwater sources).

The recommended secondary MCL (SMCL) for TDS is 500 mg/L with an upper limit of 1,000 mg/L. It has a short-term limit of 1,500 mg/L. High TDS results in an undesirable taste. **Figure 12** shows TDS concentrations in wells in the Study Area along with the well depths, and **Figure 13** shows a plot of TDS concentrations compared with maximum well screen depth. The concentration value for each well on the map and charts is the average value of all data between 1981 and 2011 listed in **Appendix C**. The frequency and timing of sample results for individual wells vary between 1981 and 2011. On **Figure 12**, concentrations greater than 500 mg/L are shown in yellow and concentrations greater than 1,000 are shown in red. Several wells in the Study Area exceed the SMCL of 500 mg/L, including the City's Gloria Way Well, which has had concentrations between 500 and 1,000 mg/l. The nearby PAPMWC wells have slightly lower TDS concentrations. The Weeks well in the City had an average concentration of 860 mg/, slightly higher than the Gloria Way Well. Nearby well 30D had a very high average TDS concentration, indicating the presence of brackish water at this depth and location. In general, there is a trend of increasing TDS concentrations with depth (**Figure 13**). The outstanding example is the Eleanor Park well in Palo Alto, a multiple-completion monitoring well used by the SVCWD. As shown on **Figure 12**, the lowest two screened intervals exhibit TDS concentrations greater than the upper limit SMCL of 1,500 mg/L. It is noteworthy that the PAPMWC wells, just southwest of Gloria Way, do not appear to have increasing TDS concentrations with depth.

2.8.2 Chloride and Saline Water Intrusion

While recognizing multiple sources, chloride concentrations often are used as an indicator of salt water intrusion, for example from San Francisco Bay. The secondary MCL is 250 mg/L.

Prior to the 1960s, groundwater level declines caused a reversal of the normal groundwater flow toward the Bay. The estimated total pumping from the San Francisquito Cone in the early 1960s was about 6,500 AFY (Sokol, 1964). Associated lowered groundwater levels induced saline water from San Francisco Bay inland into the aquifer system. Saline water intrusion in the area of Palo Alto, Menlo Park, and Atherton reportedly extended two to three miles inland (Iwamura, 1980). The zone of saline water intrusion is shallow, generally less than 150 ft-bgs. The deep aquifer system, which provides water to wells in the area, is protected by confining layers near the bay. However, in some past instances, improper well construction and/or abandonment procedures coupled with heavy pumping has led to localized saline contamination in the deep aquifer (Hamlin, 1985). Pumping tests, conducted as part of an investigation of injection to address saline water intrusion in Palo Alto (Hamlin, 1985) showed no hydraulic connection between the shallow and deep aquifers.

SCVWD monitors groundwater quality in a network of wells near San Francisco Bay in Santa Clara County to assess saline water intrusion from the bay. Recent monitoring in Palo Alto does not indicate increasing saline water intrusion in the shallow or deep aquifer; on the contrary, data suggest downward trends in chloride levels over time (SCVWD, March 2010). No comparable monitoring program exists in San Mateo County. Chloride concentrations in the Hale well peaked at 215 mg/L in 1958 during the period when this well was actively pumped prior to 1962. Similarly, the Rinconada well had a chloride concentration as high as 250 mg/L in 1972.

Based on the location of the Hale well inland of the bay along San Francisquito Creek and the historically elevated chloride concentrations, saline water intrusion into the deep water supply aquifer in East Palo Alto must be considered a potential risk of significantly increased pumping. Increased pumping by the City and emergency pumping by Menlo Park and Palo Alto combined with a large number of abandoned wells located near the bay in East Palo Alto increase the likelihood that saline water intrusion could be re-induced in the future.

Figure 14 shows the locations of some of the approximately 45 wells drilled by the Spring Valley Water Company (now San Francisco Public Utility Commission) between 1904 and 1905 along the East Palo Alto bay front. These wells are also referred to as the Ravenswood or Cooley Landing wells. The wells were left uncapped and their casings rusted and saline water may have entered many of the wells at high tide. In response to these conditions, the wells were reportedly filled and sealed (Iwamura, 1989). However, the well sealing and integrity of the seals are not known (Geomatrix and Papadopulos, September 1989). Subsequent work in the Cooley Landing Salt Pond identified at least one artesian flowing well in 2000/2001 (Papadopulos, February 2001).

Saline water intrusion is likely if regional groundwater flow directions are reversed due to increased pumping. As there is no regional monitoring network in San Mateo County, installation of monitoring wells bayward of any City production wells is recommended to monitor groundwater levels and quality and provide an early warning to minimize saline water intrusion.

Figure 15 shows average chloride concentrations in the Study area, while **Figure 13** indicates increasing chloride concentrations with depth. Most wells exhibit chloride levels below the SMCL of 250 mg/L. Two wells located in close proximity to the bay, one shallow monitoring well and one abandoned production well, exhibit chloride concentrations above 250 mg/L. The Gloria Way Well also shows chloride levels above the SMCL. However, ratios of selected trace elements to chloride indicate that bay water intrusion may not be the source of high chloride concentrations in the Gloria Way Well. Rather, groundwater moving through the deep aquifer may leach chloride-rich marine sediments and thereby increase the concentrations of chloride (Metzger, 2002). The deeper screened intervals of the Eleanor Park multiple-completion monitoring wells also show elevated chloride concentrations, which increase significantly with depth.

2.8.3 Iron and Manganese

Iron and manganese are inorganic constituents in groundwater; elevated concentrations cause staining of plumbing and laundry. The SMCL for iron is 300 micrograms per liter (ug/L) and for manganese is 50 ug/L.

Figure 16 shows iron concentrations in wells in the Study Area, and **Figure 13** shows iron concentrations with depth. Many wells have acceptable levels of iron in the Study Area. Nonetheless, **Figure 16** and **Figure 13** show a clear pattern of increasing iron concentrations with depth. Very high iron concentrations have been found in two wells (i.e., Weeks and 30-D) located near the East Palo Alto bay front. The elevated concentrations in these wells may be due to severe encrustation of the casing rather than true ambient groundwater quality. Historical iron concentrations in the Gloria Way Well have varied over time, but iron was not detected in the 2012 water quality sample (see Section 3 below).

Figure 17 shows the dissolved manganese concentrations in the Study Area wells. Manganese concentrations above the SMCL are common; similar to the distribution of dissolved iron, manganese concentrations generally increase with depth (**Figure 13** and **Figure 17**). Historical manganese concentrations in the Gloria Way Well have been relatively stable and the manganese concentration in the 2012 water quality sample was similar to historical concentrations (see Section 3 below).

2.8.4 Contamination Sites

Some contaminants detected in groundwater are the result of human activity rather than naturally-occurring conditions. Groundwater contamination related to human activity has occurred from leaking underground petroleum storage tanks and discharge of heavy metals and chlorinated solvents in commercial/industrial areas. Some human-caused contaminants are carcinogenic and many are hazardous to human health at elevated concentrations. Thus primary drinking water MCLs are the water quality standards applied to these contaminants.

An inventory of environmental release sites has been conducted as part of this study. Information on contamination sites was obtained from the California Department of Toxic Substances Envirostar database and Regional Water Quality Control Board GeoTracker database. **Figure 18** shows known leaking underground storage tank (LUST) and other active cleanup program sites; additional information on these contamination sites is included in **Appendix D**. A large number of LUST and cleanup program sites are present in and adjacent to the City; moreover, several sites have known very high concentration of solvents and heavy metals, including the Romic Chemical and Rhone-Poulenc sites (**Appendix D**).

Generally the regional confining layer provides a degree of protection for deep production wells from surface releases. However, abandoned and improperly destroyed wells can provide conduits for the downward migration of contamination.

Currently, no contamination sites have been identified in close proximity to the Gloria Way Well. In addition, historical water quality sampling has not indicated petroleum or solvent contamination in the Gloria Way Well. Development of new groundwater well sites by the City should be accompanied by a more detailed review of any nearby environmental release sites to ensure that contaminants will not impact the supply well.

3. GLORIA WAY WELL PERFORMANCE AND TREATMENT EVALUATION

This Section describes the evaluations, tests and water quality sampling performed to assess the feasibility of operating the City's existing Gloria Way Well to supplement supply. For this project, construction and condition of the Gloria Way Well was assessed to determine whether the well can be placed in operation. Previous pumping tests of the well were reviewed, and a short (4-hour) duration production test was performed to confirm well yield. Based on the predicted hydraulic performance, water-level drawdown in the aquifer was estimated and used to evaluate the potential for induced saline water intrusion and land subsidence. A water quality sample was obtained and submitted to a California-certified analytical laboratory for analysis of US EPA and CCR Title 22 drinking water parameters. Based on the historical and current water quality profile for the well, along with water quality characteristics of the City's Hetch Hetchy supply, water quality treatment and blending alternatives were evaluated and a preliminary treatment system design was prepared. Permitting requirements for construction and operation of the well and treatment system were identified.

3.1 Gloria Way Well Construction and Operational History

The Gloria Way Well was installed in November 1979 by the County of San Mateo Department of Public Works. A copy of the original Water Well Drillers Report is included in **Appendix E** and a schematic of the well construction is shown on **Figure 19**. The borehole was drilled using a reverse-circulation rotary rig to a total depth of 351 ft-bgs. The casing diameter is 12.75-inches, with spiral-seam steel blank sections and Johnson stainless steel well screen. The total depth is 339 ft-bgs, with screen intervals originally reported to be 258 to 280 and 318 to 323 ft-bgs (although different screen intervals were identified during a video survey performed in 2004 - see below). Monterey sand filter pack was emplaced from 100 to 350 ft-bgs, and a cement grout well seal was emplaced from 0 to 100 feet bgs.

The existing well pump is an 8-inch diameter, 16-stage Byron-Jackson plumbed with six-inch diameter column pipe. The pump is set at a depth of approximately 250 feet, and is rated for 300 gpm at 471 feet total dynamic head. An electrical transformer and pressure tank are provided at the parcel, and the well was originally plumbed to the City's water distribution system via an 8-inch diameter pipe.

The well was put into operation in 1981 to supplement the City's water supply. However, water from the well had high TDS iron and manganese, and consumers receiving well water objected to the water quality. Because of these complaints, pumping for water supply ceased in 1989, and the well was disconnected from the City's water distribution system. Since then, the well has operated intermittently for non-potable uses including construction and dust control.

Table 10 summarizes the historical water quality sampling results for the Gloria Way Well. The well was re-sampled in May 2012 to confirm water quality. The sampling methodologies and results are described below.

During December 2003 through January 2004, a comprehensive well inspection and testing program was conducted on the Gloria Way Well (HDR, 2004). The wellhead, surface piping, valving, and pressure tank were inspected, and downhole video surveys were performed to inspect the integrity of the well casing and screen.

The casing and screens were found to be in good condition with negligible corrosion or encrustation. The video survey revealed that the actual screened intervals of the well are 259 to 282 and 319.5 to 325.5 ft-bgs. Although the screens appear to be misaligned with the lithologies listed on the Water Well Drillers report, the presence of filter pack extending from 100 to 350 ft-bgs allows inflow to the well from permeable aquifer zones via the filter pack.

In December 2003, a step drawdown and a 72-hour duration constant rate pumping test and recovery test were performed. Water quality samples were also collected and analyzed. During the 2003 test, the well was pumped at a constant rate of 300 gallons per minute (gpm). **Figure 20** shows the water level change over time during the first 24 hours of the 2003 test. Water levels declined over time; after 1,000 minutes, the depth to water was around 125 feet. HDR reported that the 24-hour specific capacity of the Gloria Way Well was 2.6 gpm/ft.

3.2 Well Performance Testing

To verify the well's hydraulic performance and capacity as determined in 2003, a short-duration production test of the Gloria way well was performed on May 22, 2012. Prior to the test, a visual inspection of the wellhead, piping, valving, and pressure tank was performed. A minor water leak occurred near the wellhead sampling port during pumping, but otherwise the well and mechanical components appeared to be in good condition.

For the performance test, the well was operated at its current maximum pumping capacity for 252 minutes (4 hours 12 minutes). Discharge was directed through a fire hose provided by American Water Enterprises to the storm sewer. Measurements of flow rates were performed using a calibrated totalizing meter provided by American Water Enterprises. Measurements of depth to water in the well were attempted by lowering an electric water-level sounder into both a 1-inch sounding tube and a 4-inch diameter gravel fill tube. However, the water levels measured on both tubes did not change during the test, indicating the tubing is likely plugged or blocked in such a way that the water level in the tubing cannot change. During the pumping test performed in 2004, the water levels in the well were reported to draw down throughout the test.

Figure 21 shows the flow rates measured during the May 22, 2012 production test. A total of approximately 90,500 gallons were pumped over 252 minutes for an average production rate of about 359 gpm. At startup, the well produced about 380 gpm, and the production rate declined over time to about 330 gpm at the end of the 4-hour test. The current flow rate and capacity of the Gloria Way Well is similar to historical performance and pumping test results. Based on the performance test, the well appears capable of sustaining a pumping rate of approximately 300 gpm.

3.3 Water Quality Sampling

On May 22, 2012, after four hours of pumping at 300 gpm, a groundwater quality sample was collected by Todd Engineers from the Gloria Way Well. The groundwater sample was collected to confirm historical water quality concentrations, particularly for those constituents (iron and manganese) that historically exceeded secondary standards.

3.3.1 Sampling Procedures

Sampling and analysis procedures were developed to ensure that the water chemistry data are representative of groundwater quality and appropriate for analysis of water treatment or blending alternatives. These procedures are documented in the Quality Assurance and Analysis Plan (QAAP) provided in **Appendix A**. In brief, the groundwater sample is considered representative of in-situ groundwater quality conditions because of the significant purge volume.

To prepare for groundwater sampling, Todd Engineers notified the City of the sampling schedule. Two weeks' notification in advance of sampling was provided so that City and water company personnel could have the well online and operational on the proposed sampling date. The analytical laboratory also was notified of the sampling program at least two weeks in advance to allow preparation of sample containers with the appropriate preservatives and labels, and provision of coolers and chain-of-custody forms. These were delivered to Todd Engineers' office in advance of the sampling date.

The project staff examined the wellhead for signs of tampering or deterioration noting such observations in a field log book. Depth to groundwater was measured to the nearest 0.01 foot using a well sounder. The well was pumped at a rate of at least 300 gallons per minute (gpm), which was the anticipated flow rate of the well. Purged water was discharged to a nearby storm drain in accordance with City well purging procedures. The well was to be pumped for a period of four hours prior to sampling; however, because of the condition of the sampling port, accurate well depth measurements could not be obtained nor could field water quality parameters (pH, specific conductivity, temperature, turbidity) be obtained using calibrated field instruments.

The groundwater sample was collected from the sample port at the wellhead using sample bottles supplied by Alpha Analytical, Inc. (Alpha), a California Department of Public Health Certified Environmental Laboratory Accreditation Program (ELAP) analytical laboratory located in Dublin and Ukiah. Sample bottles for VOC analysis were filled with zero headspace. The groundwater sample was stored in a cooler with ice and kept chilled to 4^oC and transported under chain of custody to Alpha.

Groundwater samples were submitted to Alpha and the groundwater sample was analyzed for Title 22 Water Quality parameters and additional analytes. Because of the extensive requested analyses, some analytes were subcontracted by Alpha Analytical to other specialized laboratories. All of the subcontracted laboratories were either California ELAP laboratories or a laboratory accredited under the National Environmental Laboratory Accreditation Program (NELAP). The individual analytical laboratories and respective analytes are documented in **Table 11**.

3.3.2 Analytical Results

Tables 12 through **19** present the water quality parameters analyzed for the May 2012 Gloria Way Well groundwater sample. The tables include the named analyte and analytical method, laboratory detection or reporting limits as practical quantification limits (PQL), and results with comparison to regulatory requirements, including California and federal (EPA) water quality standards such as primary and secondary maximum contaminant levels (MCLs) (see Marshack, 2011).

Select water quality parameters with Primary MCLs (i.e., specific inorganic chemicals, volatile organic chemicals and non-volatile synthetic organic chemicals), all parameters with Secondary MCLs, and general water quality parameters were measured. For parameters with Primary and Secondary MCLs, all results indicate non-detect or are less than 40 percent of the regulated levels (e.g., arsenic, barium, selenium, nitrate, turbidity, sulfate), except a select few listed in **Table 12** that exceed Secondary MCLs. **Table 12** also lists data for some additional compounds that are relevant to compatibility with SFPUC surface waters. The complete laboratory report containing all the water quality results from analyses performed on Gloria Way Well samples taken on May 12, 2012 can be found in **Appendix F**.

In general, the Gloria Way Well produces water that is relatively high in TDS, hardness and alkalinity and has elevated levels of iron and manganese. The groundwater is aesthetically much different from SFPUC water and, unblended, will taste differently and show characteristics of hard water. Because of the iron and manganese concentrations, the water (if untreated) may stain laundry and appear orange to brown at times. The groundwater does not appear to be contaminated by agricultural or industrial sources. Concentrations of key water quality constituents do not exceed primary drinking water standards; however, some exceed some secondary MCLs (e.g., manganese) and some are above recommended values of secondary MCL ranges but below upper values (i.e., TDS, chloride). This groundwater is well buffered as it has relatively high alkalinity.

As documented in **Table 12**, four analytes were reported above regulatory requirements. These include manganese, chloride, and total dissolved solids. In addition, conductivity or Specific Conductance (EC, a measure of general quality) was reported at 1,500 microsiemans/cm (µS/cm); the California secondary MCL for EC is 900 µS/cm. All other analytes were either reported below practical quantification levels, or if detected, were below regulatory levels.

Total Dissolved Solids and Chloride. The TDS levels in the groundwater are relatively high and higher than the Secondary MCL acceptable value of 500 mg/L, but below the upper value of 1,000 mg/L. Similarly, chloride (a component of TDS) levels are higher than acceptable levels but lower than upper Secondary MCL limits. If unblended, there may be impacts to salt sensitive plants during irrigation. In addition, the groundwater sodium levels (240 mg/l measured on 5/12/2012) are relatively high and may cause impacts to soil structure with prolonged irrigation without soil maintenance. TDS and chloride are conservative water quality parameters and hence can be reduced through blending to a concentration in the blend water that is proportional to the blending ratio.

Hardness. The groundwater at the Gloria Way Well is considered hard and will be perceived by customers as different and inferior relative to SFPUC finished water. The hardness of the groundwater will require customers to use more soap to achieve the same suds during bathing, clothes washing and dishwashing. The groundwater may also leave mineral residues on counters and dishware. Hardness is a conservative water quality parameter and can be reduced through blending to a concentration in the blend water that is proportional to the blending ratio.

Alkalinity and pH. The alkalinity of the groundwater at the Gloria Way Well is relatively high, indicating that the groundwater is well-buffered (i.e., resistant to changes in pH). The pH level of 8.0 measured in the well water is also relatively high for groundwater. However, this measurement was conducted at the laboratory and not in the field; it may not represent the true pH of the groundwater at the Gloria Way Well. Field pH can be ±0.5 pH units relative to pH measured in laboratory. Alkalinity is a conservative water quality parameter at relatively neutral pH levels but pH is not conservative. Similar to the SFPUC experience, it can be expected that a small amount of well-buffered groundwater will drive the pH of a poorly-buffered surface water down to a blend pH that is lower than would be expected from the amounts and pH levels of the two waters alone (i.e., from a conservative analysis). Relatively simple computer modeling and/or bench scale testing can be performed to determine final pH values of blended waters, if finished water pH is of concern.

Fluoride. The fluoride levels in the Gloria Way Well are low and below the SFPUC finished water fluoride target of 1.0 ± 0.2 mg/L. Fluoride can be added to the groundwater and is conservative in blended water. Depending on blend flows, groundwater with ambient fluoride levels may be added to the SFPUC finished water and still meet fluoride finished water goals.

Iron and Manganese. Iron and manganese levels are elevated in the groundwater at the Gloria Way Well. Iron is below the secondary MCL but the manganese level is well above the secondary MCL. This can result in taste and odor issues as well as color (i.e., orange or brown water). Iron and manganese may not be conservative water quality parameters during blending, because they can be oxidized by residual disinfectants in the non-groundwater. This oxidation may result in precipitation of iron and manganese, and therefore in possible solids generation in the distribution system, as well as possible loss of residual disinfectant. Wellhead treatment is effective for iron and manganese removal and is commonly practiced.

3.3.3 Quality Control Sampling and Analysis

Laboratory data quality was evaluated using trip and method blank analyses, laboratory duplicates, matrix spikes with matrix spike duplicates, and surrogates. Cation-anion percent error ratios and percent error also were calculated.

Because only one sample was obtained from the Gloria Way Well, duplicate and split samples were not collected in the field; nonetheless a trip blank was included by the analytical laboratory, as were routine duplicates. The trip blank was analyzed to provide a check for potential cross-contamination of the samples during shipment to the laboratory. One trip blank sample is normally included with each shipment of samples transported to the laboratory for VOC analysis. The trip blank consisted of deionized water prepared by the laboratory in a clean environment and kept sealed in the cooler used to transport sample containers.

All of the involved laboratories produced internal control samples consisting of laboratory duplicates, matrix spikes with matrix spike duplicates, method blanks, and surrogates to assess data quality resulting from laboratory procedures and possible matrix effects from the site samples. QA/QC check samples (method blanks, Matrix Spike/Spike Duplicates (MS/MSD), duplicates, etc.) were analyzed concurrently and on the same instrument as the sample batch to which they were assigned. Method blanks consist of reagent-free water that is extracted and analyzed with each batch of samples. The results obtained from the method blank analysis are used to evaluate the presence of contaminants originating from the laboratory sample preparation process. Surrogate spikes consisted of known quantities of compounds that are chemically similar to target analytes, which are spiked into all field and QC samples. Surrogate spike results are expressed as percent recoveries and are used to evaluate sample preparation and analysis procedure efficiency. Deviations or modifications from the published EPA analytical procedures or the SOP were documented and clearly noted in the case narrative on the laboratory analytical data sheets as footnotes. A review of the laboratories' QA/QC data is given below.

Alpha Analytical Laboratories conducted general physical and general mineral, inorganics scan, anion scan, chlorinated acids, chlorinated pesticides and PCBS, and volatile organic compounds (VOCs). For metals (EPA 200 Series) where there were detectable concentrations, the trip blank was below the practical quantification limit (PQL) or not detected (ND). The Laboratory Control Sample (LCS) had percent recovery (%REC) limits between 88.3 and 103 (%REC = 85-115). The duplicate samples for detected analytes were all within the relative percent difference (RPD) limit (RFD=20) and the matrix spikes (MS) %REC ranged from 71.5 to 107 (%REC limit = 70 to 130); the matrix spike duplicate (MSD) ranged from 84.0 to 130 for %REC (%REC limit =70 to 130).

The VOCs analytes were all ND; the blank surrogate %REC ranged from 79.4 to 93.8 (%REC limit =70-130). The LCS recovery ranged from 76.8 to 104 (%REC limit =70 to130); the LCS duplicate %REC from 79.6 to 105 (%REC limit =70 to 130) with surrogate %REC from 80.8 to 95.8 (%REC limit =70 to 130).

For chlorinated pesticides and PCBs (EPA Method 508) all trip blank analytes were reported ND. Surrogates were within the method range. The chlorinated acids (EPA Method 515.1) for the trip blank were reported as ND and surrogates were all within the required method range.

Weck Laboratories performed the anion scan for iodide and bromide and for SVOCs. The iodide blank was ND, LCS %REC was 103 with acceptable %REC limits ranging from 80-120. For SVOCs (EPA 525.2), and the sample blank was ND with %REC for surrogates ranging from 91 to 98 (%REC Limits = 48 to 150 for three surrogates). For the LCS, %REC ranged from 70 to 114 but, except for dimethoate, all were within the %REC limits of 54 to 133. Dimethoate was just outside the QC limit but the laboratory indicated that the bias did not affect sample results because the analyte was below the reporting limit. The MS had variable %REC limits for different analytes, but were all were within the %REC limits. The MSD (except for disulfoton) was within the %REC limits.

TEM Laboratories conducted asbestos in drinking water analysis. The analytical sensitivity for the sample blank was 0.2 microfibers per liter (MFL) with the lower and upper confidence level ranging from 0-0.65 MFL. The laboratory sample blank analytical sensitivity was 0.01 MFL.

McCampbell Analytical performed chromium (VI) or Cr6 analysis that had MS %REC=110, MSD=109%, MS-MSD %RPD=0.548 and LCS %REC=102. The acceptance criteria in percent for Cr(VI) were MS/MSD=90-100, RPD=10 and LCS=90 to 110.

FGL Laboratory conducted DBCP, dioxin, DCP, and Strontium 90. For Strontium 90, the results error was ±0.384 pCi/L with a minimum detectable activity of 0.636 pCi/L.

GEL Laboratories LLC conducted Gross Alpha, Beta, and Radium 226 and 228 analyses. For their QA/QC, they ran initial calibration, continuing, and verification blanks, reporting level checks, quality control samples, laboratory reagent blanks, and reporting level checks. All parameters were within the %REC and %REC limits.

Underwriters Laboratory performed uranium and tritium. Their report indicated no quality control failures.

Cation-anion percent error ratios and percent error calculations (**Table 20**) show that the Gloria Way analytical data for the May 22, 2012 sampling is within the expected parameters. The total cation/anion ratio was 1.049. An ideal cation/anion ratio would be 1.0. The balance error in percent was 2.368.

3.3.4 Geochemical Data Interpretation

Major cation (calcium, magnesium, sodium, potassium) and anion (chloride, sulfate, bicarbonate and carbonate) analyses were plotted on standard Piper (Trilinear) and Schoeller diagrams and on a Brine Differentiation Plot (BDP). Data reported in mg/L were recalculated as milliequivalents per liter (meq/L) and as molar concentrations.

Trilinear (Piper) Diagrams are useful plots for comparing water quality analyses. Cation (calcium, magnesium and sodium+potassium) concentrations in meq/L are expressed as a percentage of total cations on a left hand triangle and anions (carbonate+bicarbonate, sulfate, chloride+nitrate) concentrations in meq/L are plotted on a right hand triangle. The cation-anion plot is then projected onto a central diamond-shaped area, which combines both cation and anion distribution. The intersection of the cation and anion lines can be drawn as a circle with its diameter proportional to the total dissolved solid concentration of the analysis. Groundwater with similar geochemistry will generally group together; therefore, groundwater from different sources may be identified by their bulk chemical compositions.

Schoeller (Fingerprint) Diagrams are useful in typing or fingerprinting different water sources, and in distinguishing groundwater solute sources from surface water solute sources.

The Brine Differentiation Plot (BDP) was developed by Hounslow (1995) to differentiate brine-contaminated waters from waters of other origins using major constituents commonly available in a water quality analysis. Molar concentrations of calcium divided by calcium plus sulfate on the vertical axis and sodium divided by sodium plus chloride on the horizontal axis are plotted on this type of diagram. It also allows for waters to be plotted in a finite range from 0 to 1.0 on both axes and to determine mixing lines if present. Also, fields for brines, evaporates, and sea water can be seen. One of the advantages of the BDP is that straight line mixing ratios can be shown, particularly if end member concentrations (such seawater or brackish water) are known. To determine different water sources, the BDP was used in conjunction with the Schoeller Diagram.

Gloria Way Well cation and anion analyses were recalculated (**Table 21**) and plotted on a standard Trilinear or Piper diagram (**Figure 22**) for the May 2, 1997 and May 5, 2012 sampling events. For comparison, representative analyses of ocean, San Francisco Bay (35 percent brackish), and river water (from Hem, 1989) are presented. On the Trilinear diagram, the Gloria Way Well water plots as sodium-potassium type and chloride-type with an overall saline water classification.

The Schoeller diagram (**Figure 23**) shows that the Gloria Way Well water for both 05-02-97 and 05-22-12 have plots similar to San Francisco Bay (35% salinity) brackish water suggesting that the elevated sodium and chloride were from these sources. However, an examination of the BDP for the Gloria Way samples (05-02-97 and 05-22-12) (**Table 22** and **Figure 24**) shows that they plot along a relatively straight mixing line (No. 2) along with river water and with Palo Alto Public Municipal wells (PAPMWC No. 2 shallow and PAPMWC-6 deep well water. When compared to a possible mixing line for ocean and San Francisco Bay brackish water (mixing line No. 1), the BDP indicates a distinctive origin for the Gloria Way Well water. A reasonable interpretation is that the Gloria Way water is derived largely by infiltration of stream/river water with the additional salts derived from geochemical reactions in the surrounding geologic materials.

3.4 Gloria Way Well Mechanical Condition and Serviceability

Previous well inspections and testing were reviewed to assess the well's mechanical condition, serviceability, and reliability should the well be placed into operation. The wellhead surface piping and pumping components were inspected during the 2012 performance testing. A pump inspection and downhole video survey were not performed during 2012.

Depending on well casing material and construction quality, groundwater chemistry, and well operation procedures, groundwater wells have life spans of over 75 years (Driscoll, 1986). Wells constructed of steel casing and stainless steel screens have better than average lifespans because the stainless steel screens are less subject to corrosion or mechanical failure than mild steel or plastic screens. Glotfelty (2012) estimates the well life expectancy of wells with stainless steel screens to be 75 years. These types of wells typically lose around 25 percent efficiency every 30 years, but well re-development every 30 years improves well efficiency to 95 percent of its previous value.

The Gloria Way Well was installed 34 years ago. The downhole video surveys performed in January 2004 indicated that the well casing and screen were in good condition with negligible corrosion or encrustation (HDR, 2004). Relative to 2003, the 2012 pumping test provided similar hydraulic performance, indicating that well efficiency has not decreased significantly over time. Based on this limited information, it appears that the well casing and screen are structurally sound and the well can be operated into the future without failure.

The existing well pump likely was installed in 1981 or 1984 (HDR, 2004) and was removed and inspected in 2004. It was found to be in good mechanical condition at that time. Well pumps are typically built using high-quality materials. However, they operate in potentially corrosive environments and eventually wear out or fail. During the 2012 performance test, the pump appeared to be operating normally without excessive vibration or motor heating. Should the well be placed back into operation, the pump (because of its age) should be replaced. Lifespans of well pumps vary depending on quality of construction, operational history, sand content and water quality. Typically well pumps are rebuilt or replaced every 20 to 30 years.

3.5 Predicted Hydraulic Performance and Potential for Saltwater Intrusion or Subsidence

The capacity and sustainable pumping rate of the Gloria Way Well are limited in part by the depth and diameter of the well casing and screen, and by the aquifer's hydraulic properties. The amount of water that can be transmitted through an aquifer to a pumping well is controlled by the aquifer's hydraulic conductivity and thickness, and ultimately by the rates of natural recharge to the aquifer system.

Pumping from the Gloria Way Well will result in water level drawdown. If the pumping rate increases beyond the sustainable rate, the water level in the well will draw down to the level of the pump intake, causing entrainment of air and possible pump damage. In this case, the pumping rate would then decrease to a rate in equilibrium with the ability of the aquifer and/or well screen intake to provide water to the pump.

Drawdown occurs both within and outside of the well. The amount and rate of drawdown in the aquifer surrounding the well is dependent on the pumping rate and aquifer hydraulic properties. Excessive drawdown can result in adverse impacts including additional hydraulic head lift and associated increased power costs at nearby wells, potential for reducing the water table elevations to below adjacent well screens or pump intake depths, land subsidence, or saline water intrusion from San Francisco Bay.

In order to estimate the amount of drawdown associated with operation of the Gloria Way Well, a mathematical groundwater flow model of East Palo Alto was constructed. The model solves the mathematical equations that govern groundwater, and is used to simulate drawdown resulting from operation of the well and to assess the potential for land subsidence and for intrusion of saline water from the Bay.

3.5.1 Preliminary Groundwater Model and Predicted Drawdown

A simplified numerical groundwater flow model was constructed to estimate water level changes (drawdown) as a result of pumping the Gloria Way Well. The model was constructed using the United States Geologic Survey (USGS) computer code MODFLOW. The model uses input parameters including aquifer hydraulic properties and hydrologic boundary conditions to calculate groundwater elevations in space and time. Groundwater flowpaths including flow rates and directions can be calculated using the accompanying particle tracking program MODPATH; however, this model is simplified and does not account for pumping from other wells in the groundwater Subbasin. Accordingly, flow path analysis was not performed because it would not be representative of actual flow conditions under the influence of multiple pumpers. The first-order model developed for this analysis was simplified to one MODFLOW layer, simulating two-dimensional horizontal flow only.

Figure 25 shows the groundwater model domain and boundaries. The model area comprises around 36 square miles and encompasses all of the City and parts of Palo Alto and Menlo Park. This large area was simulated in order to minimize artificial impacts of boundary conditions on simulated drawdowns. The southern boundary is located about one mile south of El Camino Real in Palo Alto and Menlo Park. Because the deep confined aquifer extends north of the City and under San Francisco Bay (see Section 2), the northern model boundary is located halfway across southern San Francisco Bay. The western boundary is located more than two miles away from the Gloria Way Well, and the eastern boundary is located more than three miles away (**Figure 25**). The western and eastern boundaries are aligned roughly parallel to presumed groundwater flow paths. All boundaries are defined as constant (general) heads.

Because the Gloria Way Well produces from deeper aquifer zones, the aquifer was simulated as fully confined. Aquifer transmissivity varies across the study area, with higher transmissivities in the southern portions of the City and study area (**Figure 8**). Accordingly, a range of transmissivities from 5,200 gpd/ft (the value estimated for the Gloria Way Well) to 7,400 gpd/ft at the southern model boundary was simulated. For the transient predictive simulations, a confined storage coefficient of 0.001 was used.

Calibration was performed by simulating steady-state water levels under non-pumping conditions. The steady-state model simulated overall groundwater elevations and hydraulic gradients reasonably well. **Figure 25** shows the simulated steady-state groundwater elevations in the absence of any pumping. Similar to observed water levels, simulated groundwater flows from south to north at a hydraulic gradient of approximately 0.002 near the Gloria Way Well.

Predictive simulations under pumping conditions were performed using a range of constant pumping rates. Pumping rates of 100, 200, and 300 gpm were simulated to predict the dynamic aquifer hydraulic response to pumping. **Figures 26** and **27** show the simulated groundwater drawdown after one and five years, respectively of continuous Gloria Way Well pumping at 100 gpm.

Predicted drawdown near the shoreline associated with Gloria Way Well pumping at 100 gpm is around 3.5 feet after one year of pumping. After five years of pumping the drawdown near the shoreline is similar to the amount after one year (around 4 feet), indicating the aquifer has essentially reached a state of equilibrium.

Figures 28 and **29** show the simulated groundwater drawdown after one and five years, respectively of continuous Gloria Way Well pumping at 200 gpm. Predicted drawdown near the shoreline associated with Gloria Way Well pumping at 200 gpm is around 7 feet after one year of pumping. After five years of pumping the drawdown near the shoreline is around 8 feet.

Figures 30 and **31** show the simulated groundwater drawdown after one and five years, respectively of continuous Gloria Way Well pumping at 300 gpm. Predicted drawdown near the shoreline associated with Gloria Way Well pumping at 300 gpm is around 10 feet after one year of pumping. After five years of pumping the drawdown near the shoreline is around 12 feet. Drawdown at the well is estimated to be around 75 feet after one year of pumping. During the 2003 pumping test of the Gloria Way Well, around 100 feet of drawdown was measured (**Figure 20**). Because well inefficiency is not accounted for in the model prediction and because finite-difference cell-averaging approximation tends to underestimate drawdown at a simulated pumping well, the simulated drawdown is consistent with the measured drawdown in the well during operation.

These preliminary drawdown estimates indicate there is a potential for drawdown and induced saline water intrusion and land subsidence, which are discussed below. These drawdown estimates are based on an assumption that the Gloria Way Well is operated continuously. Actual well pumping operations will be dependent on demand and may include periods of non-pumping. Intermittent pumping will allow water level drawdown to recover, reducing the potential for significant adverse impacts. Groundwater drawdown does not necessarily mean subsidence or saline water intrusion will occur, but it indicates the potential for these adverse impacts. Before and during operation of the groundwater production well, a monitoring program should be implemented in order to measure the actual impacts and if necessary modify the pumping rates in order to mitigate adverse impacts.

It is recommended that the City, potentially in conjunction with the cities of Palo Alto and Menlo Park, develop a more robust three-dimensional groundwater flow model that accounts for vertical variations in aquifer hydraulic properties and pumping from all Subbasin production wells, and includes particle tracking to evaluate predicted groundwater flow paths and the potential for seawater intrusion.

3.5.2 Potential for Saltwater Intrusion

In natural groundwater systems, without pumping from wells, the shape of the water table generally mimics the slope of the land surface. The recharge zone of an aquifer near the coast (or Bay) is inland, often at considerable distance. In these coastal areas, groundwater naturally flows from recharge areas to the coast (Bay) where it discharges to the surface water body. If groundwater is (over) pumped near coastal areas, the lowered water table may reverse the flow and induce sea water to migrate inland. Sea water moving inland is called saltwater intrusion.

In the 20th century, saltwater intrusion occurred in several areas of the South Bay. Brackish saltwater from San Francisco Bay can migrate upstream in creeks and streams during high tides and leak through the clay aquitard into the upper aquifer zone when this zone is pumped (Ingebritsen and Jones, 1999; SCVWD, 2001). Land subsidence may have initially aggravated this condition (see below). Elevated salinity is also present in the lower aquifer zone but on a much smaller scale, and is attributed to improperly constructed, maintained, or abandoned wells that penetrate the clay aquitard and provide a conduit from the upper to the lower aquifer zone (SCVWD, 2001). In response, SCVWD has established an extensive program to locate and properly destroy such conduit wells. SCVWD also monitors potential saltwater intrusion, collecting quarterly water quality samples from 16 wells in the upper aquifer and from 5 wells in the lower aquifer in the vicinity of the intruded area. Additionally, historical subsidence was limited to only two to three feet in the East Palo Alto area (Ingebritsen and Jones, 1999).

Alternatively, salt from mineral beds may leach into the groundwater of its own accord. The current water quality of the Gloria Way Well is partially saline, with moderate concentrations of TDS and chloride. However, the water quality source study suggested that salt water intrusion was not affecting the Gloria Way Well and the saline condition is most likely from geochemical reactions within the local geologic formations.

Based on the groundwater drawdown modeling described above, there is the potential of inducing saline water intrusion from San Francisco Bay. However, the preliminary groundwater modeling performed for this Phase 1 project does not account for vertical variations in aquifer properties, the effects of other pumpers in the Subbasin, or three-dimensional flow. Additional Subbasin-wide groundwater modeling should be considered to provide more accurate predictions of drawdown and flow directions under pumping conditions.

A significant data gap in evaluating the potential for future saline water intrusion and water quality degradation is the current distribution of saline water bayward of the Gloria Way Well. The current distribution of chloride and saline water is unknown, because no groundwater monitoring wells exist east of the Gloria Way Well. It is recommended that the City, possible in conjunction with the cities of Palo Alto and Menlo Park and San Mateo County, install a monitoring well network and implement a groundwater monitoring program to assess the current distribution of water quality and provide early warning of potential saline water intrusion.

3.5.3 Potential for Land Subsidence

Land subsidence occurs when groundwater overdraft significantly reduces the fluid pressure in the pores of the aquifer system. This results in compression of clay materials and the sinking of the land surface. This compression may be partially recoverable if pressures rebound, but the recovery is rarely of the same magnitude as the initial compression. Areas having a greater abundance of fine-grained sediments, such as northeastern East Palo Alto, are more susceptible to land subsidence than the southwestern area of the City, because of the greater compressibility of these sediments. Subsidence can exacerbate flooding and damage infrastructure.

In the first half of the 20th century, portions of the City of San Jose subsided as much as 13 feet as a result of over pumping; this subsidence has been halted with development of surface water sources and improved groundwater management. Similarly in the Study Area prior to the 1960s, groundwater levels were well below sea level; these lowered groundwater levels induced subsidence of the aquifer system. Land subsidence of more than two feet was measured in Palo Alto and East Palo Alto between 1934 and 1967 (Poland and Ireland, 1988). Subsidence in the Atherton area during the same period was reportedly between 0.1 and 0.5 foot (Metzger, 1997).

It is instructive to note the magnitude of groundwater level declines associated with subsidence; for example, groundwater levels in the Hale Well in Palo Alto reached a low elevation of -140 feet mean sea level (ft-msl) or 186 ft-bgs in 1962. The static water level in a well drilled in Atherton in 1950 was about -23 ft-msl (53 ft-bgs). PAPMWC Well No. 5 had a static groundwater level of -31 ft-msl (46 ft-bgs) when drilled in 1950. These observed historical conditions indicate a potential for subsidence, should intensive pumping resume with large drawdowns.

Because of the economic cost that subsidence incurs, the SCVWD and USGS have initiated a program of surveying the Santa Clara Valley to determine its extent. SCVWD monitors subsidence with a network of index wells, survey benchmarks, and two deep extensometers that measure the rate and magnitude of compression that occurs between the land surface and bottom of the well (SVCWD, January 2005). SCVWD has established subsidence thresholds, or groundwater elevations below which significant subsidence will likely occur for its index wells based on the PRESS (Predictions Relating Effective Stress and Subsidence) model (SCVWD, January 2005). The SCVWD has established a tolerable continuing rate of subsidence of 0.01 feet per year. Based on the modeling, if groundwater levels do not drop below the threshold level, the tolerable subsidence rate will not be exceeded. The nearest subsidence monitoring well (located in Mountain View) has a subsidence threshold of -26 ft-msl. Some of these techniques require surface and subsurface survey equipment to measure horizontal and vertical displacement. Although such surveys are very precise (e.g., borehole extensiometers), they are expensive to install and maintain. The different land surveying methods are summarized in **Table 23**.

Mitigation measures by the SCVWD in the late 1960s and early 1970s have stopped and even reversed subsidence in the Santa Clara subbasin. These measures have included provision of surface water supplies in lieu of groundwater, artificial recharge of the groundwater basin through stream channels and recharge basins, and careful monitoring and management of groundwater levels to avoid further subsidence (Borchers, et al., 1999; Ingrebritsen and Jones, 1999; Schmidt and Bürgmann, 2003).

Satellite Interferometric Synthetic Aperture Radar (InSAR) is a relatively new technique allowing measurement and mapping of changes on the Earth's surface as small as a few millimeters (mm). This is accomplished by reflection of satellite-born radar signals from space to the ground with return to the same point in space but at different times. Therefore, the radar satellite measures changes in distance between the satellite and ground as the land surface uplifts or subsides. These data are then converted into interferograms that are used to construct maps of relative ground-surface changes. Such maps are used to understand the effects of groundwater and petroleum withdrawals, or other human-induced land deformation (Bawden, et al., 2003).

To evaluate seasonal and multi-year deformation patterns, the USGS used European Observation Satellites (EOS) 5-year InSAR data from September 1992 through August 1997. The data showed small amounts (5 to 10 mm) of regional uplift that corresponded with water-level recovery throughout the Santa Clara Valley. An 8-month interferogram (January to August 1997) showed seasonal subsidence of about 30 millimeters near San

Jose that corresponded to about a 10 meter decline in water levels. In the Palo Alto and East Palo Alto area, significantly less seasonal declines were noted (Galloway, et al., 2000; Bawden, et al., 2003). InSAR can be used effectively to determine both long- and short-term land subsidence and recovery.

Based on the preliminary drawdown modeling described above, the amount of drawdown associated with operation of the Gloria Way Well likely is less than the amount that occurred in the mid-20th Century. The subsidence that did occur may have partially reversed, but this is not an indication that additional subsidence will not occur if future groundwater levels drop well below sea level. In addition, future global sea-level rise may exacerbate this potential.

It is recommended that the City work with neighboring municipalities, agencies, and the USGS to monitor land subsidence in the future, using one or more of the methods described above and listed in **Table 23**.

3.6 Treatment and Blending Evaluation

As part of the Gloria Way Well treatment and blending alternatives analysis, a review of the Gloria Way Well water quality and the quality of SFPUC water was conducted to identify potential water quality implications of adding this groundwater to the City's existing finished water.

3.6.1 SFPUC Water Quality

Approximately 85 percent of the SFPUC water supply is from High Sierra snow melt from the Hetch Hetchy Reservoir. This water is very low in total dissolved solids, hardness and alkalinity and, therefore, is a high quality water that is also aggressive to many piping materials and has very poor buffering capacity. The remaining 15 percent of SFPUC water is made up of East Bay and local surface waters. Although these waters have slightly greater levels of total dissolved solids (TDS), hardness and alkalinity, the blend is still considered a soft, high quality water.

Due to the high quality source water and the SFPUC's mandate to protect public health, the water quality goals of the SFPUC are more stringent than (at 40 percent of) primary and secondary maximum contaminant levels (MCLs) for several regulated constituents. The low levels of naturally occurring and anthropogenic contaminants allow for blending opportunities to reduce contaminants in other sources below MCLs. The SFPUC is also in the process of designing facilities to add local groundwater (i.e., wells within the City and County of San Francisco) and regional groundwater (i.e., the Westside Basin in the upper Peninsula) to their finished water. However, these groundwater additions will be introduced into the SFPUC downstream (north) of the SFPUC turnout for East Palo Alto.

The SFPUC has chosen to utilize pH as its primary corrosion control parameter in its transmission and distribution system. Prior to transmission and during treatment, the SFPUC increases the pH of the finished water to between 8.6 and 9.4, depending on source water TDS levels. The pH of this poorly-buffered finished water has been shown to decrease significantly (e.g. 0.3 to 0.5 pH units) with minimal additions of groundwater (e.g., 3 to 5 percent). SFPUC is taking precautionary steps to maintain the target pH in its systems when groundwater is added to protect infrastructure and maintain compliance with the Lead and Copper Rule. These steps include blended water quality laboratory testing and the addition of sodium hydroxide (NaOH) storage and feed facilities to SFPUC groundwater treatment locations.

3.6.2 Blending

Aesthetically, the quality of the groundwater would benefit from blending with SFPUC finished surface water supplies. Blending is recommended at a minimum of a 1:1 ratio of SFPUC surface water supplies to groundwater to reduced TDS, hardness, and chloride to acceptable levels. To maximize the supply from Gloria Way Well, which has a production capacity of 300 gpm, blending at a 1:1 ratio would require the constant water supply rate of 300 gpm from the SFPUC and a constant delivery to the distribution system of 600 gpm.

Without treatment, blending is expected to lower iron and manganese levels relative to the starting groundwater concentrations. However, without treatment the use of water from the Gloria Way Well would be limited. Based on the historical average concentration of manganese in the Gloria Way Well of about 170 ug/L, blending of 29 percent groundwater with 71 percent SFPUC water would reduce the manganese concentration below the secondary MCL of 50 ug/L. To account for the likelihood of manganese concentrations in Gloria Way Well to exceed the historical average, a safety factor should be applied. Applying a safety factor of 1.2 results in a blend of 24 percent groundwater; this is the recommended maximum percentage of groundwater if blending without treatment is pursued. At this percentage and Gloria Way Well's maximum production capacity of 300 gpm, blending would require mixing 950 gpm of water from the SFPUC system for a total water supply rate of 1,250 gpm. This supply rate exceeds the City's current minimum day demand of 1.6 mgd, or 1,111 gpm, meaning that the Gloria Way Well would not be able to operate continuously in a blend only scenario.

An additional drawback of the blending without treatment option is the potential for iron and manganese oxides to precipitate. Oxidation of iron and manganese can consume residual disinfectant in the system and the precipitate can result in the accumulation of solids in the distribution system or in the storage tank used for blending. Therefore blending alone is not considered a viable alternative.

3.6.3 Wellhead Treatment

Manganese wellhead treatment is recommended. Manganese can be treated to below regulatory levels with wellhead oxidation and pressure filtration with granular media. An added benefit will be reduced iron levels in the treated water. This treatment process for manganese removal is the most common, and usually the lowest cost technology with years of successful operating experience treating groundwater in the United States.

Blending groundwater from the Gloria Way Well in any significant amount with SFPUC water will impact the pH of the finished water. Although laboratory analysis of pH was performed in May 2012, ongoing field testing of pH from the Gloria Way Well is also recommended. Because pH is an important parameter with respect to corrosion of pipelines and plumbing materials, desktop modeling (and possibly bench scale testing) is recommended to determine the impact of blending on finished water pH. If pH adjustment is necessary, sodium hydroxide should be added to the blended water, not solely the groundwater.

Additionally, it is recommended that the anticipated fluoride concentration of the blend be evaluated once blend flows are known, to determine if addition of fluoride to the low-fluoride groundwater is needed to meet the City's finished water fluoride level goals.

Lastly, the possible addition of a residual disinfectant to the groundwater will need to be evaluated once blend flows are known. Chlorine and ammonia can be added to match the existing chloramines levels in SFPUC finished water or possibly only chlorine may be added if appropriate mixing and blending is performed. Unplanned and uncontrolled mixing of chlorine and chloramines in the distribution system should be avoided. Care should be taken to not impact the residual disinfectant in the East Palo Alto distribution system. Ideally, this can be accomplished by adding chlorine and ammonia at a 5:1 weight ratio to make chloramines at a concentration that matches SFPUC finished water.

A process schematic for the Gloria Way Well treatment option is presented on **Figure 32**. Gloria Way Well water will be mixed with spent backwash water and then applied to the pressure filters. The treated water then flows to a mix tank where further chemical conditioning occurs and where the treated water is mixed in a ratio of 1:1 with SFPUC water before being discharged to the distribution system. While a portion of the backwash water can be re-circulated to the pressure filters, some needs to be discharged as waste to the sewer.

Figure 33 shows a conceptual layout for this alternative on the Gloria Way site. This layout assumes that all existing facilities are removed except for the wellhead itself. All facilities except a standby generator fit on the site within the required setbacks. A portable standby generator is included in the overall project, but it would be stored offsite. It should be noted that a hydraulically operating check valve needs to be placed in the existing waterline. During normal operation, this valve remains shut preventing pumped water from recirculating to the mix tank. This valve will open when the mixing tank pump is off or when low pressure occurs on the mixing tank side of the check valve.

Table 24 presents the estimated probable cost of construction for this project along with an estimate of the annual cost of operation. Included in the cost estimate are a new well pump and a SCADA system to operate the facility.

3.7 Regulatory Permitting Requirements

In order to place the Gloria Way Well into regular service, several regulatory permits must be obtained. Permitting agencies identified to date include:

- The City of East Palo Alto
- The Palo Alto Regional Water Quality Control Plant (RWQCP)
- The State of California Department of Public Health (CDPH)

The Gloria Way Well Site is zoned Single Family Residential (SFR) by the City of East Palo Alto. Public utility uses, facilities and structures are permitted uses, but a conditional use permit is required. A building permit issued by the City of East Palo Alto will also be required in order to construct the treatment system facilities.

An industrial waste discharge permit will be required and will be issued by the RWQCP. The permit application form is included in Appendix G. One of the unknowns is the concentration of wastewater constituents. The RWQCP has indicated that brine or concentrated solutions may be a problem, but these concentrations are not known at present.

The CDPH also has specific permit requirements. These were identified in an email from Jose Lozano to Bret Swain dated 15 May 2012. This email is included in Appendix G. Key elements in the CDPH permitting process include:

- Documentation of the condition of the existing Gloria Way Well and whether the well meets State Well Standards

- Application for an amended permit to change the well status from inactive to active. This will include:
    - Preparation of a completed permit form
    - Copy of current pump test to establish capacity
    - A completed drinking water source assessment
    - Well design and pump specifications if well is to be rehabilitated or the pump replaced
    - Documentation of CEQA clearance
    - Current Title 22 water quality testing
- Submittal of a design engineering report, plans and specifications, and operations plan, if blending is to be used or if treatment is proposed. Similarly if a water tank is constructed, CDPH will require plans, specifications and CEQA clearance. It should be noted that the CDPH "considers the separation issues between the well and the residential sanitary sewers not an issue for the permitting process." Finally, for a new well system constructed at another City site, along with the permits listed above, a well drilling and construction permit will be required from the San Mateo County Environmental Health Services Division.

- Additional regulatory permit requirements may apply to other potential well sites.

3.8 Phasing Options and Schedule for Construction

This report is Phase 1 of the Gloria Way Well project. The Gloria Way Well treatment system would be designed and constructed during Phase 2. The City is proceeding with the environmental documentation and permitting and anticipates completion by May 1, 2013. At that time, final design could begin.

Although the Phase 2 design and construction schedule could potentially be accelerated if certain steps are eliminated or fast-tracked, the Gloria Way Well design and construction phase would take approximately 18 months after the notice to proceed is given. This timeline can be broken down as follows:

- Site surveying and geotechnical investigation – 1 month
- 60% design – 2 months
- City review period – 1 month
- 95% design – 2 months
- City Approval and Authorization to Bid-2 months
- Bidding and award period – 2 to 3 months
- Construction – 9 to 12 months

3.9 Environmental Review Requirements

Retrofit of the Gloria Way Well and construction of a manganese treatment system would be subject to project-level environmental review under the California Environmental Quality Act (CEQA) and the National Environmental Protection Act (NEPA). CEQA requirements are established under the California Code of Regulations require that government agencies with discretionary approval over a non-exempt project evaluate the environmental effects of the project and disclose ways to reduce or avoid any adverse effects. NEPA compliance is required to support federal funding requirements. New municipal production wells constructed at other sites would also be subject to CEQA requirements, but would not likely be subject to NEPA unless federal funding is sought for their implementation.

For retrofit of the Gloria Way Well, the US EPA is the NEPA Lead Agency, and the City is the CEQA Lead Agency. To comply with CEQA and NEPA requirements, the City and US EPA plan to prepare a joint Draft Initial Study (IS) and Environmental Assessment (EA) for CEQA and NEPA compliance. Environmental topics to be considered in the Draft IS/EA include, but are not limited to: aesthetics, air quality, biological resources, cultural resources, geology and soils, surface water hydrology and water quality, groundwater hydrology and water quality, hazards and hazardous materials, land use and land use planning, traffic and transportation, noise, and socio-economic and environmental justice issues.

An IS is prepared by a CEQA Lead Agency to determine if a project may have a significant effect on the environment. If it is determined that project mitigation measures, conditions of approval, or the design of the project facilities would mitigate all potentially significant impacts to a less-than-significant level, the City may adopt a Negative Declaration (ND) or Mitigated Negative Declaration (MND) (CEQA Guidelines Section 15070). However, if there is substantial evidence that the Gloria Way Well project may have a significant effect on the environment, an Environmental Impact Report (EIR) must be prepared (CEQA Guidelines Section 15064(a)).

Similar to an IS, an EA is prepared by a NEPA Lead Agency to determine the level of environmental effects associated with a proposed action and to briefly provide sufficient evidence and analysis for determining whether to prepare a Finding of No Significant Impact (FONSI) or an Environmental Impact Statement (EIS) (40 CFR Section 1508.9).

At this time, it is believed that a MND and FONSI may be sufficient to fulfill CEQA and NEPA requirements. After the Draft IS/EA is circulated for a 30-day public and agency review, if it is determined that significant impacts could be reduced to a less-than-significant level through adoption of mitigation measures, responses to any comments received on the IS/EA will be incorporated into a MND and FONSI for the proposed project. If it is determined that significant impacts would occur with implementation of the project and could not be reduced to a less-than-significant level through adoption of mitigation measures, additional environmental review may be required.

Projects receiving federal funding must also coordinate with federal agencies responsible for managing the resources that could be affected by the project. In cases where a project would not affect a particular resource, the process is used to determine the applicable authorities must be documented. It is anticipated that the proposed retrofit of the Gloria Way Well would need to comply with the federal consultation requirements of the State Historic Preservation Office (SHPO) under Section 106 of the National Historic Preservation Act (NHPA), and the US Fish and Wildlife Service (USFWS) under Section 7 of the Federal Endangered Species Act (FESA). For the Gloria Way Well project, it is believed that brief letter memoranda will be sufficient to provide the US EPA with the necessary information to make a determination of no effect under FESA Section 7, and a finding of no adverse effect under NHPA Section 106.

4. OTHER POTENTIAL CITY GROUNDWATER SUPPLY SOURCES

To meet the City's projected long-term supply deficit of 1,201 AFY, additional supply sources beyond the Gloria Way Well will need to be developed. The City's Urban Water Management Plan identifies new groundwater wells as the chief supply source to address future shortfalls.

4.1 Potential City Well Sites

This section evaluates the potential for producing groundwater at other well sites in the City. An evaluation of using other existing wells and potential new wells was conducted.

4.1.1 Existing Wells in East Palo Alto

As reported by the DWR and San Mateo County and described in Section 2, there are a number of existing groundwater wells in the City (**Appendix B**). It is possible that an existing properly-constructed high-capacity well in good condition could be used to augment City water supply. However, most of the wells listed in the well databases are shallow groundwater monitoring wells associated with the contaminated sites, shallow domestic wells, and the PAPMWC wells. Very few other wells are listed in the database and most of these have incomplete information.

Several reported existing wells were researched in order to evaluate the potential to utilize them as future supply wells. A groundwater well exists at the Brentwood School near the corner of Clark and O'Conner streets. This well, discovered during a site reconnaissance, appears to be a five-inch diameter PVC-cased well. No surface vault is in place to secure the well. Moreover, no construction information for this well is available in the DWR and San Mateo County databases and thus the total depth and screened intervals are unknown. Based on its small diameter, this well is not appropriate as a groundwater production well. It should be properly abandoned (filled and sealed).

City staff members have noted that a well is present at Bell Park, and that it is secured with a steel plate. No construction information for this well is available in the DWR and San Mateo County databases and the total depth and screened intervals are unknown. The Bell Park location is not preferred due to its proximity to the PAPMWC wells.

Additional site surveys could be performed to inspect the Bell Park Well, or any other wells that may be suitable for groundwater production. However, an optimally located and properly designed and constructed new well likely would yield better production rates, water quality, and remaining lifespan than any existing wells in the City identified to date.

4.1.2 Potential New Well Sites

As part of this study, the City has identified seven potential new well locations, which were screened for the potential to construct a second City well system. **Figure 34** shows the location of these potential sites and the Gloria Way Well site. The figure also illustrates the location of the wells in relation to the City's distribution system and the neighboring City of Menlo Park, City of Palo Alto, O'Conner Tract Water Company, and Palo Alto Park Mutual Water Company wells. Prior to constructing a new municipal production well at any of the additional well sites, a test well should be installed and a testing program conducted to confirm well yields, water quality, and treatment requirements.

The sites known as Bay/University, Bell Park, Brentwood School and Pad D, are fairly centrally located within the City's distribution system and are located alongside principal distribution mains, whereas Woodland/Manhattan, Newell/101 and Verbena sites lie at the periphery of the system and in areas with smaller distribution mains. From a distribution standpoint, sites that are located near the City's primary distribution mains are considered more suitable for the introduction of new groundwater sources because the existing infrastructure in these locations is more likely to be able to accommodate increased flows. From a production and sustainability standpoint, sites that are located further from the existing Palo Alto Park Mutual Water Company wells and other existing or planned production wells in neighboring municipalities are preferred because groundwater extraction from these locations is less likely to impact or be impacted by the other production wells. While preferred for their central location within the City's distribution system, the proximity of the Bay/University and Bell Park sites to the Palo Alto Park Mutual Water Company and existing Gloria Way Well makes these sites less attractive. However, none of the potential well sites have fatal flaws with respect to their location relative to existing infrastructure or other municipal production wells.

4.2 Site Screening Analysis

A preliminary site screening analysis has been performed to identify the most favorable of the potential well sites. Site characteristics considered in the initial screening include the following:

- Approximate Lot Size Less Setbacks – This criterion considers the constructible area of the site. The useable space on each site is subject to setbacks: 5-foot side yard setbacks and 20-foot front and back yard setbacks. The minimum constructible area needed for a new well system is estimated at 60 feet by 100 feet (6,000 square feet). This criterion has been used to screen out sites with insufficient space for new well facilities.

- Distance from the Bay – This item considers the potential for the wells to be impacted by salt water intrusion. For the high level screening conducted for this study, sites further from the Bay are considered more viable.

- Distance from Surface Water – This item considers the potential for wells to be impacted by surface water. Because the treatment requirements for drinking water sources classified as 'groundwater under the direct influence of surface water' are more stringent than standard groundwater treatment, preference is given to sites distant from local streams.

- Biological Resources Permit Considerations – Sites located in undisturbed areas or adjacent to creeks and other water bodies may require biological resource permits if project construction and/or operations would disturb riparian habitat (including through encroachment within the dripline of riparian trees) or other sensitive habitats, or could potentially result in injury to or mortality of special-status species. Biological resources permit considerations could include Section 1602 Streambed Alteration Agreement from the California Department of Fish and Game (CDFG) (for disturbances to a riparian corridor), and a Section 2081 CDFG Incidental Take Permit or Take Avoidance Plan (for impacts to special-status species).

- Ownership – This item considers the ease of acquiring the land necessary to implement the new well. Properties owned by the City or other public entities are given preference over privately owned properties.

- Adjacent Water Line Sizes and Water Distribution Improvements near Site – This criterion considers the ease of connecting the potential new groundwater supply to the distribution system.

- Current Land Use and Adjacent Land Uses – This criterion considers potential conflicts with adjacent land uses and public acceptance of new well facilities. For example, wells located close to residential land uses could result in increased noise levels during project construction and operations. Wells sited within commercial areas are considered to be more acceptable to the community compared to wells sites on properties within residential areas.

- Accessibility – This item considers the need for site accessibility improvements in order to facilitate construction, maintenance, and operation of a new well.

- FEMA Flood Hazard – This item considers the vulnerability of new well facilities to flooding. This criterion has been used to screen out sites that are included within the designated FEMA 100-year flood hazard zone.

- Distance from Palo Alto Park Mutual Water Company and O'Conner Tract Wells – This item considers the potential for new wells to impact the operation of the existing Palo Alto Park and O'Conner Tract Mutual Water Company wells, and vice-versa. Sites further from the existing wells are considered more viable.

- Distance from existing or planned City of Palo Alto and City of Menlo Park Wells – This item considers the potential for new wells to impact the operation of the existing or planned City of Palo Alto Park or City of Menlo Park wells. Sites further from the existing wells are preferred.

- Potential Well Yields – This parameter is the estimated yield of a new production well. Sites with greater yields are preferred. Based on the regional hydrogeologic information and existing well performance, potential well sites in the southern and eastern portions of the City are anticipated to have better production rates than sites in the northern and western areas of the City.

- Proximity to Documented Groundwater Contamination – This criterion considers distance from known groundwater contamination sites. For the purposes of this analysis, environmental cases whose status is closed, indicating remediation has been completed to the satisfaction of the regulatory agency, are considered to pose a low threat to groundwater quality at the potential well site. Water quality sampling would be required to confirm groundwater conditions at potential well sites.

Ambient groundwater quality (i.e., the predicted water quality of a new production well) has also been considered. Sites with better water quality, particularly with regard to ambient iron and manganese concentrations are preferred. However, groundwater quality data in the areas around the potential well sites are limited, and available water quality does not indicate a definitive trend. Proximity to known environmental contamination sites (see **Section 2** and **Figure 18**) has also been considered. However, the seven sites evaluated are not located near the identified major environmental release sites, which are located in the northern sections of the City. Therefore this parameter is not evaluated further.

A matrix listing the characteristics of each of the potential well sites is included as **Table 25**, while summaries of each site are provided below.

- **Pad D Site:** This City-owned site is located at the intersection of Clark Avenue and East Bayshore Road. The site has ample constructible area and adequate access. Its location within a commercial area reduces concerns regarding the aesthetics of a new well facility. The potential groundwater production rate is anticipated to be relatively good. The site is bordered by two 12-inch-diameter water lines, both of which are slated to be upgraded to 16-inch-diameter and should have adequate capacity to accommodate additional supplies. The site is not located in a FEMA flood hazard zone. There are no special biological resource permit considerations associated with this site. Three Leaking Underground Storage Tank (LUST) clean-up sites (1979 Pulgas Avenue, 1800 West Bayshore Boulevard, and 940 O'Connor Street) are located within ¼-mile of the site; however, these are considered to pose a low risk to groundwater because the cases are closed. One potential drawback to Site D is the potential for a proposed pedestrian overcrossing across Highway 101 to terminate on Pad D.

- **Bay/University Site:** This is a City-owned site located at the intersection of Bay Road and University Avenue, approximately 3,500 feet from the Bay. The site is adjacent to major water distribution mains and could accommodate the introduction of a new water supply. The site is at the edge of an undeveloped field. Adjacent land uses are predominantly commercial. The site is not located near any creeks and is not within a FEMA flood hazard zone. There are no apparent special biological resource permit considerations associated with this site. The site is located less than ¼-mile north of a LUST clean-up site (at 2395 University Avenue), but the LUST site is considered to pose a low risk to groundwater at the potential well site because the case is closed. The site has a constructible area of approximately 3,850 square feet, which could constrain the facilities that could be accommodated on the site. The proximity of the site to the City's Gloria Way Well and the Palo Alto Park Mutual Water Company's wells is another drawback of the Bay/University location.

- **Bell Park Site:** This City-owned site is located on University Avenue, south of Bell Road. Surrounding land uses include recreation, commercial, and residential. Construction of new well facilities on this site would be difficult because of the existing use of the site as a community open space and community resistance to the loss of this recreational space. The site has ample constructible area and adequate access. The site is not located in close proximity to creeks or other waterways and is not located in a FEMA flood hazard zone. There are no apparent special biological resource permit considerations associated with this site. The site is located within ¼-mile of three LUST sites (2101 University Avenue, 2194 University Avenue, and 1475 East Bayshore Road) whose status is indicated as closed, and one LUST site (660 Donohoe Street) whose status is indicated as open. The open LUST case could present groundwater quality concerns for a new well at this site. Of all the potential sites, Bell Park is the closest to the Palo Alto Park Mutual Water Company well site, which could present well interference issues.

- **Brentwood School Site:** This site is located at the intersection of Clark Avenue and O'Connor Street, adjacent to the Edison-Brentwood Elementary School. The site is owned by the school district. The site has ample constructible area and adequate access. The site also has the advantage of being located alongside major water distribution mains. Other nearby land uses include single-family and multifamily residential and industrial. The site is not located in a FEMA flood hazard zone. There are no apparent special biological resource permit considerations associated with this site. The site is located less than ¼-mile north of two LUST clean-up sites (at 940 O'Connor Street and 1979 Pulgas Avenue). The LUST sites are considered to pose a low risk to groundwater at the potential well site because the cases are closed. The site is one of the furthest sites from the Palo Alto Park Mutual Water Company and

O'Conner Tract wells, which means it has a lower potential for well interference. However, of all the potential sites, it is the closest to the bay (approximately ½ mile) and as such has a greater potential to be impacted by seawater intrusion. The Brentwood School site has the additional drawback of requiring negotiations with the school district to implement new well facilities.

- **Newell/101 Site:** This privately-owned site is located at the intersection of Newell Road and West Bayshore Road. Adjacent land uses are predominantly multifamily residential. The site has ample constructible area and adequate access. The site is also located within a FEMA flood hazard zone. There are no apparent special biological resource permit considerations associated with this site. The site is located within ¼-mile of one LUST cleanup site (1800 West Bayshore Boulevard); however, because the case status is indicated as closed, this site is considered to pose a low risk to groundwater at the potential well site. The Newell/101 site is among the furthest from the Palo Alto Park Mutual Water Company well and the Bay, reducing the potential for well interference and seawater intrusion. The site also has one of the larger buildable areas. The potential groundwater production rate is anticipated to be relatively good. Disadvantages of this site are that it lies outside of the City's main distribution network and is situated next to residential land uses. In addition, the west side of the proposed Highway101 overcrossing may terminate on this site.

- **Verbena Site:** This privately-owned site is located at the terminus of Verbena Drive (near the intersection at Abelia Way) and is surrounded by single-family residences. The site has ample constructible area and adequate access. The site is located in a FEMA flood hazard zone (one-percent annual chance flood) and is located adjacent to the San Francisquito Creek. The site is also located approximately 1/5-mile from the Bay, which increases the potential for seawater intrusion. The site is located within ¼-mile of two LUST cleanup sites (2085 East Bayshore Boulevard and 151 Laura Lane), which have closed status, and one LUST site (1905 East Bayshore Boulevard) whose status is open. The open LUST case could present groundwater quality concerns for a new well at this site. This site has special biological permit considerations due to its proximity to San Francisquito Creek.

- **Woodland/Manhattan Site:** This privately-owned site is located immediately south of the intersection of Woodland Avenue and Manhattan Avenue. Adjacent land uses include single-family and multifamily residential and commercial. After applying the site setback requirements, it was determined that the Woodland/Manhattan site does not have buildable space; additionally, the site is within the FEMA floodplain and is located adjacent to the San Francisquito Creek. The site is located within ¼-mile of one LUST cleanup site (1901 University Avenue) whose case is indicated as closed, indicating it poses a low risk to groundwater at the potential well site. This site has special biological permit considerations due to its proximity to San Francisquito Creek.

Of the potential well sites, Pad D appears best suited for a new well. Based on data from nearby production and monitoring wells, yields of a Pad D well may be relatively high (over 500 gpm) and groundwater quality may be relatively good and may not require manganese treatment.

Prior to moving forward with a new well system, it will be necessary to confirm well capacity and yield and ambient groundwater quality. If the City desires to construct a new well system, a hydrogeologic field investigation should be performed, including installation and water quality sampling of a test well potentially with multiple depth completions for discrete interval testing.

4.3 Potential for Saltwater Intrusion or Subsidence

The preliminary numerical groundwater flow model described in Section 3 was used to estimate water level drawdown resulting from pumping of a future well at Pad D; focus was placed on simulated drawdown at the shoreline as an indicator of potential salt water intrusion. The model used the same boundaries and aquifer parameters as the Gloria Way Well model described in Section 3. The Pad D well is in the southern portion of the City in an area of higher aquifer transmissivity and likely higher well yield. Two predictive simulations under pumping conditions were performed using constant pumping rates of 300 and 500 gpm for the Pad D well. Transient flow was simulated to predict the dynamic aquifer hydraulic response to pumping. **Figures 35** and **36** show the simulated groundwater drawdown after one and five years, respectively, of continuous Pad D well pumping at 300 gpm. Predicted drawdown near the shoreline associated with Pad D well pumping at 300 gpm is around 8 feet after one year of pumping. After five years of pumping, the drawdown near the shoreline is around 10 feet. Comparison of the drawdown predicted for pumping the Gloria Way Well at 300 gpm (**Figures 30** and **31**)and for pumping a Pad D well at 300 gpm (**Figures 35** and **36**) reveals less drawdown will occur near the Bay shoreline from pumping at the inland Pad D location.

Figures 37 and **38** show the simulated groundwater drawdown after one and five years, respectively, of continuous Pad D well pumping at 500 gpm. Predicted drawdown near the shoreline associated with Pad D well pumping at 500 gpm is around 14 feet after one year of pumping. After five years of pumping, the drawdown near the shoreline is around 17 feet. Although the aquifer transmissivity in the Pad D area is simulated as higher than at the Gloria Way Well, the simulated pumping rate for this scenario is also higher. The amount of drawdown over time for a Pad D well pumping at 500 gpm is similar to the amount predicted at the shoreline during pumping of the Gloria Way Well at 300 gpm. Model-simulated drawdown in the simulated Pad D well is around 105 feet after one year of pumping at 500 gpm.

These preliminary drawdown estimates indicate there is a potential for inducing saline water intrusion and/or land subsidence. If the City pursues a new well system at Pad D, it is recommended that a hydrogeologic site investigation be performed to quantify aquifer hydraulic properties at the site. As with the Gloria Way Well, groundwater drawdown does not necessarily mean land subsidence or saline water intrusion will occur, but it indicates the potential for these adverse impacts. Again, a groundwater monitoring program should be implemented prior to and during production well operation in order to measure the actual impacts and if necessary modify the pumping rates in order to mitigate adverse impacts. A more robust three-dimensional groundwater flow model also should be developed that accounts for vertical variations in aquifer hydraulic properties and for pumping from all Sub-basin production wells, and includes particle tracking to evaluate predicted groundwater flowpaths and the potential for seawater intrusion or subsidence.

4.4 Permitting and Environmental Review Requirements

Permit requirements for a new production well system are similar to those required to place the Gloria Way Well in service. CDPH permit requirements are included in **Appendix G**. Additional permits for drilling and installation of new wells will be required by the San Mateo County Health Department.

4.5 Preliminary Treatment Alternatives and System Design and Capital and Operating Budget

It is assumed that treatment for the removal of iron and manganese will be required at any site and that blending will also be required. It is possible that better groundwater quality may exist at a potential new well site and manganese treatment will not be required. This will be confirmed when a test well is drilled. It is also assumed that the maximum capacity of this well will be 500 gpm.

The process schematic presented previously in Section 3 is still valid. **Figure 39** presents a layout for a 500 gpm facility. It is very similar to the 300 gpm facility, but spread out more as it is assumed there are no site constraints similar to the Gloria Way site. Again, this layout assumes that a portable generator will be acquired and located off site. The estimated probable cost of construction and annual operating costs for the 500 gpm option are presented in **Table 26**.

4.6 Lifecycle Water Cost Comparisons for Gloria Way and New Well Sites

Table 27 summarizes the net present value of the project benefits and the average cost of water (per AF) for the two alternative locations with various water production rates. The alternatives are the existing Gloria Way Well operating at 100, 200, or 300 gpm, and a new well located at Pad D operating at 100, 200, 300 or 500 gpm. For the Pad D system costs for operation both with and without treatment were estimated. The calculation of the net present worth follows the format of Tables 7, 19, and 20 contained in the Grant Application for Proposition 84 IRWM (Integrated Regional Water Management) funding. This analysis utilizes a 6% discount rate and a 50 year project life.

Additional assumptions used in this analysis include:

- Total annual production is based on producing water 85 percent of the total available annual hours.
- Construction occurs in a two year period (2012 and 2013) during which time no water is produced and all capital costs are incurred.
- Replacement costs include filter media, chemical feed pumps and other minor pieces of equipment. A major rehabilitation of the well pump and treatment system is scheduled 25 years after project initiation.
- Operation and replacement costs vary proportionately to the annual volume of water produced. Administration and maintenance costs are fixed and do not vary with respect to the volume of water produced.
- The life of the well is estimated at 50 years and no well rehabilitation costs are anticipated.
- There is no salvage value at the end of the 25-year project life.

The costs of water for the Gloria Way system alternatives range from \$260 to \$550/AF (at 300 and 100 gpm, respectively). The costs of water for the Pad D system alternatives range from and from \$240 to \$780/AF (for 500 and 100 gpm, respectively, with manganese treatment). Without manganese treatment water costs for Pad D at 500 and 100 gpm are \$100 and \$310/AF. These costs compare quite favorably with the current SFPUC wholesale water price of \$1,276/AF (SFPUC, 2012).

5. OVERVIEW OF NEED FOR EMERGENCY STORAGE

5.1 Storage Sizing

In 2006, the City of East Palo Alto, in conjunction with the City of Menlo Park, completed the Final Feasibility Evaluation of Menlo Park/East Palo Joint Reservoir Facility and Alternative Water Supply. In this evaluation, the two cities investigated the feasibility of a joint use reservoir to serve both East Palo Alto and Menlo Park needs. Through the study, it was determined that a joint reservoir was not feasible, and recommendations were made for storage facilities for the individual cities. Two storage sizing scenarios were prepared for each of the cities. The first scenario was based on a request by the California Department of Public Health (CDPH) that the suburban users of the Hetch-Hetchy system support the reliability of the system by developing plans to provide 8 hours of supply at peak day demand without firefighting reserves. Using this methodology and long-term demand projections at the time of the study, it was determined that a 2.2 million gallon (MG) reservoir would be necessary. The second scenario was based on review of storage of other Bay Area Water Supply and Conservation Association members; this scenario recommended two days of storage at the average summer day demand. Using this methodology, a 10.1 MG reservoir would be necessary to meet projected demands through 2030.

Storage recommendations for East Palo Alto are also presented in the Water System Master Plan. The storage recommendation in the Water System Master Plan is based on providing one day of supply at the peak day demand plus a maximum fire flow of 4,000 gpm over 4 hours. Based on this methodology and an assumed peak day demand of 2,208 gpm, a 4.2 MG reservoir would be necessary to meet current demands. The Water System Master Plan estimates that an additional 1.8 MG would be required to meet future demands associated with the Ravenswood Business District for a total of 6.0 MG of storage.

For this study, CDPH was contacted to obtain an update on the Department's previous request that systems provide 8 hours of supplemental supply. CDPH does not have requirements for local storage but did recommend that 24 hours of supplemental supply would be more appropriate than the previous 8 hours request. This recommendation is based on the goal stated in SFPUC's Water Supply Improvement Program of limiting outages to 24 hours for the majority of customers. The total storage volume required to meet 24 hours of peak day demand is 3.0 MG for current demands and 4.5 MG for long-term demand projections.

Consistent with the Water System Master Plan's recommendation, and also in accordance with DPH's current guidance, it is recommended that the City pursue storage options that will provide 24 hours of peak day demand plus 4 hours of fire flow at 4,000 gpm (960,000 gallons). Under current demand, this equates to a total storage volume of 4.0 MG, and under long-term demand projections, a total storage volume of 5.5 MG would be required.

Table 28 compares the recommended storage sizing with alternatives gathered from past studies and the recent input from CDPH.

5.2 Operational Considerations

In typical water storage tank operations, filling of the tank is controlled by water levels in the tank and the system pressure controls the pumps that discharge to the distribution system. For the City's storage tank flow, additional control strategies will be necessary because the City does not have different pressure zones, meaning the emergency storage tank will pump water into the same pressure zone from which it withdraws water. The control strategy for this type of operation is important to ensure that water from the tank is turned over routinely and is not simply re-circulated in and out of the tank.

For the City's water storage tank, the inlet valve can be operated based on water levels in the tank, but the control strategy should include overrides on the valve to prevent it from opening whenever the tank's booster pumps are operating and whenever there is heavy demand in the immediate service area of the tank. If the booster pumps are operating and the inlet valve is opened, a portion of the pumped water will simply be re-circulated back to the inlet of the tank rather than being pumped into the distribution system. During periods of heavy demand near the storage facility, if the inlet valve is opened, a portion of the flows would be diverted into the tank rather than to the area where the water is required.

The outlet valve will be controlled by discharge pumps that have two different modes of operation – emergency operations and normal operations. The purpose of the storage tank is to provide emergency supply when the SFPUC system cannot deliver water. During emergency conditions, the pumps would operate as needed throughout the day and system pressure would control the operations. During normal operations, the pumps are controlled by the need to turnover water in the tank to maintain water quality. Normal operation will be controlled by the time of day when the water is pumped and by the volume pumped during a given cycle.

It is recommended that the water in the tank be turned over completely every three days. From an economic standpoint, pumping during normal operations would occur ideally during off-peak power hours, which are from 9:30 pm to 8:30 am. For a 1 MG storage tank, the daily discharge volume required to turn over the tank once every three days is 0.33 MG, which equates to an average pump discharge of 500 gpm over an 11 hour period. For a 2 MG storage tank, the daily discharge is 0.67 MG with an average pump discharge of 1,000 gpm over an 11 hour period. For a 5 MG storage tank, the daily discharge is 1.67 MG with an average pump discharge of 2,500 gpm. Under the City's current average day demand of 2.0 mgd, or 1,400 gpm, it would not be possible to limit the discharge from a 5 MG tank to off-peak hours. Determination of the required volume to turn over a 1 MG or 2 MG tank every three days with pumping during daily off-peak periods would require an analysis of the City's water consumption during such periods. A preliminary analysis of the City's diurnal water demand was completed using peaking factors from an AWWA standard diurnal demand curve; diurnal demands are presented in **Table 29**. This analysis estimated a total off-peak demand of 0.46 MG under current average day flows, suggesting that the off-peak demand is only sufficient to provide the off-peak turnover of a 1 MG storage tank.

The pumps need to have a discharge pressure only slightly above the distribution system's maximum static pressure. The system's pressure is controlled by the pressure of the deliveries from the SFPUC turnouts. The City is served by three SFPUC turnouts located at Willow Road, O'Brien Drive and University Avenue. The pressure regulating valves at the turnouts are set at 70 psi at Willow Road and 75 psi at O'Brien Drive and

University Avenue. The design of the booster pump station should include a pressure relief valve that discharges water back to the storage tank. The pressure relief valve would prevent over-pressurizing the distribution system and possibly damaging the City's water distribution system or the plumbing of individual customers.

5.3 Storage Locations

The City's total emergency storage volume can either be distributed throughout the City or stored in one location depending on the size of the sites available to the City and the space required for the storage facilities. Multiple smaller sites would provide more redundancy and would equalize flows better than one large tank; however, the single large tank would be more cost effective. Sites that may be considered by the City range from parcels that are currently owned by the City and other publicly owned parcels to privately owned vacant parcels that can be purchased or occupied parcels that can be purchased and reconfigured.

Sites considered during the preparation of this report are listed in **Table 25**. Two sites stand out as preferred alternatives: the Bay/University site across from 2415 University; and the Newell/101 site on the west side of Highway 101. The benefits of these sites include:

- Existing or proposed city ownership
- Proximity of large diameter lines of the existing water distribution
- Distance from Bay resulting in better soil conditions and greater depth to groundwater
- Location would alleviate existing supply and pressure problems.

The Newell/101 site is the location of the west landing of a proposed Highway 101 pedestrian overcrossing. There is adequate land available for the tank and pedestrian ramp, but carefully planning is necessary to maximize use of this site for multiple purposes.

Conceptual site layouts were prepared for 1 MG, 2 MG and 5 MG above-ground storage facilities; these are presented in **Figures 40** through **42**. Based on these layouts, a 0.4 acre site would be required for 1 MG of storage, 0.5 acres for 2 MG and 0.9 acres for 5 MG.

Because of the high groundwater levels throughout the City and regulations that discourage the construction of reservoirs below maximum anticipated groundwater levels, above-ground storage options should be considered prior to below-ground storage options. If the City determines that conventional above-ground storage options are not viable, DPH may permit the City to construct a tank below the groundwater table. It is anticipated that DPH would require multiple layers of redundancy for this option. Measures that could be implemented to provide the redundancy include encapsulating the entire reservoir in a waterproof material such as a sheet applied membrane surrounding the concrete tank, using a bentonite backfill around the structure, and monitoring for groundwater intrusion. An advantage of constructing a below-ground storage tank is that overhead uses such as parking, ball fields, tennis courts and other recreational spaces can be maintained. A disadvantage of an underground storage tank in areas of high groundwater is the need to design the tank so that is won't float when the water level is lowered during an emergency or maintenance.

A nontraditional above-ground storage option that the City may explore is the co-location of a tank and commercial building space. If the City were to pursue this option, discussions with CDPH would be necessary to understand any special measures that might be required to implement this option. It is anticipated that CDPH would require that the reservoir be waterproof and that the public be kept separated from the tank including overflow and vent structures. Another issue that will need to be considered is the limitations on the height of the tank. The conceptual site layouts and site size requirements that were developed for conventional above-ground storage tanks have heights ranging from 36 to 61 feet. To blend into existing architecture, the height of the tank would likely be limited to 15 to 20 feet; decreasing the height of the tank increases the footprint required for storage tank. If the tank height is limited to 20 feet, a 0.6 acre site would be required for 1 MG of storage, 1.0 acres for 2 MG and 2.1 acres for 5 MG.

An important variable in locating the storage tanks is the underlying soil condition. This is important because of the cost implications of constructing deep foundations. Pile supported systems are typically required for structures constructed around the Bay due to the presence of Bay Mud. Geotechnical information gathered in the Final Feasibility Evaluation of Menlo Park/East Palo Joint Reservoir Facility and Alternative Water Supply suggests that the presence of Bay Mud is limited to the northern and eastern edges of the City outside the areas being considered for storage tank siting. This suggests that a pile system may not be necessary in all locations; nonetheless, additional geotechnical studies should be conducted to confirm this need.

5.4 Storage Tank Material

Above-ground storage tanks can be constructed of concrete or steel. Various design options exist for concrete tanks. They can be pre-stressed concrete or reinforced concrete, and they can be designed with a flat roof slab or a domed structure. Flat roofs are more expensive to install than domed roofs, but are useful in situations where there are height restrictions. Concrete tanks are more expensive to install than steel tanks; however, steel tanks are more expensive to maintain because they must be periodically recoated to prevent corrosion. Because of the aggressive nature of SFPUC water, a steel storage tank for the City of East Palo Alto would require impressed current cathodic protection as an additional corrosion protection measure. Below-ground storage tanks are limited to concrete construction.

5.5 Cost Estimate

Cost will be an important consideration in the type of storage tank utilized by the City. Conceptual cost estimates have been prepared for different storage options. The costs shown in **Table 30** are the estimated project construction and engineering costs for above ground storage tanks. These costs do not include land acquisition, environmental, legal or administrative costs.

Cost estimates have been prepared for different tank sizes – 1 MG, 2 MG and 5 MG – and different tank materials – pre-stressed concrete, reinforced concrete and steel. Because of the potential need for pile supported systems, the cost estimates also include estimate for each tank size and material combination with and without a pile supported system to reflect the potential for deep foundation. Additional cost details are presented in **Table 30**.

6. OVERVIEW OF GOVERNANCE, GROUNDWATER MANAGEMENT, AND FUNDING

This section summarizes governance, management, and funding issues related to City water supply with a focus on groundwater. Recommendations are provided to support the groundwater development and management strategy for supplemental and emergency supply. These recommendations are provided in light of the City's mission: to provide responsive, respectful and efficient public services to enhance the quality of life and safety for its multi-cultural community.

6.1 Groundwater Management

Groundwater management, as defined by DWR, is the planned and coordinated monitoring, operation, and administration of a groundwater basin or portion of a groundwater basin with the goal of long-term sustainability of the resource (DWR, 2003). While most Western states have centralized control of groundwater, the California legislature has repeatedly held that groundwater management is a local responsibility. Three major mechanisms have developed for local management (DWR, 2003): 1) coordinated agreements and ordinances, 2) court adjudications, and 3) management by local agencies under authority granted by state statute. The last includes preparation of a groundwater management plan, especially the AB 3030/SB 1938 management plans that have become the major means of local groundwater management in California.

6.1.1 Agreements and Ordinances

Some water agencies and purveyors have entered into agreements for mutually beneficial management activities (such as joint basin studies, capital projects and operational programs) with cost sharing and joint collection of fees. For example, the non-profit Water Resources Association of San Benito County was formed mutually by the San Benito County Water District, City of Hollister, City of San Juan Bautista and Sunnyslope County Water District to prepare a groundwater management plan; the WRA currently focuses on water conservation. Agreements among local agencies and stakeholder groups can pave the way toward other management processes. For example, the Paso Robles Groundwater Basin Agreement among San Luis Obispo County, the City of Paso Robles and organized landholders has forestalled adjudication, supported groundwater monitoring and reporting, and fostered cooperation toward a recently adopted AB 3030 groundwater management plan. Similarly, the Sacramento Water Forum agreement supported the subsequent development of the joint-powers Sacramento Groundwater Authority (Bachman, et al., 2005). While agreements may prove useful in resolving specific issues, they are difficult to apply as stakeholders change and as management issues become more complex. For example, unanimous and specific agreement among signatories may be needed for each new management function (Bachman, et al., 2005).

Groundwater ordinances have been adopted by some cities and by 27 counties, mostly with the specific intent to limit or prohibit groundwater exports of groundwater. Local governments implementing this type of groundwater management utilize their police power, land use authority and general plan provisions to regulate groundwater pumping in their jurisdiction. Such ordinances typically are narrow—focused solely on regulating groundwater use—and do not support flexible management. Neither San Mateo nor Santa Clara counties has such ordinances. Cities and counties can exercise such police powers and develop AB 3030 management plans (Bachman, 2005).

6.1.2 Adjudication

Adjudication is a management method for groundwater basins that have typically experienced overdraft for a sustained period. Adjudication is the product of a judicial process involving parties in a groundwater basin to determine the nature and quantity of each producer's water rights and share of the basin's perennial yield. The process includes the appointment of a watermaster to oversee the court judgment that specifies how much each of the parties to the decision can extract from the basin. There are 22 final adjudications of groundwater basins in California, mostly in Southern California (DWR website). Most were initiated or completed prior to the passage of AB 3030 in 1992; however, interest in adjudication increased in recent years, with adjudication of the Santa Maria Valley Groundwater Basin in 2008 and ongoing adjudication of the Antelope Valley.

Adjudication can be viewed as providing some certainty by quantifying specific rights for individual producers in the basin. However, the process is time consuming, expensive and complex for the involved parties, and does not result necessarily in rapid resolution of overdraft. With regard to groundwater rights, a municipality (such as East Palo Alto and Menlo Park) typically holds appropriative rights, which are defined by and limited to the historical pumping based on "first-in-time, first-in-right." Appropriative rights are secondary to the overlying rights of property owners; these rights arise from property ownership and are not limited by historical use. Municipalities can exercise overlying rights only insofar as groundwater pumped from a city-owned parcel overlying a groundwater basin is used on that parcel. In the case of adjudication, overlying rights may be defined by reasonable needs and appropriative rights may be extinguished (Bachman, 2005).

6.1.3 Local Management under Authority Granted by State Statute

Many local water agencies are authorized by statute to implement some form of groundwater management. These include a variety of water districts, but not municipalities. Nonetheless, these are useful to recognize, because various water districts are, or may become, water management partners for the City of East Palo Alto. For example, various water districts belong to Bay Area Water Supply and Conservation Agency (BAWSCA, an organization of SFPUC water retailers) and the Regional Water Management Group of the San Francisco Bay Area Integrated Regional Water Management (IRWM) Plan. Santa Clara Valley Water District (SCVWD) is a special act district with expanded broad responsibility for groundwater management, water supply, flood control, water recycling, and environmental stewardship across Santa Clara County. With its groundwater management authority, SCVWD has prepared a Groundwater Management Plan (SCVWD, 2001).

6.1.4 Groundwater Management Plans

In 1992, the State Legislature passed Assembly Bill (AB) 3030 to provide local agencies with increased authority to develop a groundwater management plan (GWMP). AB 3030 (codified in Water Code Section 10750 et seq.) applies to agencies that provide water service, flood control, or water management and overlie part or all of a groundwater basin defined by DWR Bulletin 113. The City of East Palo Alto is eligible as a water provider overlying a portion of the San Mateo Plain subbasin of the Santa Clara Valley Groundwater Basin (DWR Basin No.2-9.03). AB 3030 plans may be developed by an eligible agency overlying a groundwater basin for its service area, but collaboration among overlying agencies and stakeholders is strongly encouraged by the State Legislature and agencies.

AB 3030 provides a systematic procedure to develop a groundwater management plan, including a list of components that may be addressed (e.g., control of saline water intrusion, mitigation of overdraft, wellhead protection, monitoring, replenishment, contamination clean-up, coordination with other agencies) and procedures for public outreach and hearings (Bachman et al., 2005). In 2002, the Legislature modified the Water Code with Senate Bill (SB) 1938. SB 1938 provides local agencies with incentives for improved groundwater management by requiring inclusion of specific elements in a GWMP for an agency to be eligible for certain funding administered by DWR. Required elements include:

- Written documentation to the public describing how they can participate in developing the plan
- Basin management objectives
- Components relating to monitoring and managing groundwater levels, groundwater quality, land subsidence, and changes in surface flow and quality linked to groundwater levels or pumping
- A plan to involve other agencies overlying the basin to work cooperatively
- Adoption of monitoring protocols
- A map showing the area of the groundwater basin as defined by DWR with the area of the plan and the boundaries of other local agencies overlying the basin

Step-by-step development of an AB 3030 GWMP is well documented (DWR, 2003; Bachman, 2005; DWR online at http://www.water.ca.gov/groundwater/gwmanagement/ab_3030.cfm). Moreover, numerous and various examples exist across California. As of 2003, more than 200 agencies had adopted an AB 3030 GWMP (DWR, 2003). The California Water Plan Update currently in preparation will likely document many updated and additional GWMPs.

6.1.5 California Statewide Groundwater Elevation Monitoring Program (CASGEM)

In 2009, the State Legislature amended the Water Code with SBx7- 6, which mandates a statewide groundwater elevation monitoring program to track seasonal and long-term trends in groundwater elevations in all of California's designated groundwater basins. To that end, the amendment requires collaboration between local monitoring entities and DWR to collect groundwater elevation data. In accordance with the amendment, DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) program (see DWR CASGEM websitehttp://www.water.ca.gov/groundwater/casgem/). The intent of CASGEM is to establish a permanent, locally-managed program of regular and systematic monitoring in all of California's designated groundwater basins (per DWR Bulletin 118). The CASGEM program was designed to rely and build on established local groundwater monitoring and management programs.

The law requests the voluntary participation of local entities in monitoring groundwater elevations. A hierarchy of local entities eligible to be Monitoring Entities was included in the legislation. In order of priority these are:

- Watermaster in an adjudicated basin
- Groundwater management agency
- Water replenishment district
- Local agency or county that is managing all or part of a groundwater basin pursuant to an AB 3030 plan
- Local agency that is managing all or part of a groundwater basin pursuant to an IRWM Plan

- A county that is not managing all or part of a groundwater basin pursuant to an AB 3030 plan or substantive equivalent
- Voluntary cooperative groundwater monitoring association formed pursuant to Section 10935 of the Water Code

The inclusion in the priority list of a county that is not managing groundwater ensures that all groundwater basins in California are addressed. Subsequent legislation (AB 1152) recognizes that some groundwater basins (e.g., in the Mojave Desert) are not developed and/or not accessible for monitoring and provides for alternative monitoring. Assembly Bill 1152 also permits local agencies that have been collecting and reporting groundwater elevations but do not have an adopted groundwater management plan to become Monitoring Entities on an interim basis. Under this new provision, each agency will be required to adopt an AB 3030 groundwater management plan to maintain its authorization to serve as a Monitoring Entity.

As of 2012, DWR has prepared online lists of designated and conditionally designated monitoring entities. No known entity has volunteered for or been designated as the monitoring entity for the San Mateo Plain subbasin of the Santa Clara Valley Groundwater Basin (DWR Basin No.2-9.03). Locally, SCVWD is the conditionally designated monitoring entity for the Santa Clara Valley subbasin (No. 2-9.02) and the SFPUC is the monitoring entity for the Westside Basin (No. 2-35 in San Francisco and San Mateo counties) among others. In San Mateo County, only the Half Moon Bay groundwater basin has designated monitoring entities, both of which are local water districts. At time of writing, ten counties (Butte, Colusa, Shasta, Siskiyou, Mono, Sonoma, Napa, Marin, Santa Cruz, and Ventura, not including county-wide water districts) were listed; some of these through environmental health departments, planning departments, and water conservation or watershed protection districts.

The law required local entities interested in becoming Monitoring Entities to notify DWR in writing by January 1, 2011. However, it is clear that many basins remain without designated monitoring entities and late notifications would be handled by DWR. If local parties do not volunteer to perform the groundwater monitoring functions, DWR will attempt to contact all well owners in the area and determine if there is interest in establishing a GWMP, IRWM plan or voluntary groundwater monitoring association. If so, DWR will provide organizational assistance for up to two years to the party seeking to qualify as a Monitoring Entity. If these efforts fail and DWR eventually assumes the monitoring functions, then all the potential Monitoring Entities within the county become ineligible for water grants or loans from the state.

Implementation of the CASGEM process begins with application to be the monitoring entity; this application is reviewed by DWR. Upon approval, the Monitoring Entity must prepare and submit a Monitoring Plan. Minimum requirements of the Monitoring Plan include monitoring locations, timing of measurements, field methods, and data reporting. The Monitoring Plans are reviewed by DWR; upon acceptance, the Monitoring Entity can begin monitoring groundwater elevations.

CASGEM Monitoring Plans are built on existing groundwater monitoring programs; the most significant problem often is the identification of an adequate number of suitable wells. The location and construction details of all wells in the Monitoring Plan must be submitted to DWR and these details will be made publically available via the internet; this raises confidentiality and security issues. A database of well locations and monitoring details must be prepared with all the required information to comply with CASGEM. Subsequently, monitoring will be conducted at least twice a year with semi-annual upload to the CASGEM web portal.

6.1.6 Local Groundwater Basin Development and Management

As context for considering the City's groundwater management and governance options, this section briefly summarizes local groundwater basin development and management. The intent is not to explain the roles and responsibilities of all the various involved Federal, State and local agencies; such documentation is more appropriate for a GWMP. Rather, the intent is to identify agencies and organizations that are involved in local groundwater development or may become active partners in developing and adopting a GWMP.

Groundwater Subbasin Definition. In considering groundwater basin management, the first step is to define the basin or subbasin. The City of East Palo Alto overlies a portion of the Santa Clara Valley Groundwater Basin (DWR, August 1967). As defined by DWR, this basin includes not only the Santa Clara Valley but also the East Bay Plain and bay plain portions of San Mateo County. Within this large area, local subbasins are defined differently by DWR and by USGS. DWR defines the San Mateo subbasin (DWR Basin No.2-9.03) completely within San Mateo County: bounded on the east and west by the Coast Ranges and San Francisco Bay respectively, and by the Westside Basin on the north (in Burlingame) and San Francisquito Creek and Santa Clara subbasin (No. 2-9.02) on the south. USGS identifies the San Francisquito Creek Groundwater Subbasin (Metzger, 2002), which corresponds to the alluvial fan of San Francisquito Creek and underlies portions of San Mateo and Santa Clara counties, including southern Redwood City, Atherton, Menlo Park, East Palo Alto and northern Palo Alto. The USGS San Francisquito definition, based on hydrogeology, is very appropriate for understanding the physical setting and for managing a single, unified groundwater resource. The DWR definition effectively recognizes the San Mateo-Santa Clara county boundary as significant in defining jurisdictional boundaries to be bridged through regional planning.

San Mateo County. San Mateo County has two departments with direct relevance to groundwater management. The Environmental Health division of the **San Mateo County Health System** (see website at http://smchealth.org/) conducts a Groundwater Protection Program with the goal of protecting underground water supplies and surface waters, such as the creeks, streams, ocean and the Bay, from chemical pollution. Staff members oversee clean-up of pollution caused by leaking underground tanks and chemical spills. The Groundwater Protection Program also administers and issues permits for construction and destruction of all wells including monitoring wells, agricultural wells, and community water supply wells. For the Westside Basin, San Mateo County previously maintained a semiannual groundwater monitoring program that included static water level and water quality monitoring from 2000 through 2003 (WRIME, 2012).

The **San Mateo County Department of Public Works** advises the Board of Supervisors on all public works issues, and plans, designs, constructs, operates, and maintains facilities and equipment. Public Works includes the Engineering and Resource Protection Division, which in turn consists of five sections: Project Development, Design and Construction Management, Flood Control and Utilities, Transportation Services, and Waste and Environmental Management (see http://www.co.sanmateo.ca.us/portal/site/publicworks).

The San Mateo County Flood Control District is a Countywide Special District that was created by State legislation to finance flood control projects. It has three active flood control zones; one of these is the San Francisquito Creek Flood Control Zone, which finances creek improvements in cooperation with the Santa Clara County Water District. The Zone's source of revenue is property taxes, which are limited by Article XIII of the State Constitution. The Creek overtopped its banks in 1998 and flooded portions of the Cities of Palo Alto, East Palo Alto and Menlo Park. The San Francisquito Creek Joint Powers Authority (SFCJPA) was created as a result to develop solutions to the flooding problem and provide for a coordinated approach to planning in the

San Francisquito Creek Watershed. The SFCJPA members include the cities of Palo Alto, East Palo Alto, Menlo Park and the Santa Clara Valley Water District and San Mateo County Flood Control District. Stanford University and the San Francisquito Creek Watershed Council are Associate Members. While the SFCJPA does not address groundwater, it is an example of multi-jurisdictional collaboration.

City of Menlo Park. The City of Menlo Park services are organized through seven main departments (including Finance, Library, Police, etc.). The Engineering, Maintenance, Transportation, and Environmental sections are a part of the Public Works Department, while Building, Planning, and Housing and Redevelopment services and projects are part of the Community Development Department.

Similar to the City of East Palo Alto, Menlo Park has relied on SFPUC water supply. Since 2002, Menlo Park has been investigating the potential for groundwater development as a supplemental or emergency supply. The goal of the Emergency Water Supply Project is to improve water supply reliability to the Menlo Park Municipal Water District's eastern service area to ensure that firefighting and basic potable supply needs can be met following a major earthquake or other emergency.

The project's specific objectives are to:

- design and construct up to 3 emergency wells in the eastern service area as a backup to the SFPUC Hetch Hetchy system; and
- provide at least 3,000 gallons per minute (gpm) of emergency back-up water supply that meets state and federal drinking water standards.

If feasible, the project may also provide a source of non-potable irrigation water by converting test wells to long-term irrigation use (IEC, 2011).

Recently, seven sites were identified as most promising (Gnesa and Buising, 2011). In January 2012, an exploratory boring was drilled at the Willow Road Site on the northwest corner of Willow Road and Highway 101 (actually located in East Palo Alto). Menlo Park is also considering installation of an irrigation well at Nealon Park to offset Sharon Heights Golf and Country Club water supply. The well would reduce the City's overall demand and provide a potential irrigation source for other nearby parks.

California Water Service Company. The Bear Gulch District of the California Water Service Company (Cal Water) is located in southern San Mateo County, and serves the communities of Atherton, Portola Valley, Woodside, parts of Menlo Park, and adjacent unincorporated portions of San Mateo County including: West Menlo Park, Ladera, North Fair Oaks, and Menlo Oaks. The Bear Gulch District receives 85 percent to 95 percent of its daily supply from the SFPUC, with the balance supplied by surface water runoff from California Water Service Company's watershed. The water is stored in the Bear Gulch Reservoir and treated before distribution (BAWSCA 2012). Cal Water has no production wells in the Bear Gulch District and, given local hydrogeology, does not consider groundwater as a significant future supply for its Bear Gulch system (Cal Water 2011).

Nonetheless, groundwater resources have been developed for private use, predominantly residential landscape irrigation with some institutional landscape irrigation. The USGS performed a comprehensive survey of wells in the Town of Atherton and identified at least 278 likely active wells as of 1993-1995 (Metzger and Fio, 1997). The wells are widely distributed, with the residential pumping averaging 26 gpm while institutional pumping averaged 130 gpm. Metzger and Fio estimated that the total pumping from these wells at approximately 710 AFY.

City of Palo Alto. The City of Palo Alto maintains seven wells for emergency standby supply and is planning to drill one additional well (Palo Alto, 2006). Wells were last used in the drought of 1987-1991(Carollo, 2003). It has been estimated that the wells could produce 500 AFY on a continuous basis or 1,500 AFY on an intermittent basis without causing excessive declines in groundwater levels (Carollo, 2003). (Additional information on Palo Alto is provided in the next section.)

Stanford University. Stanford has four sources of water supply: purchased potable water from the SFPUC, groundwater, non-potable surface water from the local watershed, and recycled water. There are four wells located on Stanford property that could be used in an emergency. Three of the wells are in compliance with all drinking water standards, while the fourth well is on standby because of high manganese levels. Stanford's landscaping system relies on a non-potable lake water system that supplies about 80 percent of its irrigation needs, which is supplemented by groundwater. Stanford University currently uses groundwater for irrigation totaling 342 AFY (BAWSCA, May 2011).The operations of two nearby municipal water systems are also documented and their operations are compared with that of the City of East Palo Alto. The two water systems evaluated in addition to the City of East Palo Alto are the City of Palo Alto and the City of San Bruno. The budgets and staffing requirements of these two cities are presented and then compared to those for East Palo Alto. The monthly water rates and connection fees for single family residences are presented in this section and the complete rate schedules are included in **Appendix H**.

6.2 Governance

This section summarizes potential governance alternatives for the City, and provides two case studies of nearby Peninsula municipalities, the Cities of San Bruno and Palo Alto, who operate groundwater supply systems. The fundamental difference between the Cities of San Bruno and Palo Alto and the City of East Palo Alto is that East Palo Alto contracts system operation to American Water Enterprise (AWE) while Palo Alto and San Bruno both manage, operate, and maintain their own water systems.

6.2.1 San Bruno

The City of San Bruno obtains most of its water from the San Francisco Public Utilities Commission (SFPUC). However, San Bruno has five municipal water wells that supplement and require treatment for iron and manganese removal. In addition to these well sources of supply, San Bruno has 13 pressure zones served by eight water tanks located at six sites and various pump stations. According to San Bruno's 2011 Urban Water Management Plan Update, the customers are distributed as shown in **Table 31**.

San Bruno's Water Enterprise Account is separated in two divisions, the Water Supply Division and the Water Distribution Division. Estimated revenue for the Fiscal Year (FY) 2012-2013 budget is as follows:

- Operating revenue $11,067,000
- Capacity Charges $30,000
- Interest income $55,000
- TOTAL $11,152,000

Estimated expenses for FY 2012-13 by division are presented in **Table 32**.

With respect to staffing, the City of San Bruno assigns staff in terms of Full Time Equivalents (FTE) to the two divisions. In addition certain administrative staff, such as the Public Services Director, has a portion of their time assigned to Water Supply and/or Water Distribution. **Table 33** shows the staffing in terms of FTEs for the Water Enterprise.

The monthly charge for a single family home in San Bruno with a 1-inch meter is $21.85 + $5.06 per unit of water used. The quantity charge increases from $5.06 for the first 10 units (7480 gallons) used to $8.10 for all usage greater than 20 units (14,960 gallons). For a typical family of four that uses 70 gallons per person per day the total monthly volume will be 8,400 gallons and the associated charge is $21.85 + 10 x $5.06 + 1.23 x $6.07 = $79.92. Therefore, the annual charge is $959. This is for in-house use only. Outside water used for lawn irrigation will increase the annual cost significantly. The connection fee for a single family house using a 1-inch meter is $9,400. For a ⅝ x ¾ meter, the charge drops to $5,000.

6.2.2 Palo Alto

Currently, the City of Palo Alto obtains all of their water from the SFPUC. However they are in the process of drilling several emergency wells. The City is divided into 9 pressure zones served by six reservoirs and seven booster pumping stations. A new reservoir is being constructed at the Mayfield Pump Station site and that pump station is also undergoing renovations. According to the City's 2011 Urban Water Management Plan Update, the City's customers are distributed as shown in **Table 34**.

The City of Palo Alto Utilities department provides gas, electric, water, and sewer service to the residents of Palo Alto. Each utility is a separate enterprise fund. Estimated revenue for the Water Enterprise Fund for FY 2012-2013 is as follows:

- Sale of Water $34,446,000
- Interest Income $749,000
- Other income $3,392,000
- Transfer From Reserves $1,655,000
- TOTAL $40,292,000

Estimated expenses for the Palo Alto Water Department are presented in **Table 35**. Staffing for the Palo Alto Water Department is shown in **Table 36**.

For a typical family of four in Palo Alto, the charge for in-house water usage (non-irrigation usage) is $27.35 + $4.54 for first 6 units (4,644 gallons) and $7.06 for each unit above 6. Therefore, the monthly charge for 8,400 gallons is $27.35 + 6 x $4.54 + 8.23 x $7.06 = $112.69. For one year, exclusive of irrigation water the charge is $1,352. The connection fee for a new 1-inch meter for a single family residence is $3,797.

6.2.3 East Palo Alto

The City of East Palo Alto obtains all of its water from the SFPUC. There is a single pressure zone in East Palo Alto and there are no storage facilities or booster pumps in the system. According to the City's 2011 Urban Water Management Plan Update, the City's customers are distributed as shown in **Table 37**.

The City of East Palo Alto operates its water system in a fundamentally different manner than their neighboring sites. Most neighboring cities operate and maintain their water systems using city staff. East Palo Alto contracts these services out to American Water Enterprise (AWE). AWE has a 25 year lease for system operation and maintenance that began on May 22, 2001. According to terms of this lease, AWE pays East Palo Alto a lease payment of 6 percent of gross revenue and a franchise fee of 5 percent of gross revenue. In addition, East Palo Alto levies a utility tax of 5 percent on all water bills.

For the year ending December 12, 2012, total revenue generated was $4,181,156. The expenses for this period of $3,885,165 are shown in **Table 38**. This results in an annual operating income of $295,521. However, AWE as a for-profit corporation, must pay income tax which decreases the net income.

As part of their lease agreement, AWE provides the following staff as shown in **Table 39**. In addition to this staff, additional HR, training, and safety staff are provided from AWE's corporate offices.

For a typical family of four in East Palo Alto, the charge for in-house water usage (non-irrigation usage) is $13.73 + $3.82 per ccf. This is subject to a 5 percent utility tax. Therefore the monthly charge for 8,400 gallons is 1.05 x ($13.73 + $3.82 x 11.23) = $59.46. This is equivalent to $677.52 annually, exclusive of irrigation water. The connection fee for a new 1-inch meter is $1510 for an existing parcel and $3610 for a new parcel. This fee includes the meter cost, account setup cost, plan review fee and inspection costs.

Relative to nearby municipalities, current City staffing levels to operate, maintain and improve water facilities are significantly lower on a per capita basis; this suggests inadequate staffing. Inadequate staffing in key areas can lead to long periods of deferred maintenance. This in turn typically leads to significant escalation of costs to repair and replace existing water systems simply to maintain current operational capacities, without considering development of new capacity. Deferred maintenance also entails increased risk of unexpected system failures, with adverse ramifications for public health and safety.

The City should be cognizant of the risks associated with deferred maintenance and should evaluate current staffing levels relative to 1) needed improvements to maintain and operate existing water facilities and 2) proposed new systems to supplement and increase water supply. Additional costs stemming from inadequate maintenance, operation, and replacement are not evaluated in this study.

6.3 Funding

Potential funding for the proposed water treatment facility includes:

- State and Federal loans and grants
- Conventional municipal bonds
- Self-financing

Funding can be provided from a combination of these sources to develop an overall financial plan.

6.3.1 State and Federal Loans and Grants

Direct Federal loans and grants are extremely limited and will not be discussed. East Palo Alto may be eligible for programs due to its disadvantaged community status. However, no specific programs have been identified at this time. There are several loan and grant programs that may be available to East Palo Alto for the Gloria Way Well Project which are:

- California Department of Public Health (CDPH) Safe Drinking Water State Revolving Fund (SDWSRF) loan program which is focused on high public health risk problems
- California Infrastructure and Economic Development Bank (I- Bank), Infrastructure State Revolving Fund (ISRF) Program
- California Department of Water Resources (DWR) Integrated Regional Water Management (IRWM) Plan grant funding from Proposition 84

Other grant/loan programs may become available periodically as state water bonds are passed. Examples include the Local Groundwater Assistance Act (LGA), American Recovery and Reinvestment Act (ARRA), and Proposition 50, which have terminated or are near completion.

The SDWSRF is partly funded by US EPA and partly by the State of California, with administration by the State. These funding sources enable funding to be provided to governmental agencies at a lower interest rate than is available through conventional bond financing and have more favorable debt covenants and repayment schedules. The Gloria Way Well Project is an eligible project under the SDWSRF in accordance with project eligibility found in **Appendix H**. However, the City needs to document water system inadequacy in order to rank high on the priority list for funding. It may be possible to describe the Gloria Way Well Project as a:

> "Water system with water outages, significant water quantity problems caused by source water capacity, or water delivery capability that is insufficient to supply current demand."

If described in this manner, the project could qualify as a Category E project in accordance with CDPH priorities found in Attachment A of **Appendix H**. Otherwise, it will likely be a Category O project and is not likely to rise high enough on the priority list to be eligible for funding. Category E is possible if the City can meet the mandatory documentation requirements indicative of insufficient supply.

In addition, portions of East Palo Alto qualify as a Disadvantaged Community (DAC) which would allow an eligible project to qualify for a zero interest loan for up to 30 years. If non DAC, the loan rate is 50 percent of the average interest rate by the State on general obligation bonds issued in the prior year for a maximum of 20 years of project useful life. The 2012 loan rate is 2.0933 percent until December 31, 2012. In either case, the maximum project loan is $20,000,000.

Similar to the SDWSRF Loan program, the California I-bank ISRF loan program targets general infrastructure projects with local economic benefit. One of the differences is that a project does not have to be screened for project eligibility category. Eligible project categories include streets/highways/transit, drainage, water supply and flood control, educational, parks and recreational facilities, sewage collection and treatment, and water treatment and distribution. ISRF Program funding is available in amounts ranging from $250,000 to $10,000,000, with loan terms of up to 30 years. Interest rates are set on a monthly basis and September 2012 rates were 2.03 percent for a 20 year loan and 2.32 percent for a 30 year loan. The loans require a completion of a preliminary application, and if accepted a more detailed financing application. Processing times can be on the order of 6 – 9 months from filing of the preliminary application to completed loan agreement.

Both Propositions 50 and 84 fund grants are available under the IRWM program for a range of multi-benefit, integrated projects. Eligibility for the IRWM program implementation funding required that the Gloria Way Well Project be submitted to the Bay Area IRWM by September 7, 2012 for inclusion in the 2013 IRWM Plan update. Once the project is accepted into the Bay Area IRWM Plan, then it would also have to be accepted as part of an Implementation Grant application. The Round 2 Implementation Grant is likely to be due in March 2013 and requires extensive documentation regarding the benefits of the project as well as a quantified economic benefits analysis. Like the SDWSRF, critical drinking water or water quality projects that benefit DAC projects can be eligible for a waiver of the minimum 25 percent funding match. The Bay Area IRWM Region is expected to compete for about $20 million in the upcoming Round 2 and then over $70 million in Round 3 which is expected in 2014.

Annual repayment costs are a function of the loan interest rate and repayment period. For the various State loan programs identified, the annual repayment for a $2,000,000 for varying interest rates and repayment periods is as follows:

- 20 years at 2.03 percent -- $121,750 annually
- 30 years at 2.32 percent -- $92,600 annually
- 20 years at 2.0933 percent -- 122,500 annually

6.3.2 Conventional Bond Financing

If the City opts to borrow the cost of the well project, instead of using reserves, then several financing approaches are available, either using the general fund or the water enterprise fund as the source of repayment. The traditional general fund borrowing approach entails a lease-based financing where the City pledges a capital asset in a lease (an unencumbered building or the well itself) and makes a pledge to budget and appropriate funds for payments over the life of the lease. The lease is then either placed with a financial institution or sold to investors in the form of lease revenue bonds or certificates of participation. In making the lease payments, the City could, in turn, look to the enterprise fund to reimburse the general fund. Generally, however, cities do not finance water enterprise projects through their general funds as this burden is more appropriately placed on the enterprise, which has its own means of paying for improvements.

Water enterprise-based financing typically involves a pledge of system revenues to investors. The revenue pledge or "rate covenant" involves a promise to maintain water system revenues, less operating and maintenance expenses (but excluding depreciation), in an amount sufficient to pay for annual debt service plus "coverage." This coverage allowance provides investors with a buffer if water revenues drop or operating expenses rise and is typically set at 25 percent, but can be higher or lower depending on the nature of the issuer. For an issuer with a 25 percent coverage pledge, annual debt service of $1 million would require a rate structure producing $1.25 million after operating expenses. Should revenues prove insufficient to meet this pledge, the borrowing documents obligate the issuer to process a rate increase to satisfy its obligations.

Given this basic financing approach, the borrowing program itself can be structured as a sale of water revenue bonds to investors, as a direct placement to a bank, or as a state revolving fund loan. While the packaging for each approach varies, the underlying rate covenant will remain relatively consistent. Each approach entails different levels of paperwork, financing timelines, repayment periods and borrowing costs. A state revolving fund loan will carry the lowest borrowing cost, but will take the longest time to process and carries the uncertainty of the actual availability of funds. A placement to a bank may be executed quickly, but banks typically do not lend beyond 15 years and will likely want to assume additional banking services for the City, like cash management. A conventional water revenue bond can be set with a 30 year term, but financing expenses may be relatively high for the well project given the relatively small financing need.

To provide a rough sense of costs, **Table 40** provides an indication of repayment amounts for water revenue bonds with 20 and 30 year final maturities and an assumed “BBB” investment grade rating.

Bonds may present additional challenges and loans may be preferred. The City should conduct additional financial analyses prior to procuring any financing for water system improvements.

6.3.3 Self-Financing

Self-Financing or pay-as-you-go financing involves raising rates in anticipation of a project, setting the money aside in an interest bearing account, and letting the funds accumulate until adequate cash is available to fund the project.

In a previous section, it was noted that a $2,000,000 project funded over 30 years would require a rate increase of $176,986 exclusive of operation and maintenance costs for 30 years. Assuming that $176,986 was placed annually in a State of California Local Agency Investment Fund earning 0.4 percent, a total of $3,692,223 would accumulate in 20 years. The funds would have to be set aside for this long period as the project costs would increase due to inflation. Assuming a 3 percent inflation rate, a $2,000,000 project would cost $3,612,222 in 20 years.

Pay-as-you-go is not practical for a project needed in the short-term unless significant reserve funds already exist.

6.3.4 Impacts on Rate Payers

Total current revenue is $4,181,156, which balances out expenses. This revenue does not generate any reserves. As shown in **Table 24**, the operating expenses for the Gloria Way facility are estimated as $173,500. Assuming that low-interest State backed bonds can be obtained for a $2,000,000 project, then the bond repayment charges would be equal to approximately $120,000 annually. Therefore the incremental increase in expenses is $293,500. This needs to be increased by 11 percent to cover the lease payment and franchise fee included in system expenses, resulting in an expense increase of approximately $325,785 or 7.8 percent. This needs to be increased by an additional 5 percent to account for the City’s utility tax. Therefore customers would see an increase in their monthly charges of 8.2 percent. This assumes that monthly service charge and the commodity (or usage) charge are both increased by the same percentage.

A typical residential customer would see their charge for 8400 gallons of water increase from $59.46 to $64.21 per month. It is to be noted that this monthly charge is for in-house water only and exterior water usage can increase this monthly charge significantly.

7. Recommendations

The following summarizes recommendations for next steps in developing the City's groundwater supply. These recommendations—regarding groundwater management, monitoring, construction of a new treatment system for the Gloria Way Well, development of a second well system in the City, funding, and emergency storage—are presented in recommended order of implementation. In this way, groundwater production can be funded and managed in a manner that is economical and sustainable.

7.1 Groundwater Management

It is recommended that the City engage the neighboring municipalities and counties in development of a cooperative Groundwater Management Plan (GWMP) for the groundwater subbasin. Given the planned groundwater production by the City and by neighboring municipalities, the management plan should include a basin-wide groundwater monitoring program with monitoring of wells both within the City and in neighboring cities. This will involve identification of an appropriate management area, likely based on the DWR Bulletin 118 definition of the San Mateo County Plain, but potentially including hydrogeologically connected areas within the San Francisquito Cone in Santa Clara County. Development of the GWMP should be performed in accordance with AB 3030/SB 1938 guidance, which will allow the City and partners to obtain local groundwater assistance grants (if the grant program is continued in the future). The GWMP could also include memorializing future pumping plans as compared with basin sustainable yield and identification of programs and projects to mitigate potential long-term impacts. Preparation of a GWMP should also be accompanied by planning for and implementation of a local CASGEM program.

7.2 Groundwater Monitoring

Monitoring of groundwater flow and water quality conditions is critical in assessing both initial water level and quality conditions (specifically the current three-dimensional distribution of water quality, including the location of the saline water front) and the aquifer system response to pumping. It is recommended that the City immediately begin evaluating and designing a sentinel well system and monitoring program, using existing wells where possible and properly constructed wells and piezometers. The monitoring program should include a three-dimensional network of wells at appropriate locations and completed at multiple depth intervals. It is possible that a few of the existing wells identified in **Appendix B** may be appropriately located and modified for use as monitoring points. These existing wells should be further evaluated for accessibility and construction, and if appropriate, included in the monitoring well network. It is likely that additional new nested monitoring wells will be required for a comprehensive monitoring network. The monitoring program and network design should be optimized by a competent hydrogeologist knowledgeable of local subsurface conditions and project issues. A routine sampling and data analysis program with relatively frequent (initially quarterly) monitoring should be implemented as soon as possible in order to establish baseline conditions.

7.3 Predictive Modeling of Saline Water Intrusion and Subsidence

Further predictive analysis of the effects of pumping by the City and other groundwater subbasin users should be performed. The preliminary groundwater flow model constructed for this analysis should be expanded to three dimensions, and enabled to simulate dynamic groundwater flow over time and to account for variable aquifer hydraulic properties, variations in natural recharge rates, and current and planned pumping from different well depths. The current distribution of saline water should be determined and particle-track modeling and potentially solute transport modeling should be coupled with the three-dimensional flow model. Using this improved predictive tool, assessment of the risks of impacts under various current and future pumping scenarios can be better quantified.

Similarly, prediction of potential land subsidence should be performed using geotechnical soil compaction models. Using the estimates of drawdown in space and time developed with the groundwater flow model, soil consolidation modeling can be performed to estimate the amounts, rates and distributions of potential land subsidence.

Groundwater monitoring and these additional modeling analyses could potentially be performed with the support of and in conjunction with the other municipalities (and counties). Because additional groundwater production is proposed or planned by neighboring municipalities, the same potential impacts could occur due to their expanded groundwater production. The City should begin discussions with the municipalities and Agencies to plan collaborative monitoring and evaluations (see Groundwater Management recommendations, below).

7.4 Gloria Way Well

The Gloria Way Well presents an opportunity for relatively low cost water supply that can be implemented in the near future. Accordingly, it is recommended that the City proceed with design and construction of the Gloria Way Well treatment system. Recognizing the risk of both saline water intrusion and land subsidence (and potential impacts to other existing wells), it is recommended that operation of the Gloria Way Well system be implemented in a manner that minimizes this risk. Specifically, initial pumping for augmented supply should be conducted at relatively low flow rates (less than the 300 gpm capacity of the well) to manage drawdown and associated risks. The pumping rate can be increased subsequently as operational and monitoring data are acquired. Construction of the treatment system and limited initial operation of the Gloria Way Well will provide the City with a functional emergency supply in the near future, and a potential long-term supply to meet part of the projected future deficit if adverse impacts are not observed during monitoring.

Planning and phasing of these tasks can allow the City to begin limited operation of the Gloria Way Well with minimized risk of adverse impacts, while collecting the additional information needed for predictive analyses of potential long-term impacts.

7.5 Other Potential City Groundwater Supply Sources

Groundwater production at Pad D or another new well site near the southern boundary of the City appears feasible and potentially can provide the City with better quality groundwater at higher rates with relatively less risk of impacts than the Gloria Way Well. Implementation of a second well system in addition to the Gloria Way Well also could provide the same amount of groundwater for augmented supply, with less risk of adverse impacts. Distribution of pumping at these different locations could result in less drawdown and potential for intrusion or subsidence than from operation of Gloria Way alone.

However, planning and design of a new well system will require more time to implement, and at a higher cost than the Gloria Way Well system. Property access will be required, and a preliminary hydrogeologic site investigation and testing program should be performed, followed by installation of the production well. If funding is available for initial site testing, it is recommended that the City proceed with the hydrogeologic investigation of Pad D or alternative new well sites. The hydrogeologic investigation should include drilling of a deep test boring and depth-discrete flow and water quality testing, perhaps via installation and testing of nested test wells.

7.6 Storage Sites

The City should develop one day of storage (6 million gallons) as identified in the Water System Master Plan. A more detailed study should be undertaken to identify potential locations and evaluate the feasibility of locating storage facilities. Identification of potential locations for facilities should initially focus on available undeveloped properties; sites in the south portion of the City are preferred because these are close to relatively large mains and minimize substantial foundation construction costs associated with bay muds. Smaller decentralized storage facilities distributed around the City may be more useful to provide redundancy in case of emergency and more localized supplies in case of disruptions to distribution systems. However, cost should be considered, and fewer larger facilities can provide some cost benefits.

Two potential locations initially identified as potential candidates for additional review would be a undeveloped parcel at the corner of Newell Road and West Bayshore Road, and a large parcel at the corner of University Avenue and Bay Road. A more detailed site specific feasibility study should be undertaken prior to proceeding forward with plans for storage facilities to be located at these sites. Other candidate sites may exist, and future studies should be undertaken to identify and evaluate the feasibility of such sites for storage facilities, as needed.

7.7 Governance and Funding

The periodic review clause of the contract recurs on five year intervals, with the next interval occurring in 2016. At this time the City may exercise an option to end their contract with American Water Enterprises if so desired. Prior to future periodic review periods, additional study of governance options should be performed in light of apparent low staffing levels. However, based on our review of the current governance and water costs and rate structures for the City's water system operation, and comparison with the rates and services of neighboring water departments, it is recommended that in the near term, the City continue to contract water system operations to American Water Enterprises.

Funding for this project will be accomplished using available grants, loans, and reserves. It is unlikely that 100 percent grant funding can be obtained and it appears that the City does not have adequate reserves. Therefore low-interest loans will be required. The City needs to identify what grant funds are available and proceed to obtain loans for the remaining costs.

7.8 Estimated Costs of Recommendations

The estimated capitol costs to implement these recommendations are summarized below. Note that additional operations and maintenance costs also will be incurred.

- Groundwater Management Plan and Improved Model: $250,000
- Groundwater Monitoring Plan and Monitoring Well System: $350,000
- Gloria Way Well Rehabilitation: $2,000,000
- Pad D New Well System: $3,400,000
- Additional Water Storage Site Evaluation and Feasibility Analysis: $200,000
- Storage Tanks (Two 2MG Tanks): $10,000,000

8. References

Bawden, G.W., Sneed, M., Stork, S.V., and Galloway, D.L., 2003, Measuring Human-Induced Land Subsidence from Space: US Geological Survey Fact Sheet 069-03, 4 p.

Bay Area Water Supply & Conservation Agency (BAWSCA), May 2011, *Annual Survey, FUY 2009-10.*

Bohley/Maley Associates, December 16, 1993, Irrigation Well Report for Pacific Shores Center.

Borchers, J., Galloway, D., Phipps, H., and Thomas, A., 1999, Land Subsidence – An Often Overlooked Consequence of Our Water-Use Practices: Subsidence Monitoring and Management Considerations: HydroVisions, v. 8, n2, pp. 1, 4-5 and 8.

Brown and Caldwell, April 1998, Water System Master Plan, County of San Mateo, East Palo Alto Waterworks District.

California Department of Water Resources (DWR), California's Groundwater, Update 1975, Bulletin No.118: http://www.water.ca.gov/groundwater/bulletin118/history.cfm

California Department of Water Resources (DWR), 2003, California's Groundwater, Update 2003, Bulletin No.118, October: http://www.water.ca.gov/groundwater/bulletin118/update2003.cfm.

California Department of Toxic Substances Control, 2012. EnviroStor Database of Cleanup Sites or Hazardous Waste Facilities. http://www.envirostor.dtsc.ca.gov/public/

California Regional Water Quality Control Board, San Francisco Bay Region (SFRWQCB), The Groundwater Committee, in cooperation with Alameda County Water District, Santa Clara Valley Water District, and San Mateo county Environmental Health Services Division, May 2003, *A Comprehensive Groundwater Protection Evaluation for the South San Francisco Bay Region.*

California Regional Water Quality Control Board, San Francisco Bay Region, November 2003, *http://www.swrcb.ca.gov/rwqcb2*, List of Spills, Leaks, Investigations, and Cleanup Program Sites, List of MtBE Sites.

California State Water Resources Control Board, 2012. Geotracker database of regulated facilities in California. http://geotracker.waterboards.ca.gov/

Carollo Engineers, September 2001, City of Palo Alto Alternative Emergency Water Supply Options Study.

CDM, May 27, 2010, *Long-Term Reliable Water Supply Strategy Phase I Scoping Report,* prepared for Bay Area Water Supply & Conservation Agency.

Charlton International, August 14, 1996, Preliminary Review and Discussion of the Hydraulic Relationship Between the Deep and Shallow Aquifers, Atherton, Menlo Park, and East Palo Alto Study Area, San Mateo County, California, letter to Raychem Corporation.

CH2MHill, July 1992, Santa Clara Valley Groundwater Model Project, Hydrogeologic Interpretation.

City of Palo Alto Utilities Department, June 4, 2003, *Groundwater Supply Feasibility Study,* memorandum to Utilities Advisory Commission.

City of Redwood City, June 13, 2011, *2010 Urban Water Management* Plan.

Department of Water Resources (DWR), August 1967, Evaluation of Ground Water Resources South Bay, Appendix A: Geology, Bulletin No. 118-1.

Driscoll, F.G., 1986, *Groundwater and Wells,* Johnson Filtration Systems, Inc., St. Paul, Minnesota.

Fio, J.L. and Leighton, D.S., 1995, Geohydrologic Framework, Historical Development of the Ground-Water System and General Hydrologic and Water Quality Conditions in 1990, South San Francisco Bay and Peninsula Area, California, USGS, Open File Report 94-357.

Galloway, D.L., Jones, D.R., and Ingebritsen, S.E., 2000, Measuring Land Subsidence from Space: US Geological Survey Fact Sheet-051-00, 4 p.

Geoconsultants, Inc., May 17, 1991, Summary Report Drilling and Well Completion, Well No. 1, Bayport Center, Redwood City, California.

Geomatrix Consultants, Inc. (Geomatrix) and S.S. Papadopulos & Associates, Inc. (Papadopulos), September 19, 1989, *Final Remedial Investigation Report, 1990 Bay Road Site and Vicinity, East Palo Alto, California.*

Gnesa, Aric and Anna Buising, November 11, 2011, *City of Menlo Park Supplemental Emergency Water Supply Project, Technical Memorandum No. 4: Phase 2 Well Site Ranking.*

Hamlin, S.N., September 1983, *Injection of Treated Wastewater for Groundwater Recharge in the Palo Alto Baylands, California, Hydraulic and Chemical Interactions—Preliminary* Report, USGS Water-Resources Investigation Report 82-4121.

Hamlin, S.N., April 1985, *An investigation of Ground-Water by Injection in the Palo Alto Baylands, California: Hydraulic and Chemical Interactions—Final Report*, USGS Water-Resources Investigation Report 82-4152.

HDR, April 2004, *East Palo Alto Area, Gloria Way Well Investigation Summary Report.*

HDR, April 2004, *East Palo Alto Area, Gloria Way Well Investigation Summary* Report, prepared for California American Water Monterey District.

Helley, E.M., and K.R. Lajoie, 1979, flatland deposits of the San Francisco Bay Region, California – their geology and engineering properties, and their importance to comprehensive planning: USGS Professional Paper 2254.

Hem, J. D., 1989, Study and Interpretation of the Chemical Characteristics of Natural Water, USGS Water Supply Paper 2254.

Hensolt, W. H., and E.E. Brabb, 1990, *Maps Showing Elevation of Bedrodk and Implications for Design of Engineered Structures to Withstand Earthquake Shaking in San Mateo county,* California, USGS Open-File Report 90-469.

Hounslow, A.W., 1995, Water Quality Data: Analysis and Interpretation: Lewis Publishers, Boca Raton, FL, 397 p.

Ingebritsen, S.E. and Jones, D.R., 1999, Santa Clara Valley, California in D. Galloway, D.R. Jones, and S.E. Ingebritsen, Land Subsidence in the United States: US Geological Survey Circular 1182, pp. 15-22.

Integrated Resource Management, June 21, 2011, *2010 Urban Water Management* Plan, prepared for City of East Palo Alto.

Kennedy/Jenks Consultants, December 2000, Domestic Water Distribution Model for Stanford University.

Marshack, J. B., 2011, A Compilation of Water Quality Goals (16th Edition): California Environmental Protection Agency, State Water Resources Control Board, Sacramento, CA, 47 pages with tables.

Metcalf and Eddy, 2000, Menlo Park Water Master Plan Report.

Metzger, Loren, F. and John L. Fio, 1997, *Ground-Water Development and the Effects on Ground-Water Levels and Water Quality in the Town of Atherton, San Mateo County, California,* USGS Water-Resources Investigations Report 97-4033.

Metzger, Loren, F., 2002, *Streamflow Gains and Losses along San Francisquito Creek and Characterization of Surface Water and Groundwater Quality, Southern San Mateo and Northern Santa Clara Counties, California, 1996-1997,* USGS Water-Resources Investigations Report 02-4078.

Oliver, H.W., 1990, *Preliminary Ground-Water-Quality Data and Extent of the Ground-Water Basin from Drill-Hole, Seismic, and Gravity Data in the Palo Alto 7.5' Quadrangle, California,* USGS Open-File Report 90-74.

Palo Alto, November 2006, *Draft City of Palo Alto Emergency Water Supply and Storage Project, Environmental Impact Report.*

Pampeyan, Earl H., 1970, *Geologic Map of the Palo Alto 7-1/2' Quadrangles, San Mateo and Santa Clara Counties, California,* USGS.

Pampeyan, Earl H., 1993, *Geologic Map of the Palo Alto and Part of the Redwood Point 7-1/2' Quadrangles, San Mateo and Santa Clara Counties, California,* USGS.

Peck, Dallas, L., April 1985, *An Investigation of Ground-Water Recharge by Injection in the Palo Alto Baylands, California: Hydraulic and Chemical Interactions – Final Report, USGS Water-Resources Investigations Report 84-4152.*

Poland, J.F., 1971, *Land Subsidence in the Santa Clara Valley, San Mateo, and Santa Clara Counties, California,* USGS Miscellaneous Field Studies Map MF-332.

Papadopulos & Associates, Inc. (Papadopulos), February 6, 2001, *Letter to SFPUC, Subject: Spring Valley Water Company Wells, Cooley Landing Salt Pond, Menlo Park, CA.*

Rafferty, M., S.S. Papadopulos & Associates, May 2012, Personal communication.

San Mateo Health Services Agency, September 4, 2001, *Letter to Geomatrix, Subject: Analytical Results for Weeks St. and Iwasaki Wells.*

Santa Clara Valley Water District (SCVWD), March 2010, *2009 Groundwater Quality Report.*

Santa Clara Valley Water District (SCVWD), January 2005, *2002/2003 Groundwater Conditions.*

Santa Clara Valley Water District (SCVWD), 2001, Santa Clara Valley Water District Groundwater Management Plan, July 2001 in SCVWD UWMP 2010, Appendix E: http://www.valleywater.org/Services/UWMP2010.aspx.

Schmidt, D.A. and Bürgmann, R., 2003, Time-dependent Land Uplift and Subsidence in the Santa Clara Valley, California, from a Large Interferometric Synthetic Aperture Radar Data Set: Journal of Geophysical Research, v. 108, n. B9, pp. 2416, doi:10.1029/2002JB002267, 2003.Barrett Consulting Group, Inc., August 1989, *Groundwater Supply and Water System Storage Investigation,* prepared for the City of Menlo Park, San Mateo County, California.

Sokol, Daniel, 1963, *The Hydrogeology of the San Francisquito Creek Basin, San Mateo and Santa Clara Counties, California,* Dissertation Stanford University.

State Water Resources Control Board (SWRCB), 2003, (www.geotracker.swrcb.ca.gov).

Todd, David K., 1980, *Groundwater Hydrology* (second edition), John Wiley & Sons, New York.

Todd Engineers, August 2005, *Feasibility of Supplemental Groundwater Resources Development, Menlo Park and East Palo Alto, California*.

Unknown Author, unknown date, *Densities of Rocks Exposed in the Palo Alto 7.5' Quadrangle.*

William C. Ellis, consultant in Groundwater and Geology, ~1992, *Water Quality Data.*

Wood, P.R., April 1975, Sources of Emergency Water Supplies in San Mateo County, California, USGS Open-file Report 75-43.

Tables

Table 1. Historical Water Use from the WSMP

Water Year	Total SFPUC Deliveries	SFPUC Deliveries to Menlo Park	SFPUC Deliveries to EPA	Gloria Way Well Use	Total EPA Use
1999/2000	2,289	0	2,289	0	2,289
2000/2001	2,400	0	2,400	0	2,400
2001/2002	2,283	0	2,283	0	2,283
2002/2003	2,274	0	2,274	0	2,274
2003/2004	2,464	0	2,464	11	2,475
2004/2005	1,874	149	1,725	6	1,731
2005/2006	2,386	128	2,258	2	2,260
2006/2007	2,381	139	2,242	3	2,245
2007/2008	2,424	136	2,288	18	2,306
2008/2009	2,273	120	2,153	1	2,155

Note: Water use in acre-feet per year (AFY).

Table 2. Historical Water Use from the UWMP

	Total SFPUC Deliveries	SFPUC Deliveries to Menlo Park	SFPUC Deliveries to EPA
2002	2,283	172	2,110
2003	2,274	163	2,111
2004	2,463	161	2,303
2005	2,265	156	2,108
2006	2,248	134	2,113
2007	2,437	146	2,291
2008	2,417	133	2,284
2009	2,273	126	2,147
2010	2,033	98	1,935

Note: Water use in acre-feet per year (AFY).

Table 3. Projected Water Demand from the WSMP

	Annual Demand
2015	2,728
2020	3,114
2025	3,696
2030	3,696

Note: Water use in acre-feet per year (AFY).

Table 4. Projected Water Demand from the UWMP

	Total Water Deliveries to EPA	Sales to Other Water Agencies	Additional Water Uses and Losses	Total
2015	2,458	3	197	2,658
2020	2,571	3	206	2,780
2025	2,738	3	219	2,960
2030	2,924	3	234	3,161
2035	3,145	3	252	3,400

Note: Water use in acre-feet per year (AFY).

Table 5. Future City Supply and Demand Estimates from UWMP

Current Supplies / Potential Additional Supplies (AFY)	2015	2020	2025	2030	2035
Supply (SFPUC)	2,199	2,199	2,199	2,199	2,199
Demand	2,658	2,780	2,960	3,161	3,400
Surplus (Shortfall)	(459)	(581)	(761)	(962)	(1,201)
Potential New Supply Sources					
Gloria Way Well	420	420	420	420	420
New Groundwater Wells	1,210	1,210	1,210	1,210	1,210
Recycled Water	0	125	150	150	150
Total Potential Additional Supplies	1,630	1,755	1,780	1,780	1,780
Surplus (Shortfall)	1,171	1,174	1,019	818	579

Note: Water use in acre-feet per year (AFY).

Table 6. Aquifer Hydraulic Properties from Pumping Tests

Well	Depth (feet)	Transmissivity (gpd/ft)	Storativity	Hydraulic Conductivity (gpd/ft^2)	Reference
6S/3W-1B2	900	7,585			Fio and Leighton, 1995
6S/3W-1D1	592	7,387			Fio and Leighton, 1995
6S/3W-1M1	430	2,690			Fio and Leighton, 1995
Gloria Way	323	5,200			HDR, 2004
I1	20	3,516	0.002		Hamlin, 1983
I6	55	7,181	0.0005		Hamlin, 1983
Multiple	~0-9	1,548		172	Geomatrix and Papadopulos, 1989
Multiple	~25 -35	2,090		209	Geomatrix and Papadopulos, 1989
Multiple	~0-20	60-2,900		7.5 -216	Connor Pacific/EFW, 1999
Multiple	~30-45	45-4,880		6-75	Connor Pacific/EFW, 1999
Multiple	~55-80	50-350		3.7-22	Connor Pacific/EFW, 1999

Notes: gpd/ft – gallons per day per foot
gpd/ft^2 – gallons per day per square foot

Table 7. Estimated Annual Groundwater Pumping
San Francisquito Groundwater Subbasin

Groundwater Pumping	Estimated Existing Use (AFY)	Estimated Potential Future Use[1] (AFY)	Estimated Emergency Supply Use[1] (AFY)
Atherton Private and Institutional Wells	710	890	
Private Wells Palo Alto, Menlo Park, East Palo Alto, and Redwood City	170	215	
O'Connor Tract Cooperative Water Company	84	100	
Palo Alto Park Mutual Water Company	523	218	
USGS, St. Patricks Seminary, Menlo College, and Veterans	500		
City of Redwood City		500 - 1,000	
City of Palo Alto			500/1,500[2]
City of Menlo Park		184	795
City of East Palo Alto		1,630	
Stanford University	342	410	
Total	**2,329**	**4,547- 4947**	**1,295 - 2,295**

Notes: AFY acre feet per year

[1] Future usage in year 2020 assuming a 20 percent reduction in Hetch Hetchy allocation

[2] 500 AFY sustainable yield, 1,500 AFY short-term yield, once every three years

Table 8. Estimated Annual Groundwater Recharge
San Francisquito Groundwater Subbasin

Irrigation Return Flow	Annual Water[2] Importation (AFY)	Surface[2] Water (AFY)	Groundwater (AFY)	Total Water Use (AFY)	LOW 30% Used for Irrigation (AFY)	HIGH 50% Used for Irrigation (AFY)	Percolation to Groundwater LOW Low x 10% (AFY)	HIGH High x 15% (AFY)
Redwood City[1]	5,383			5,383	1,615	2,691	161	404
CWSC -Atherton and Menlo Park[3]	8,426	834		9,260	2,778	4,630	278	695
Private			880	880	264	440		
Menlo Park MWD	3,574			3,574	1,072	1,787	107	268
East Palo Alto	1,935			1,935	580	967	58	145
Palo Alto	12,311			12,311	3,693	6,156	369	923
Santford	2,396	809	342	3,547	1,064	1,774	106	266
						Irrigation Percolation Total	**1,080**	**2,701**
Water Pipeline Leakage				**Total Water Use (AFY)**			**Leakage to Groundwater LOW - 3% (AFY)**	**HIGH - 5% (AFY)**
Redwood City[1]				9,689			291	484
CWSC -Atherton and Menlo Park[3]				16,668				
Private				1,584			48	79
Menlo Park MWD				6,433			193	322
East Palo Alto				3,482			104	174
Palo Alto				22,160			665	1,108
Stanford				6,385			192	319
						Water Pipeline Leakage	**1,492**	**2,487**
Sewer Pipeline Leakage				**Total Water Use (AFY)**			**Leakage to Groundwater LOW - 0.5% (AFY)**	**HIGH - 2% (AFY)**
Redwood City[1]				9,689			48	194
CWSC -Atherton and Menlo Park[3]				16,668				
Private				1,584			8	32
Menlo Park				6,433			32	129
East Palo Alto				3,482			17	70
Palo Alto[1]				22,160			111	443
Stanford				6,385			32	128
						Sewer Leakage	**249**	**995**
Surface Water Infiltration							**Recharge to Groundwater (AFY)**	**(AFY)**
San Francisquito Creek						Surface Water Infiltration	**950**	**950**
Recharge from Precipitation			**Basin Area (acres)**	**Annual Rainfall (feet)**	**Rainfall on Basin Area (AFY)**		**Rainfall Percolation to Groundwater LOW - 5% (AFY)**	**HIGH - 10% (AFY)**
Alluvial Basin			14,080	1.25	17,600		**880**	**1,760**
Subsurface Inflow		**Watershed Area (acres)**	**Annual Rainfall (feet)**	**Rainfall on Watershed Area (AFY)**	**Percolation to Upland 5% (AFY)**		**Subsurface Inflow to Alluvial Basin LOW - 25% (AFY)**	**HIGH - 50% (AFY)**
Uplands		23,936	2	47,872	2,394		**598**	**1,197**
Total							**5,001**	**10,089**

AFY - acre-feet per year CWSC - California Water Service Company
MWD Municipal Water Distict

[1] SFPUC use reduced by half since only approximately half of city within San Fancisquito Subbasin.

[2] FY 2009-10 usage reported in BAWSCA Annual Summary

[3] Assume 70% of CWSC Bear Gulch SFPUC Purchases go to Atherton and Menlo Park

Table 9. Estimated Annual Groundwater Discharge

San Francisquito Groundwater Subbasin

Groundwater Pumping and Consumptive Use	Estimated Existing Use (AFY)			Consumption 95% (AFY)
Atherton Private and Institutional Wells	710			675
Private Wells Redwood City, Menlo Park, East Palo Alto, and Palo Alto	170			162
O'Connor Tract Cooperative Water Company	84			80
Palo Alto Park Mutual Water Company	523			497
USGS, St. Patricks Seminary, Menlo College, and Veterans	500			475
Stanford	342			325
			Total Consumption	**2,213**
Subsurface Outflow Q = L x T x dh/dl	**Width (feet)**	**T (gpd/ft)**	**dh/dl (ft/ft)**	**Outflow (AFY)**
Shallow Aquifer	29,800	2,000	0.0005	33
Deep Aquifer	29,800	10,000	0.002	668
			Total Subsurface Outflow	**701**
Total Groundwater Discharge (AFY)				**2,914**

Table 10. Historical Water Quality Sampling Results for Gloria Way Well

Sample date	Data source	TDS (mg/L)	pH (pH units)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)	Chloride (mg/L)	Fluoride (mg/L)	Iron (ug/L)	Manganese (ug/L)
Regulatory standard	**Upper**	**1,000**[b]	**na**	**na**[c]	**na**	**500**[b]	**2**	**300**	**50**
	Recommended	**500**				**250**			
	Short-term	**1,500**				**600**			
5/12/2012	Todd Engineers	840	8.0[a]	251	200	350	0.14	130	160
12/15/2003	HDR 2004	804		250		280	0.33	140	190
5/2/1997	USGS 2002	802		220		350	0.1	47	160
6/1/1989	HDR 2004	800		192		264	0.9	100	
12/18/1986	HDR 2004	1040		190		450	0.1	1000	
12/2/1983	Geomatrix 1989	760							
11/3/1981	HDR 2004							60	150
8/21/1981	HDR 2004	958				146			
5/29/1981	Geomatrix 1989	520							
Historical average		820	na	210	na	300	0.35	270	170

(a) pH measured in the laboratory, may not accurately reflect pH in groundwater
(b) Secondary MCL, Consumer Acceptance Contaminant Level Range
(c) Water hardness ranges: soft < 17 mg/L, slightly hard = 17 to 60 mg/L, moderately hard = 61 to 120 mg/L, hard > 120 mg/L

Table 11. Laboratories Conducting Water Quality Analyses May 2012 Gloria Way Well Sampling

Laboratory	Analytes Analyzed	Table of Results
Alpha Analytical	General Physical and General Mineral	12
	Inorganics scan	13
	Anion Scan	14
	Chlorinated Acids	15
	Chlorinated Pesticides and PCBs	16
	Volatile Organic Compounds (VOCs)	17
	Perchlorate	19
Weck Laboratories	Anion Scan: Iodide	14
	Anion Scan: Bromide	14
	Semi-VOCs	18
TEM Laboratories	Asbestos in DW	19
McCampbell Analytical	Chromium(VI) or Cr6	19
FGL Laboratory	DBCP, Dioxin, DCP	19
	Strontium 90	19
GEL Laboratories LLC	Gross Alpha, Beta	19
	Radium 226 and 228	19
Underwriters Laboratory (UL) LLC	Uranium and Tritium	19

Note: Complete analytical reporting data contained in Alpha Analytical Laboratories, Inc. June 8, 2012 final report (see Appendix F).

Table 12. General Physical and Minerals May 2012 Gloria Way Well Sampling

Analyte	Method (EPA/SM)	Reporting Limit as PQL	Results	Regulatory Requirement	
		Concentration			Type
Color	SM2120B	5 CU	ND	15	CSMCL
Odor	EPA 140.1	1 TON	ND	3	CSMCL/ESMCL
Turbidity	EPA 180.1	0.05 NTU	0.44	1/5	CPMCL-EPMCL/ CSMCL-ESMCL
Aggressive Index	AWWA	Calculated	12.36	–	–
Alkalinity (total as $CaCO_3$)	EPA 2320B	5.0 mg/L	200	–	–
Bicarbonate (HCO_3^-)	SM 2320B	5.0 mg/L	250	–	–
Calcium (Ca^{2+})	EPA 200.7	1.0 mg/L	59	–	–
Carbonate (CO_3^{2-})	SM 2320B	5.0 mg/L	ND	–	–
Chloride (Cl^-)	EPA 300.0	12 mg/L	**350**	250	CSMCL-ESMCL
Conductivity (Electrical or Specific Conductance-EC)	SM 2510B	20 µS/cm	**1,500**	900	CSMCL
Copper (Cu)	EPA 200.8	50 µg/L	ND	1,300/1,000	CPMCL-EPMCL/ CSMCL-ESMCL
Cyanide (CN)	10-204-00-1X	100 µg/L	ND	150/200	CPMCL/EPMCL
Iron (Fe) (total)	EPA 200.8	5.0 µg/L	130	300	CSMCL-ESMCL
Hardness (total as $CaCO_3$)	SM2340B	5.0 mg/L	251	–	–
Hydroxide (OH^-)	SM 2320B	1.0 mg/L	ND	–	–
Potassium (K^+)	EPA 200.7	1.0 mg/L	1.1.0	–	–
MBAS (Methylene Blue Active Substances) (Foaming Agents)	SM 5540C	0.050 mg/L	ND	5.0	CSMCL-ESMCL
Magnesium (Mg^{2+})	EPA 200.7	1.0 mg/L	25.0	–	–
Manganese (Mn^{2+})	EPA 200.8	20 µg/L	**160**	50	CSMCL-ESMCL
Sodium (Na^+)	EPA 200.7	1.0 mg/L	240	–	–
pH	SM 4500	1.68 pH units	7.98	6.5-8.5	ESMCL
Total Dissolved Solids (TDS)	SM 2540C	10 mg/L	**820**	500	CSMCL-ESMCL
Sulfate (SO_4^{2-})	EPA 300	0.50 mg/L	33	500/250	EPMCL/CSMCL-ESMCL
Zinc (Zn^{2+})	EPA 200.8	50 µg/L	ND	5,000	CSMCL-ESMCL

Notes:
µg/L = micrograms per liter or parts per billion (ppb)
mg/L = milligrams per liter or parts per million (ppm)
µS/cm = micro Siemans per centimeter.
EPA = U.S. Environmental Protection Agency
SM = Standard Method
CU = Color Units
TON = Threshold Odor Number
NTU = Nephalometric Turbidity Units
PQL = Practical Quantification Level
Values in bold font exceed regulatory requirements
Sample collected on May 22, 2012; received and, unless otherwise noted, analyzed by Alpha Analytical Laboratories, Inc., Ukiah, CA.

Table 13. Inorganics May 2012 Gloria Way Well Sampling

Analyte	EPA Method	Reporting Limit as PQL	Results	Regulatory Requirement	
		µg/L			Type
Aluminum (Al)	200.8	50.0	ND	1,000/200	CPMCL/CSMCL
Antimony (Sb)	200.8	6.0	ND	6	CPMCL-EPMCL
Arsenic (As)	200.8	2.0	2.8	10	CPMCL-EPMCL
Barium (Ba)	200.8	100	380	1,000/2,000	CPMCL/EPMCL
Beryllium (Be)	200.8	1.0	ND	4	CPMCL-EPMCL
Cadmium (Cd)	200.8	1.0	ND	5	CPMCL-EPMCL
Chromium (Cr) total	200.8	10	ND	50/100	CMCL/EMCL
Copper (Cu)	200.8	50	ND	1,300/1,000	CPMCL-EPMCL/ CSMCL-ESMCL
Iron (Fe)	200.8	100	130	300	CSMCL-ESMCL
Lead (Pb)	200.8	5.0	ND	15	CPMCL-EPMCL
Mercury (Hg)	245.1	1.0	ND	2	CPMCL-EPMCL
Nickel (Ni)	200.8	10	ND	100	CPMCLC
Selenium (Se)	200.8	5.0	7.5	50	CPMCL-EPMCL
Silver (Ag)	200.8	10.0	ND	2	CPMCL-EPMCL
Thallium (Tl)	200.8	1.0	ND	2	CPMCL-EPMCL
Zinc (Zn)	200.8	50	ND	5,000	CSMCL-ESMCL
Fluoride (F^-)	300.0	100	1.400	2,000/4,000	CPMCL/CSMCL
Nitrate (NO_3^-)	300.0	2,000	ND	45,000/10,000	CPMCL/EPMCL
Nitrite (NO_2^-)	300.0	400	ND	1,000/1,000	CPMCL/EPMCL
Nitrite (NO_2^-) + Nitrate (NO_3^-) as N (calc)	300.0	400	ND	10,000/10,000	CPMCL/EPMCL

Notes:
µg/L = micrograms per liter or parts per billion (ppb)
CPMCL = California Department of Public Health Primary Maximum Contaminant Level
CSMCL = California Department of Public Health Secondary Maximum Contaminant Level
EPMCL = U.S. Environmental Protection Agency Primary Maximum Contaminant Level
ESMCL = U.S. Environmental Protection Agency Secondary Maximum Contaminant Level
PQL = Practical Quantification Level
ND = Not detected or below PQL
Sample collected on May 22, 2012; received and analyzed, unless otherwise noted, by Alpha Analytical Laboratories, Inc., Ukiah, CA.

Table 14. Anions May 2012 Gloria Way Well Sampling

Analyte	EPA Methods	Reporting Limit as PQL	Results	Regulatory Requirement	
		Concentration			Type
Bromide(Br^-)*,***	300.0	0.010 mg/L	1.3**	–	–
Chloride (Cl^-)	300.0	12 mg/L	**350**	250	CSMCL-ESMCL
Fluoride (F^-)	300.0	0.10 mg/L	0.14	2.0/4.0	CPMCL/EPMCL
Iodide (I^-)*,**	200.7	5 µg/L	–	–	–
Nitrate (NO_3^-)	300.0	2.0 mg/L	ND	45/10	CPMCL/EPMCL
Nitrite (NO_2^-)	300.0	0.40 mg/L	ND	1.0	CPMCL-EPMCL
Sulfate (SO_4^-)	300.0	0.50 mg/L	33	250	CSMCL-ESMCL

Notes:
* In addition to standard anions
** Analysis by Weck Laboratories, Inc., City of Industry, CA
*** Analysis by UL Drinking Water Laboratory, South Bend, IN
µg/L = micrograms per liter or parts per billion (ppb)
mg/L = milligrams per liter or parts per million (ppm)
CPMCL = California Department of Public Health Primary Maximum Contaminant Level
CSMCL = California Department of Public Health Secondary Maximum Contaminant Level
EPMCL = U.S. Environmental Protection Agency Primary Maximum Contaminant Level
ESMCL = U.S. Environmental Protection Agency Secondary Maximum Contaminant Level
PQL = Practical Quantification Level
ND = Not detected or below PQL
Value in bold font exceeds regulatory requirements
Sample collected on May 22, 2012; received and analyzed, unless otherwise noted, by Alpha Analytical Laboratories, Inc., Ukiah, CA.

Table 15. Chlorinated Acids May 2012 Gloria Way Well Sampling

Analysis	EPA Method	Reporting Limit as PQL	Results	Regulatory Requirement	
		µg/L			Type
Bentazon	515.1	2.0	ND	18	CPMCL
2,4-D	515.1	10	ND	70	CPMCL-EPMCL
Dalapon	515.1	10	ND	200	CPMCL-EPMCL
Dinoseb	515.1	2.0	ND	7	CPMCL-EPMCL
Pentachlorophenol	515.1	0.20	ND	1	CPMCL-EPMCL
Picloram	515.1	1.0	ND	500	CPMCL-EPMCL
2,4,5-TP (Silvex)	515.1	1.0	ND	50	CPMCL-EPMCL

Notes:
µg/L = micrograms per liter or parts per billion (ppb)
CPMCL = California Department of Public Health Primary Maximum Contaminant Level
CSMCL = California Department of Public Health Secondary Maximum Contaminant Level
PQL = Practical Quantification Level
ND = Not detected or below PQL
Sample collected on May 22, 2012; received and analyzed, unless otherwise noted, by Alpha Analytical Laboratories, Inc., Ukiah, CA.

Table 16. Chlorinated Pesticides and PCBs
May 2012 Gloria Way Well Sampling

Analyte	EPA Method	Reporting Limit as PQL	Results	Regulatory Requirement	
		µg/L			Type
Endrin	508	0.10	ND	2	CPMCL-EPMCL
HCH-gamma (Lindane)	508	0.20	ND	0.2	CPMCL-EPMCL
Heptachlor	508	0.010	ND	0.01/.4	CPMCL/EPMCL
Heptachlor epoxide	508	0.010	ND	0.01/0.2	CPMCL/EPMCL
Hexachlorobenzene	508	0.50	ND	1	CPMCL-EPMCL
Hexachlorocyclopentadiene	508	1.0	ND	50	CPMCL-EPMCL
Methoxychlor	508	10	ND	30/40	CPMCL/EPMCL
PCB-1016	508	0.50	ND	0.5	CPMCL-EPMCL
PCB-1232	508	0.50	ND	0.5	CPMCL-EPMCL
PCB-1232	508	0.50	ND	0.5	CPMCL-EPMCL
PCB-1248	508	0.50	ND	0.5	CPMCL-EPMCL
PCB-1254	508	0.50	ND	0.5	CPMCL-EPMCL
PCB-1260	508	0.50	ND	0.5	CPMCL-EPMCL
Total PCBs	508	0.50	ND	0.5	CPMCL-EPMCL
Toxaphene	508	1.0	ND	3	CPMCL-EPMCL
Chlordane (tech)	508	0.10	ND	0.1/2	CPMCL/EPMCL

Notes:
CPMCL = California Department of Public Health Primary Maximum Contaminant Level
CSMCL = California Department of Public Health Secondary Maximum Contaminant Level
µg/L = micrograms per liter or parts per billion (ppb)
PQL = Practical Quantification Level
ND = Not detected or below PQL
Sample collected on May 22, 2012; received and analyzed, unless otherwise noted, by Alpha Analytical Laboratories, Inc., Ukiah, CA.

Table 17. Volatile Organic Compounds
May 2012 Gloria Way Well Sampling

Analyte	EPA Method	Reporting Limit as PQL	Results	Regulatory Requirements	
		µg/L			Type
Benzene	524.2	0.50	ND	1/5	CPMCL/EPMCL
Carbon tetrachloride	524.2	0.50	ND	0.5/5	CPMCL/EPMCL
Chlorobenzene	524.2	0.50	ND	70/100	CPMCL/EPMCL
1,2-Dichlorobenzene	524.2	0.50	ND	600	CPMCL-EPMCL
1,4-Dichlorobenzene	524.2	0.50	ND	5/75	CPMCL/EPMCL
1,1-Dichloroethane	524.2	0.50	ND	5	CPMCL
1,2-Dichloroethane	524.2	0.50	ND	0.5/5	CPMCL/EPMCL
1,1-Dichloroethane	524.2	0.50	ND	5	CPMCL
cis-1,2-Dichloroethene	524.2	0.50	ND	6/70	CPMCL/EPMCL
trans-1,2-Dichloroethene	524.2	0.50	ND		
1,2-Dichloropropane	524.2	0.50	ND	5	CPMCL/EPMCL
1,2-Dichloropropene (total)	524.2	0.50	ND	10/100	CPMCL/EPMCL
Ethylbenzene	524.2	0.50	ND	300/700	CPMCL/EPMCL
Methyl tert-butyl ether	524.2	3.0	ND	13/5	CPMCL/CSMCL
Methylene chloride	524.2	0.50	ND	5	CPMCL-EPMCL
Styrene	524.2	0.50	ND	100/100	CPMCL/CSMCL
1,1,2,2-Tetrachloroethane	524.2	0.50	ND	1	CPMCL
Tetrachloroethene	524.2	0.50	ND	5	CPMCL-EPMCL
Toluene	524.2	0.50	ND	150/1,000	CPMCL/EPMCL
1,2,4-Trichlorobenzene	524.2	0.50	ND	5/70	CPMCL/EPMCL
1,1,1-Trichloroethane	524.2	0.50	ND	200	CPMCL/EPMCL
1,1,2-Trichloroethane	524.2	0.50	ND	5/5	CPMCL/EPMCL
Trichloroethene	524.2	0.50	ND	5/5	CPMCL/EPMCL
Trichlorofluoromethane	524.2	5.0	ND	150	CPMCL
Trichlorotrifluoroethane	524.2	10	ND	1200	CPMCL
Vinyl chloride	524.2	0.50	ND	0.5/2	CPMCL/EPMCL
Xylenes (total)	524.2	0.50	ND	1,750/10,000	CPMCL/EPMCL

Notes:
CPMCL = California Department of Public Health Primary Maximum Contaminant Level
CSMCL = California Department of Public Health Secondary Maximum Contaminant Level
EPMCL = U.S. Environmental Protection Agency Primary Maximum Contaminant Level
ESMCL = U.S. Environmental Protection Agency Secondary Maximum Contaminant Level
PQL = Practical Quantification Level
ND = Not detected or below PQL
Sample collected on May 22, 2012; received and analyzed, unless otherwise noted, by Alpha Analytical Laboratories, Inc., Ukiah, CA.

Table 18. Semivolatile Organic Compounds
May 2012 Gloria Way Well Sampling

Analyte	EPA Method	Reporting Limit as PQL	Results	Regulatory Requirements	
		µg/L			Type
Alachlor	525.2	0.10	ND	2.0	CPMCL-EPMCL
Atracene	525.2	0.10	ND	1.0/3.0	CPMCL/EPMCL
Benzo(a) pyrene	525.2	0.10	ND	0.2	CPMCL-EPMCL
Bis(2-ethyhexyl)adipate	525.2	5.0	ND	200	CPMCL-EPMCL
Bis(2-ethylhexyl)phthalate	525.2	3.0	ND	4/6	CPMCL/EPMCL
Bromacil	525.2	0.50	ND	–	–
Butaclor	525.2	0.10	ND	–	–
Captan	525.2	1.0	ND	–	–
Chloropropham	525.2	0.10	ND	–	–
Cyanazine	525.2	0.10	ND	–	–
Diazinon	525.2	0.10	ND	–	–
Dimethoate	525.2	0.20	ND	–	–
Diphenamid	525.2	0.10	ND	–	–
Disulfoton	525.2	0.10	ND	–	–
EPTC	525.2	0.10	ND	–	–
Metolachlor	525.2	0.10	ND	–	–
Metribuzin	525.2	0.10	ND	–	–
Molinate	525.2	0.10	ND	20	CPMCL
Prometon	525.2	0.10	ND	–	–
Prometryn	525.2	0.10	ND	–	–
Simazine	525.2	0.10	ND	4	CPMCL-EPMCL
Terbacil	525.2	2.0	ND	–	–
Thiobencarb	525.2	0.10	ND	70/1	CPMCL/CSMCL
Trithion	525.2	0.10	ND	–	–

Notes:
CPMCL = California Department of Public Health Primary Maximum Contaminant Level
CSMCL = California Department of Public Health Secondary Maximum Contaminant Level
EPMCL = U.S. Environmental Protection Agency Primary Maximum Contaminant Level
ESMCL = U.S. Environmental Protection Agency Secondary Maximum Contaminant Level
PQL = Practical Quantification Level
ND = Not detected or below PQL
Sample collected on May 22, 2012; received by Alpha Analytical Laboratories, Inc., Ukiah, CA and analyzed by Weck Laboratories, Inc., City of Industry, CA.

Table 19. Additional Analytes
May 2012 Gloria Way Well Sampling

Analyte	EPA/SM Methods	Reporting Limit as PQL	Results	Regulatory Requirement	
		Concentration			Type
Asbestos in DW*	EPA 100.2	0.2 MFL	ND	7	CPMCL-EPMCL
Chromium(VI) (Cr6)**	SM 3500-Cr B	0.05 µg/L	ND	0.02	CPHG
1,2-dibromomethane (DBCP)***	EPA 504.1	0.01 µg/L	ND	0.2	CPMCL-EPMCL
Dioxin 2378 TCDD in DW***	EPA 1613A	5.0 pg/L	ND	30	CPMCL-EPMCL
Ethylene dibromide*** (EDB)/Dibromchloropropane (DCP)	EPA 504.1	0.01 µg/L	ND	0.2	CPMCL-EPMCL
Gross Alpha‡	EPA 900.0	3.0 pCi/L	ND	15	CPMCL-EPMCL
Gross Beta‡	EPA 900.0	4.00 pCi/L	2.69	50	CPMCL-EPMCL
Perchlorate	EPA 314.0	4.0 µg/L	ND	6	CPMCL
Radium (Ra)226‡	EPA 903/904	1.0 pCi/L	ND	50	See Ra 226+228
Radium (Ra) 228‡	EPA 904.0	1.0 pCi/L	ND	3	See Ra 226+228
Radium 226 + 228†		calculated	ND	5	CPMCL-EPMCL
Strontium 90§	EPA 905.0	0.636 pCi/L	ND	8	CPMCL
Tritium†	EPA 906	1,000 pCi/L	ND	20,000	CPMCL
Uranium (U)†	EPA 200.8	1.0 µg/L	0.27	20.1	CPMCL/EPMCL

Notes:
* Analyzed by Asbestos TEM Laboratories, Inc. Berkeley, CA
** Analyzed by McCampbell Analytical, Inc., Pittsburg, CA
*** Analyzed by FGL Laboratory , Santa Paula, CA
† Analyzed by UL Drinking Water Laboratory, South Bend, IN
‡ Analyzed by GEL Laboratories LLC, Charlston, SC
§ Analyzed by FGL Laboratories, Santa Paula, CA
California MCL for Gross Beta = 50 pCi/L; U.S. EPA Primary MCL (EPMCL) = 4 millirems per year (mrem/yr)
MFL = Millions of fibers per liter
µg/L = micrograms per liter or parts per billion (ppb)
pg/L = picograms per liter or parts per quadtrillion (ppq)
pCi/L = picoCuries per liter
CPHG = California Department of Public Health Goal
CPMCL = California Department of Public Health Primary Maximum Contaminant Level
EPMCL = U.S. Environmental Protection Agency Primary Maximum Contaminant Level
PQL = Practical Quantification Level
ND = Not detected or below PQL
Sample collected on May 22, 2012; received and analyzed, unless otherwise noted, by Alpha Analytical Laboratories, Inc., Ukiah, CA

. Table 20. Cation-Anion Ratios and Percent Error Calculations May 2012 Gloria Way Well Sampling

Sample	Cation/Anion Ratio	Balance (Error %)
Seawater	1.009	0.426
SF South Bay (35% salinity	1.007	0.340
Riverwater	1.002	0.105
GW: 05-02-97	1.207	9.386
GW 05-22-12	1.049	2.368
PAPMWC No 2 Shallow (05-17-11)*	4.627	64.456
PAPMWC No 6 Deep (05-17-11)*	2.356	40.410

Notes:
GW = Gloria Way well
mmoles/L = millimoles per liter
* Bicarbonate not analyzed or reported

Table 21. Piper and Schoeller Diagram Calculations
May 2012 Gloria Way Well Sampling

Sample:	Seawater		SF South Bay (35% salinity)		Riverwater		GW: 05-02-97		GW 05-22-12		PAPMWC No 2 Shallow (05-17-11)		PAPMWC No 6 Deep (05-17-11)	
Analyte	**mg/L**	**meq/L**	**mg/L**	**meq/L**	**mg/L**	**meq/L**	**mg/L**	**meq/L**	**mg/L**	**meq/L**	**mg/L**	**meq/L**	**mg/L**	**meq/L**
Cations														
Calcium	410	20.45	143.5	7.16	15.0	0.75	51.0	2.54	59.0	2.94	110.0	5.49	56.0	2.79
Magnesium	1,350	111.09	472.5	38.88	4.1	0.34	23.0	1,89	25.0	2.06	26.0	2.14	17.0	1.40
Potassium	390	9.98	136.5	3.49	2.3	0.06	1.0	0.03	0	–	1.4	0.04	2.10	0.05
Sodium	10,500	456.75	3,675	159.86	6.3	0.27	210	9.14	2.40	10.44	48.0	2.09	89.0	3.87
Anions														
Bicarbonate	142	2.33	49.7	0.81	58.0	0.95	230	3.77	250.0	4.10	–	–	–	–
Carbonate	0	–	0	–	0	–	0	–	0	–	–	–	–	–
Chloride	19,000	0.07	6,650	187.60	7.8	0.22	350	9.87	350.0	9.87	52.0	1.47	80.0	2.26
Sulfate	2,700	56.21	945.0	19.67	11.0	0.23	29.0	0.60	33.0	0.69	84.0	1.75	53.0	1.10

Notes:
GW = Gloria Way well
mg/L = milligrams per liter
meq/L = milliequivalents per liter
dash (–) = no data or possible calulations

Table 22. Brine Differentiation Plot Calculations
May 2012 Gloria Way Well Sampling

	Na/(Na+Cl)	Ca/(Ca+SO_4)
Sample	**mmoles/L**	
Seawater	0.46	0.27
SF South Bay	0.46	0.27
Riverwater	0.55	0.77
GW: 05-02-97	0.48	0.81
GW 05-22-12	0.51	0.81
PAPMWC No 2 Shallow (05-17-11)	0.59	0.76
PAPMWC No 6 Deep (05-17-11)	0.63	0.72

Notes:
GW = Gloria Way well
mmoles/L = millimoles per liter

Table 23. Land Subsidence Monitoring Methods

Method	Component Displacement	Resolution (mm)	Spatial Density (samples/survey)	Spatial Scale (elements)
Spirit Level	Vertical	0.1 – 1.0	10 – 100	Line-network
Geodimeter	Horizontal	1.0	10 – 100	Line-network
Borehole extensometer	Vertical	0.01 – 0.1	1 – 3	Point
Horizontal extensometer				
Tape	Horizontal	0.3	1 – 10	Line-array
Invar wire	Horizontal	0.0001	1	Line
Quartz tube	Horizontal	0.00001	1	Line
GPS	Vertical Horizontal	20 5	10 – 100	Network
InSAR	Range	5 – 10	100,000 – 10,000,000	Map pixel

Notes:
GPS = Global Positioning System Satellites
InSAR = Satellite Interferometric Synthetic Aperture Radar

Source: Galloway, et al. (2000)

Table 24. Gloria Way Well Treatment System Construction and Annual Operating Costs

Estimated Construction Cost				
Description	**Number**	**Unit**	**Cost**	**Total Cost**
Mobilization	1	LS		$59,000
Site Work	1	LS	$60,000	$60,000
Demolition	1	LS	$20,000	$20,000
Yard Piping	1	LS	$40,000	$40,000
Chlorination / Ammonia System	1	LS	$50,000	$50,000
pH Control	1	LS	$25,000	$25,000
Concrete	1	LS	$45,000	$45,000
Prefabricated Building	1	LS	$130,000	$130,000
Treatment Units	1	LS	$250,000	$250,000
Backwash Tank and Piping	1	LS	$28,000	$28,000
Backwash Recovery Pumps & Decant System	1	LS	$15,000	$15,000
Mix Tank and Piping	1	LS	$28,000	$28,000
Finished Water Pump Station	1	LS	$90,000	$90,000
Well Pump and Motor	1	LS	$90,000	$90,000
Electrical	1	LS	$200,000	$200,000
SCADA	1	LS	$65,000	$65,000
Portable Generator	1	LS	$10,000	$10,000
Startup, Testing and Training	1	LS	$30,000	$30,000
Check Valve and Vault	1	LS	$20,000	$20,000
Subtotal				$1,255,000
Contingency 25%				$313,700
Engineering Design and Construction Management				$431,300
Total Estimated Construction Cost				**$2,000,000**

Estimated Annual Operating and Maintenance Cost	
Description	**Annual Cost**
Chemical	$58,000
Power	$48,100
Wastewater Disposal	$6,000
Filter Media Replacement	$1,400
Equipment Replacement	$8,300
Labor	$36,000
Subtotal	$157,800
Contingency 10%	$15,700
Total Estimated Operating and Maintenance Cost	**$173,500**

Table 25. Characteristics of Potential New Well Sites

Site Name	Approximate Lot Size Less Setbacks (sq. ft.)	Distance from Bay[1] (ft)	Distance from Surface Water[2] (ft)	Ownership	Adjacent Water Line Sizes	Water Distribution Improvements near Site[3]	Current Land Use (General Plan Designation)	Adjacent Land Uses	Accessibility	FEMA Flood Hazard	Distance from Palo Alto Park Mutual Water Company Wells (ft)	Distance from O'Conner Tract Cooperative Water District Wells (ft)	Distance from City of Palo Alto Well [4] (ft)	Distance from City of Menlo Park Well [4] (ft)	Potential Well Capacity	Special Biological Resource Permit Considerations?	Located within 1/4-mile of open GW contamination case?
Gloria Way (Existing Well)	2,500	4,200	--	City	8" on Bay (existing tie in) 8" on Univeristy	8" on University to 12" (Group III priority)	Existing well site (Low/Medium Density Residential)	Residential	No restrictions	No	2,500	5,500	7,875	11,750	Fair	No	No
Bay/University	3,850	3,500	--	City	12" on University 8" on University 10" on Bay	8" on Univeristy to 12" (Group III priority) 12" on University to 16"	Vacant (General Commercial)	Commercial	No restrictions	No	3,100	5,500	8,125	12,750	Fair	No	No
Bell Park	180,425	4,700	--	City	8" on University 8" on Bell 6" on Euclid	8" on Bell to 12" (Group I priority) 8" on University to 12" (Group II priority) 6" on Euclid to 8" (Group II priority)	Park/community center (Community Open Space Conservation)	Residential and Commercial	No restrictions	No	1,800	2,750	5,250	10,375	Fair	No	Yes (LUST)
Brentwood School	34,805	2,700	--	School District	12" on Clarke 8" on O'Connor	8" on O'Connor was recent upgrade from 6" (Group I priority) 12" on Clarke to 16" (Group II priority)	Vacant (Low/Medium Density Residential)	Residential	No restrictions	No	4,500	4,375	4,625	12,250	Fair	No	No
Pad D	15,645	3,400	--	City	12" on Clarke 12" on East Bayshore	12" on Clarke to be upgraded to 16" (Group II priority) 12" on East Bayshore to 16" (Group II priority)	Vacant (General Commercial)	Commercial	No restrictions	No	5,100	4,000	3,625	11,750	Good	No	No
Verbena	20,625	2,800	50	Unknown	6" on Verbena	6" on Verbena and neighboring streets to 8" (Group II priority)	Vacant (Resource Management)	Residential	Access road needs to be improved.	Yes	7,700	6,600	4,600	14,100	Fair	Yes	Yes (LUST)
Woodland/ Manhattan	0	5,700	50	Private	8" on Woodland	8" on Woodland and Euclid to 12" (Group II priority)	Vacant (Community Open Space Conservation)	Commercial and Residential	No restrictions	Yes	3,400	1,875	2,875	9,625	Good	Yes	No
Newell/101	28,870	3,700	950	Private	8" on Newell 10" on West Bayshore	8" on Newell to 12" (Group II priority)	Vacant (Neighborhood Commercial)	Residential	No restrictions	Yes	5,000	3,500	2,900	11,250	Good	No	No

Notes:
1) Distance measured from parcel to the beginning of the Baylands.
2) Distance measured from parcel to center of creek. Distances only measures for locations within 1000 ft of a creek.
3) Priorities were assigned in the Water System Master Plan. Group I are lines with greater than 700 gpm fire flow deficiency. Group II are lines between 500-700 gpm. Group III are lines less than 500 gpm.
4) Distance from new well site to closest planned or potential Palo Alto and Menlo Park well.

Table 26. Construction and Annual Operating Costs for New 500 GPM Well System

Estimated Construction Cost				
Description	**Number**	**Unit**	**Cost**	**Total Cost**
Hydrogeologic Site Investigation	2	LS	$150,000	$300,000
16" Production Well 500 feet TD	1	LS	$450,000	$450,000
Mobilization	1	LS	$75,000	$75,000
Site Work	1	LS	$75,000	$75,000
Yard Piping	1	LS	$50,000	$50,000
Chlorination / Ammonia System	1	LS	$70,000	$70,000
pH Control	1	LS	$35,000	$35,000
Concrete	1	LS	$65,000	$65,000
Prefabricated Building	1	LS	$180,000	$180,000
Treatment Units	1	LS	$300,000	$300,000
Backwash Tank and Piping	1	LS	$44,000	$44,000
Backwash Recovery Pumps & Decant System	1	LS	$15,000	$15,000
Mix Tank and Piping	1	LS	$44,000	$44,000
Finished Water Pump Station	1	LS	$135,000	$135,000
Well Pump and Motor	1	LS	$120,000	$120,000
Electrical	1	LS	$240,000	$240,000
SCADA	1	LS	$80,000	$80,000
Portable Generator	1	LS	$10,000	$10,000
Startup, Testing and Training	1	LS	$30,000	$30,000
Check Valve and Vault	1	LS	$20,000	$20,000
Subtotal				$2,338,000
Contingency 25%				$585,000
Engineering Design and Construction Management				$515,000
Total Estimated Construction Cost				$3,438,000

Estimated Annual Operating and Maintenance Cost	
Description	**Annual Cost**
Chemical	$ 98,000
Power	$ 67,800
Wastewater Disposal	$ 9,600
Filter Media Replacement	$ 2,300
Equipment Replacement	$ 11,600
Labor	$ 36,000
Subtotal	$ 225,300
Contingency 10%	$ 22,500
Total Estimated O&M Cost	$ 247,800

Table 27. Lifecycle Water Cost Comparisons for Gloria Way and New Well Sites

Alternative	Total Present Value Project Costs	Total Water Produced from 2012 to 2061 (Acre-Feet)	Total Present Value Cost per Acre-Foot of Water Produced
Gloria Way -- 300 gpm	$ 5,177,000	19,740	$ 260
Gloria Way -- 200 gpm	$ 4,419,000	13,160	$ 340
Gloria Way -- 100 gpm	$ 3,639,000	6,580	$ 550
Pad D -- 500 gpm with Mn treatment	$ 8,014,000	32,900	$ 240
Pad D -- 300 gpm with Mn treatment	$ 6,587,000	19,740	$ 330
Pad D -- 200 gpm with Mn treatment	$ 5,874,000	13,160	$ 450
Pad D -- 100 gpm with Mn treatment	$ 5,160,000	6,580	$ 780
Pad D -- 500 gpm without Mn treatment	$ 3,421,000	32,900	$ 100
Pad D -- 300 gpm without Mn treatment	$ 2,722,000	19,740	$ 140
Pad D -- 200 gpm without Mn treatment	$ 2,372,000	13,160	$ 180
Pad D -- 100 gpm without Mn treatment	$ 2,022,000	6,580	$ 310

Table 28. Storage Sizing Alternatives

Alternative	Current[a] (MG)	Long-Term[b] (MG)
8 Hours Peak Day Demand	0.7	1.0
24 Hours Average Day Demand	2.0	3.0
24 Hours Average Day Demand Plus 4 Hours of Maximum Fire Flow[c]	3.0	4.0
24 Hours Peak Day Demand	3.0	4.5
24 Hours Peak Day Demand Plus 4 hours of Maximum Fire Flow[c] (Recommended Alternative)	**4.0**	**5.5**
2 Day Average Summer Day Demand[d]	4.4	6.5

Notes:
(a) The City's current demand was presented in Section 2. The average day demand is 2.0 mgd, and the peak day demand is3.0 mgd.
(b) The City's long-term demand was presented in Section 2. The average day demand is projected to be 3.0 mgd with a peak day demand of 4.5 mgd.
(c) The maximum fire flow for the City as stated in the Water System Master Plan is 4,000 gpm.
(d) The average summer day was calculated using the 1.09 average day to average summer day factor developed in the Final Feasibility Evaluation of Menlo Park/East Palo Alto Joint Reservoir Facility and Alternative Water Supply.

Table 29. Diurnal Demand

Hour	Peaking Factor	Current Average Day Flow (gpm)
0	0.3	417
1	0.2	278
2	0.2	278
3	0.2	278
4	0.3	417
5	0.4	556
6	0.6	833
7	0.9	1250
8	1.2	1667
9	1.3	1806
10	1.4	1944
11	1.4	1944
12	1.3	1806
13	1.3	1806
14	1.2	1667
15	1.2	1667
16	1.3	1806
17	1.4	1944
18	1.6	2222
19	1.7	2361
20	1.8	2500
21	1.7	2361
22	0.8	1111
23	0.4	556

Table 30. Cost for Various Tank Options

Tank Size (MG)	1			2			5		
Tank Material	Prestressed Concrete	Reinforced Concrete	Steel	Prestressed Concrete	Reinforced Concrete	Steel	Prestressed Concrete	Reinforced Concrete	Steel
Tank	$1,207,500	$1,181,000	$748,000	$1,707,500	$1,854,000	$1,076,000	$3,082,500	$3,366,000	$1,739,000
Site Work & Yard Piping	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Tank Appurtenances	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000
Cathodic Protection	$0	$0	$25,000	$0	$0	$25,000	$0	$0	$25,000
Booster Pump Station	$950,000	$950,000	$950,000	$950,000	$950,000	$950,000	$950,000	$950,000	$950,000
Construction Cost without Pile System	*$2,307,500*	*$1,331,000*	*$923,000*	*$1,857,500*	*$2,004,000*	*$1,251,000*	*$3,232,500*	*$3,516,000*	*$1,914,000*
+15% Engineering	$346,000	$200,000	$138,000	$279,000	$301,000	$188,000	$485,000	$527,000	$287,000
+15% Contingency	$346,000	$200,000	$138,000	$279,000	$301,000	$188,000	$485,000	$527,000	$287,000
Total Project Cost without Pile System	**$2,999,500**	**$1,731,000**	**$1,199,000**	**$2,415,500**	**$2,606,000**	**$1,627,000**	**$4,202,500**	**$4,570,000**	**$2,488,000**
Pile System									
Slab	$120,000	$120,000	$120,000	$210,000	$210,000	$210,000	$435,000	$435,000	$435,000
Piles	$944,000	$944,000	$752,000	$1,768,000	$1,768,000	$1,464,000	$4,128,000	$4,128,000	$3,568,000
Construction Cost with Pile System	*$3,371,500*	*$2,395,000*	*$1,795,000*	*$3,835,500*	*$3,982,000*	*$2,925,000*	*$7,795,500*	*$8,079,000*	*$5,917,000*
+15% Engineering	$506,000	$359,000	$269,000	$575,000	$597,000	$439,000	$1,169,000	$1,212,000	$888,000
+15% Contingency	$506,000	$359,000	$269,000	$575,000	$597,000	$439,000	$1,169,000	$1,212,000	$888,000
Total Project Cost with Pile System	**$4,383,500**	**$3,113,000**	**$2,333,000**	**$4,985,500**	**$5,176,000**	**$3,803,000**	**$10,133,500**	**$10,503,000**	**$7,693,000**

Table 31. City of San Bruno Customers by Classification

Classification	Number
Single Family	10,367
Multi-Family	889
Commercial	532
Industrial	3
Institutional	235
Other	120
Total	**12,145**

Table 32. San Bruno Water Enterprise Expenses FY 2012-13

Description	Water Supply	Water Distribution	Total
Personnel	$635,146	$1,323,338	$1,958,484
Supplies and Equipment	$167,800	$189,800	$357,600
Contract Services	$410,500	$136,225	$566,725
Operations	$663,751	$423,685	$1,087,436
Intergovernmental	$2,619,160	$800	$2,619,960
Internal Allocations	$545,645	$919,760	$1,465,405
Total	**$5,042,006**	**$2,593,608**	**$7,635,614**

Table 33. San Bruno Water Enterprise Staffing FY 2012-13

Classification	Supply	Distribution	Total
Public Services Director	0.20	0.15	0.35
Deputy Director of Utilities	0.15	0.20	0.35
Maintenance Services Manager	0.30	0.70	1.00
Associate Civil Engineer	0.50	0.00	0.50
Conservation Manager	0.50	0.50	1.00
Water Quality Technician	0.00	1.00	1.00
Management Analyst I/II	0.50	0.25	0.75
Engineering Technician	0.00	0.50	0.50
Pump Mechanic I/II	0.25	0.75	1.00
Lead Maintenance Worker	1.00	1.00	2.00
Maintenance Worker I/II	1.20	6.80	8.00
Executive Assistance	0.20	0.15	0.35
Secretary	0.25	0.25	0.50
Total	**5.05**	**12.25**	**17.30**

Note: Staffing as full-time employees (FTEs).

Table 34. City of Palo Alto Customers by Classification

Classification	Number
Single Family	15,458
Multi-Family	2,248
Commercial	1,870
Industrial	251
City Facilities	322
Public Facilities	89
Total	**20,238**

Table 35. City of Palo Alto Water Fund Expenses

Description	Budget
Utility Purchases and Charges	$15,940,000
Salaries and Benefits	$5,210,000
Contract Services	$743,000
Supplies and Materials	$451,000
Facilities and Equipment Purchases	$11,000
General Expenses	$452,000
Rents and Leases	$3,001,000
Allocated Charges	$3,395,000
Debt Service	$3,219,000
Capital Improvements Program	$6,115,000
Operating Transfers Out	$1,705,000
Total Expenses	**$40,242,000**

Table 36. Palo Alto Water Enterprise Staffing FY 2012-13

Classification	Number of FTEs
Administration and CIP	9.60
Customer Service	10.44
Engineering (operating)	1.35
Operations and Maintenance	24.62
Resource management	1.65
Total	**47.66**

Table 37. City of East Palo Alto Customers by Classification

Classification	Number
Single Family	3,703
Multi-Family	201
Commercial	110
Industrial	111
Public Facilities	27
Irrigation	15
Total	**3,855**

Table 38. City of East Palo Alto Water Fund Expenses (AWE)

Description	Budget
Labor Costs (AWE)	$ 477,252
Subcontract/Outside Services (AWE)	$ 105,780
Power & Utilities (AWE)	$ 2,459,598
Repairs & Maintenance (AWE)	$ 72,000
Equipment Operating Cost (AWE)	$ 20,922
Other Direct Costs (AWE)	$ 706,143
Depreciation & Amortization (AWE)	$ 4,644
Total Direct Costs (AWE)	$ 3,846,340
Project Administration (AWE)	$ 39,295
Total Costs (AWE)	**$ 3,885,635**
Gross Margin	$ 295,521
Provision (benefit) income tax	$ 103,432
Net Income To City Water Fund	**$ 194,729**

Table 39. East Palo Alto Staff Provided by American Water Enterprises

Classification	Number of Full Time Employees
Superintendent	1
Supervisor	1
Operators	2
Customer Service Representatives	2
Total	**6**

Table 40. Financing Option--Borrowing Term

	20 Years	30 Years
Project Funded	$2,000,000	$2,000,000
Reserve Fund	190,000	142,000
Financing Costs	100,000	98,000
Total Borrowing	**$2,290,000**	**$2,240,000**
Avg. Interest Rate	4.50%	4.75%
Average Bond Payment	$176,046	$141,589
Revenue Needed after O&M (to meet 25% coverage)	$220,058	$176,986

Note: The reserve fund equals one year's debt service and interest earnings on the reserve fund offset annual debt service.

Figures

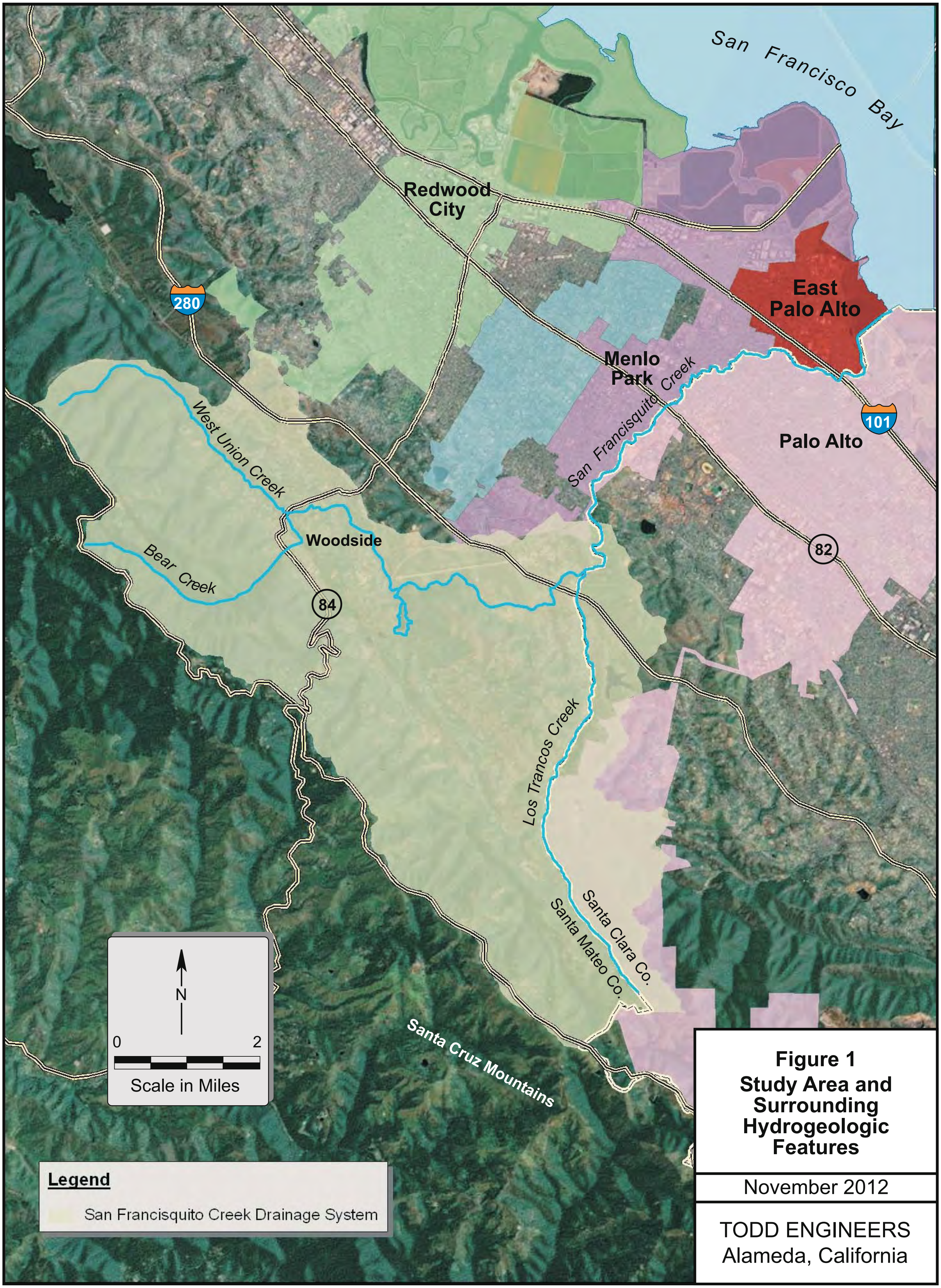

Figure 1
Study Area and Surrounding Hydrogeologic Features

November 2012

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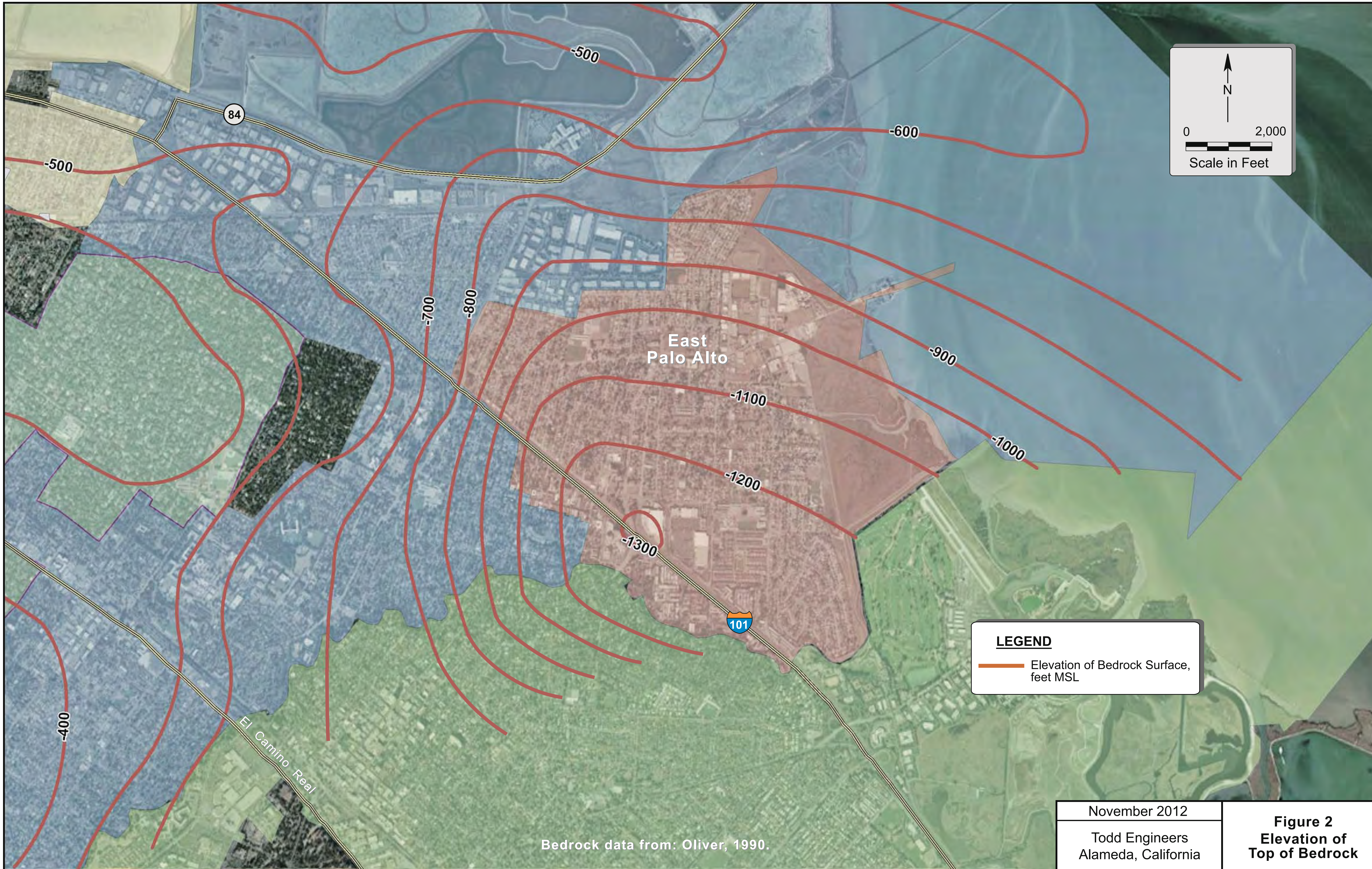
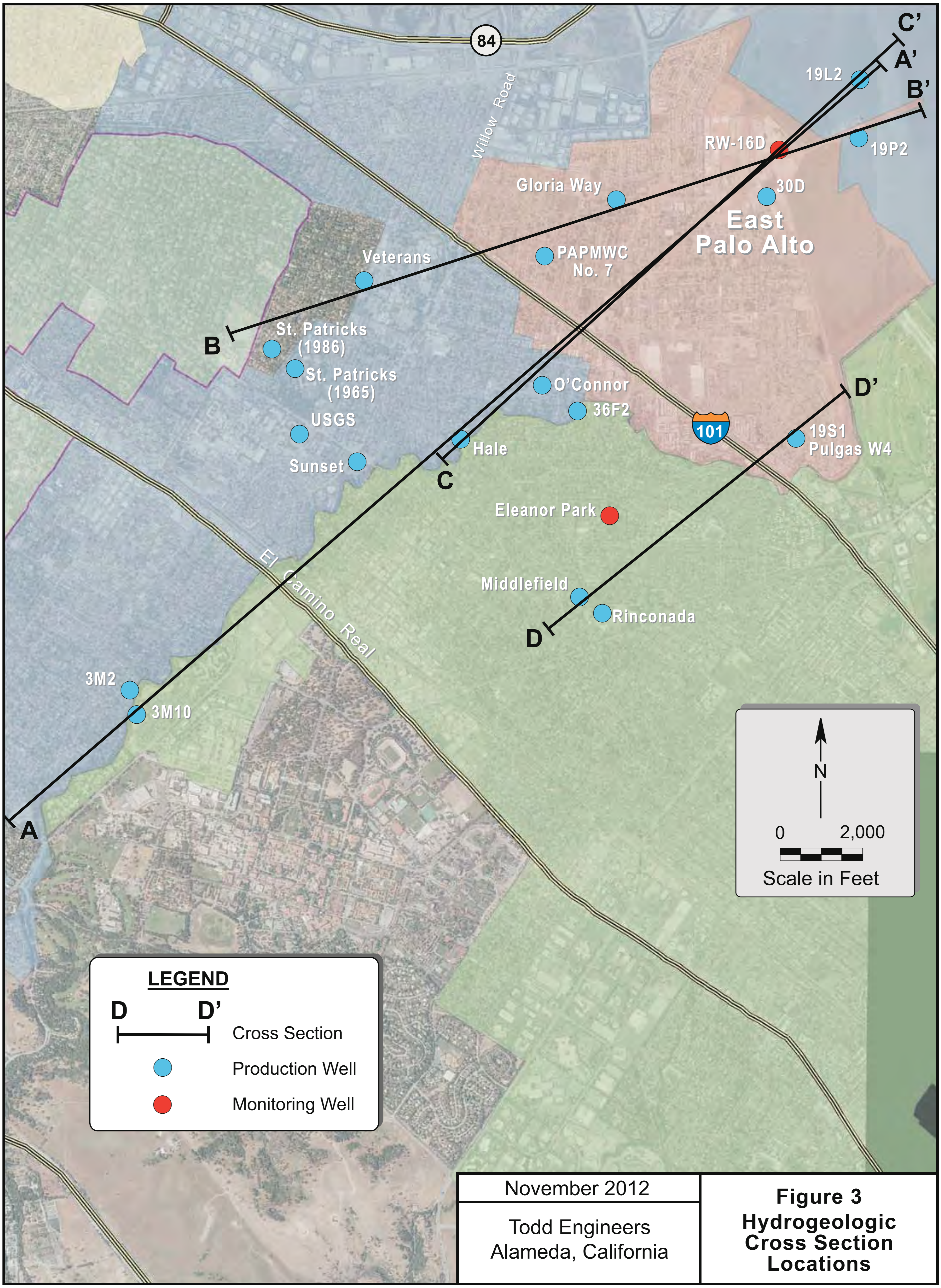

-500
-500
84
-600
-700
-800
-900
-1000
-1100
-1200
-1300
-400
East
Palo Alto
101
El Camino Real
N
0
2,000
Scale in Feet
LEGEND
Elevation of Bedrock Surface, feet MSL
Bedrock data from: Oliver, 1990.
November 2012
Todd Engineers
Alameda, California
Figure 2
Elevation of
Top of Bedrock



November 2012

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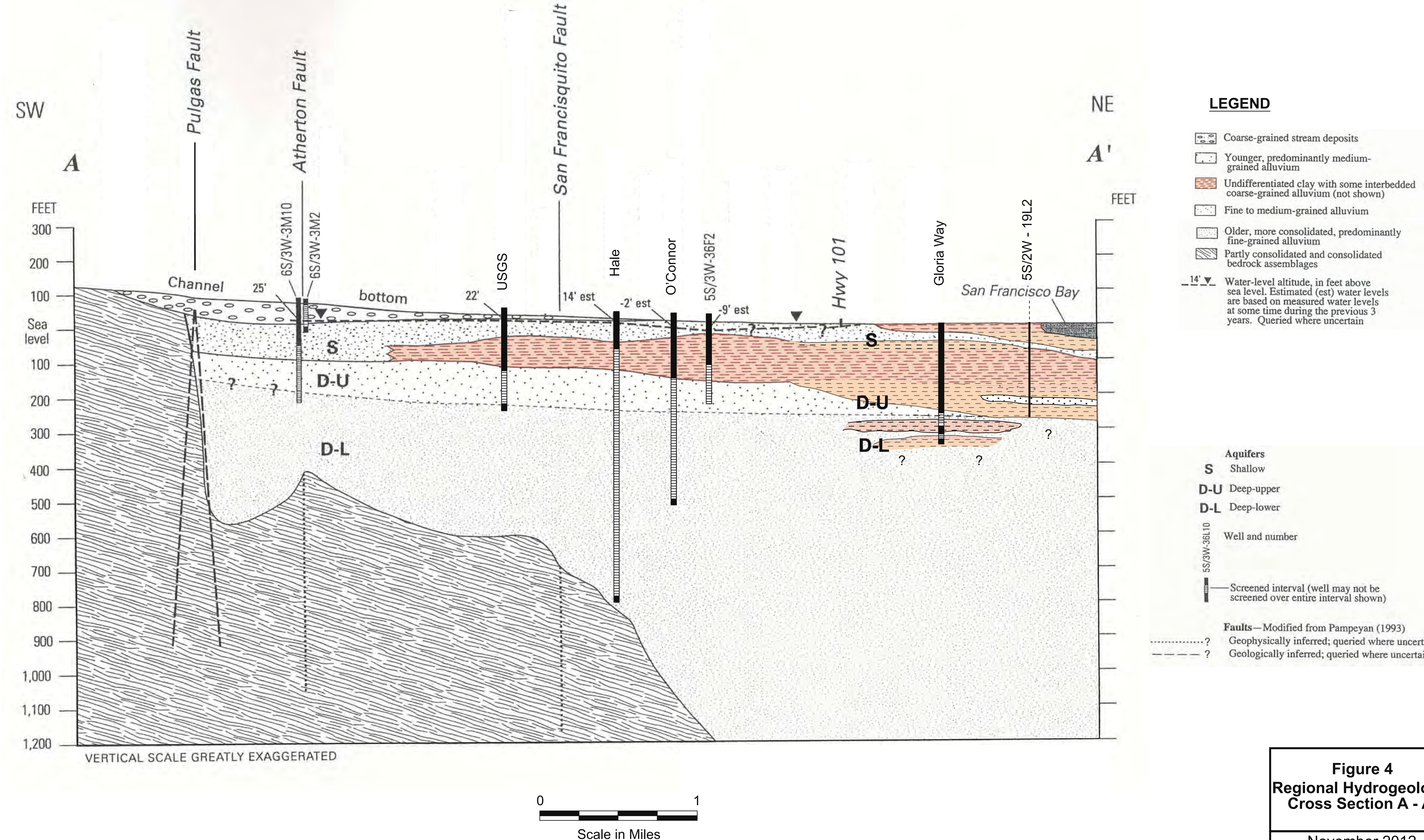
Figure 3
Hydrogeologic Cross Section Locations



Modified from: Metzger, 2002.

Figure 4
Regional Hydrogeologic Cross Section A - A'

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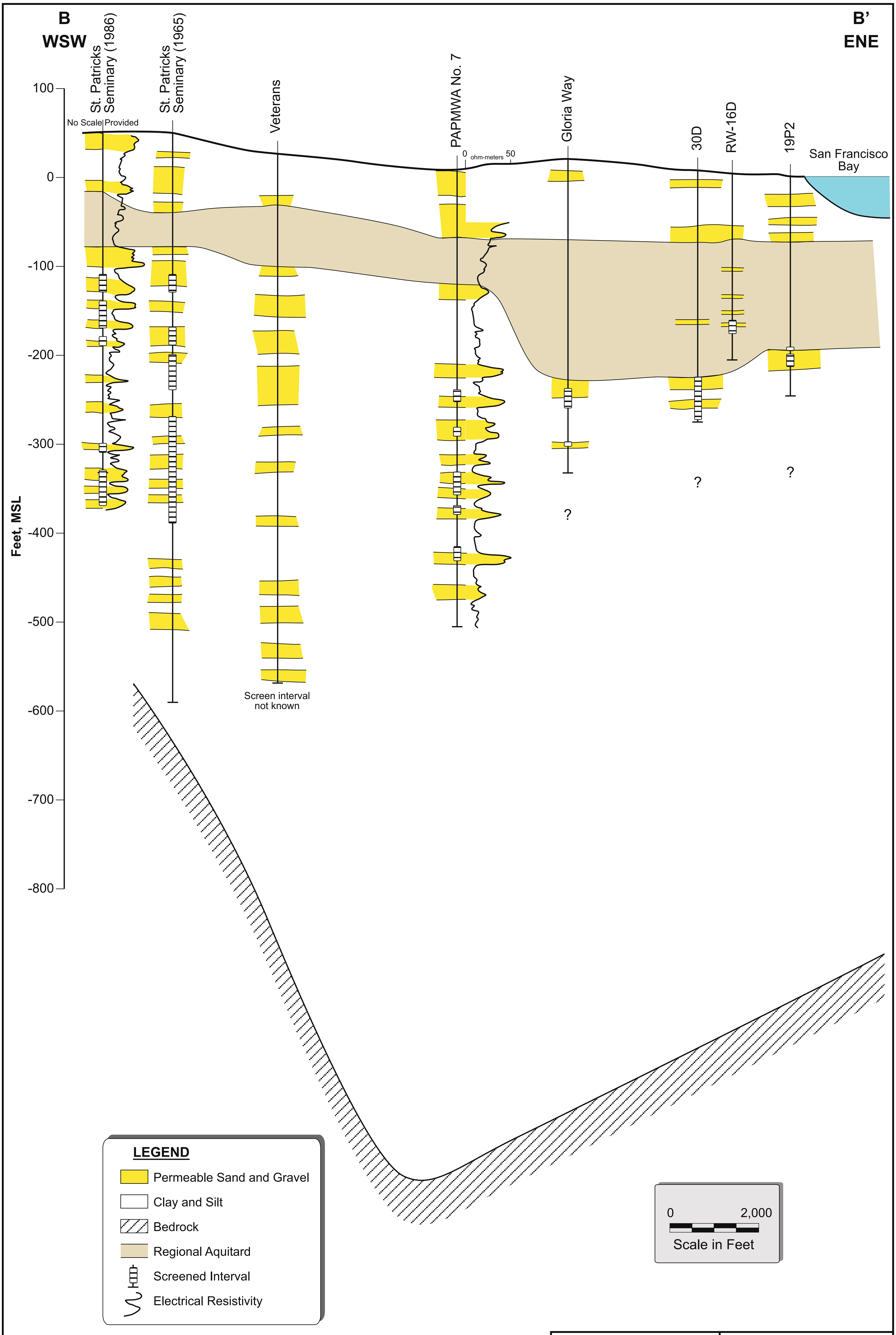

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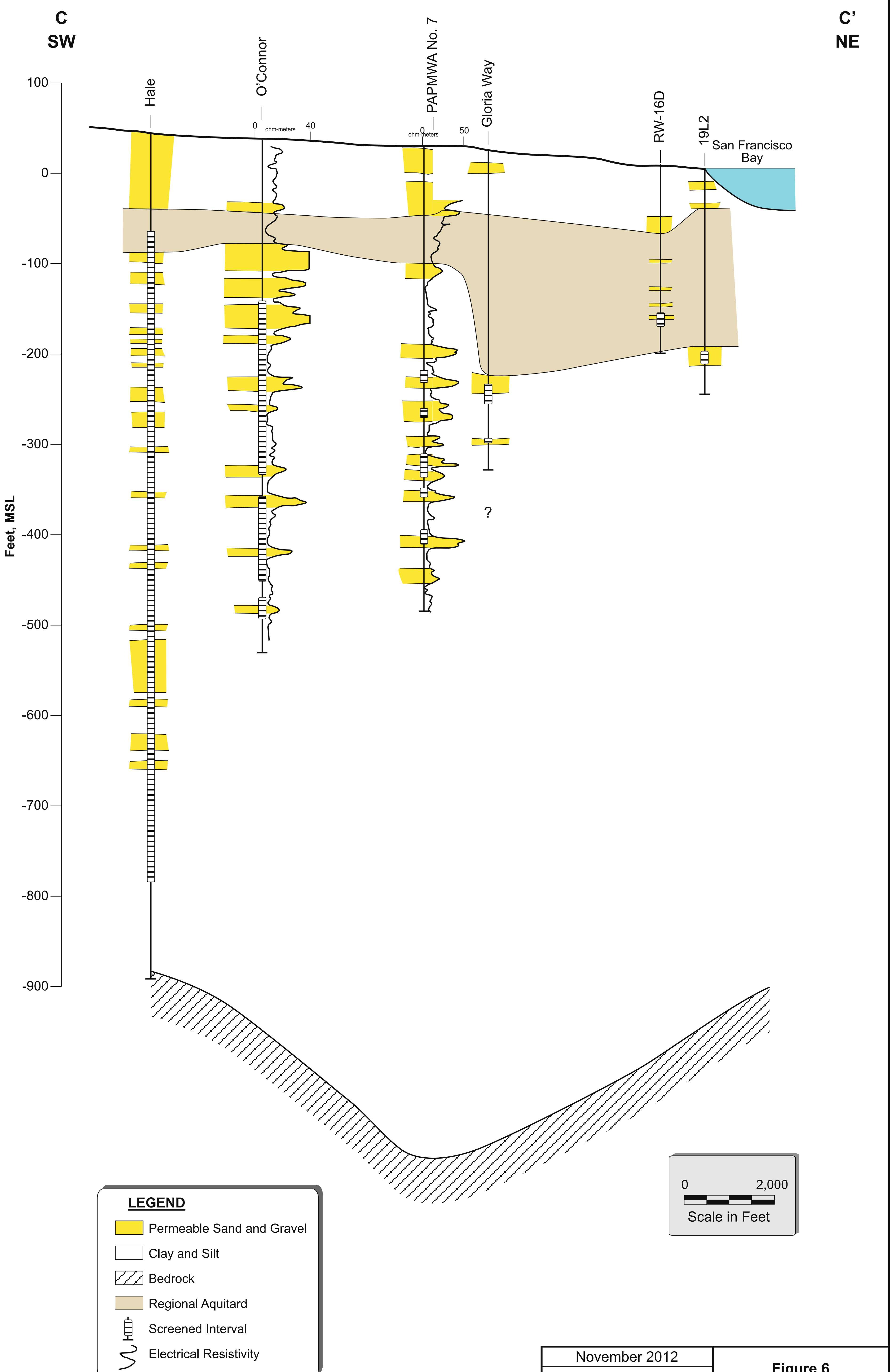
Figure 5
Local Cross Section
B - B'



November 2012	**Figure 6**
TODD ENGINEERS Alameda, California	**Local Cross Section C - C'**

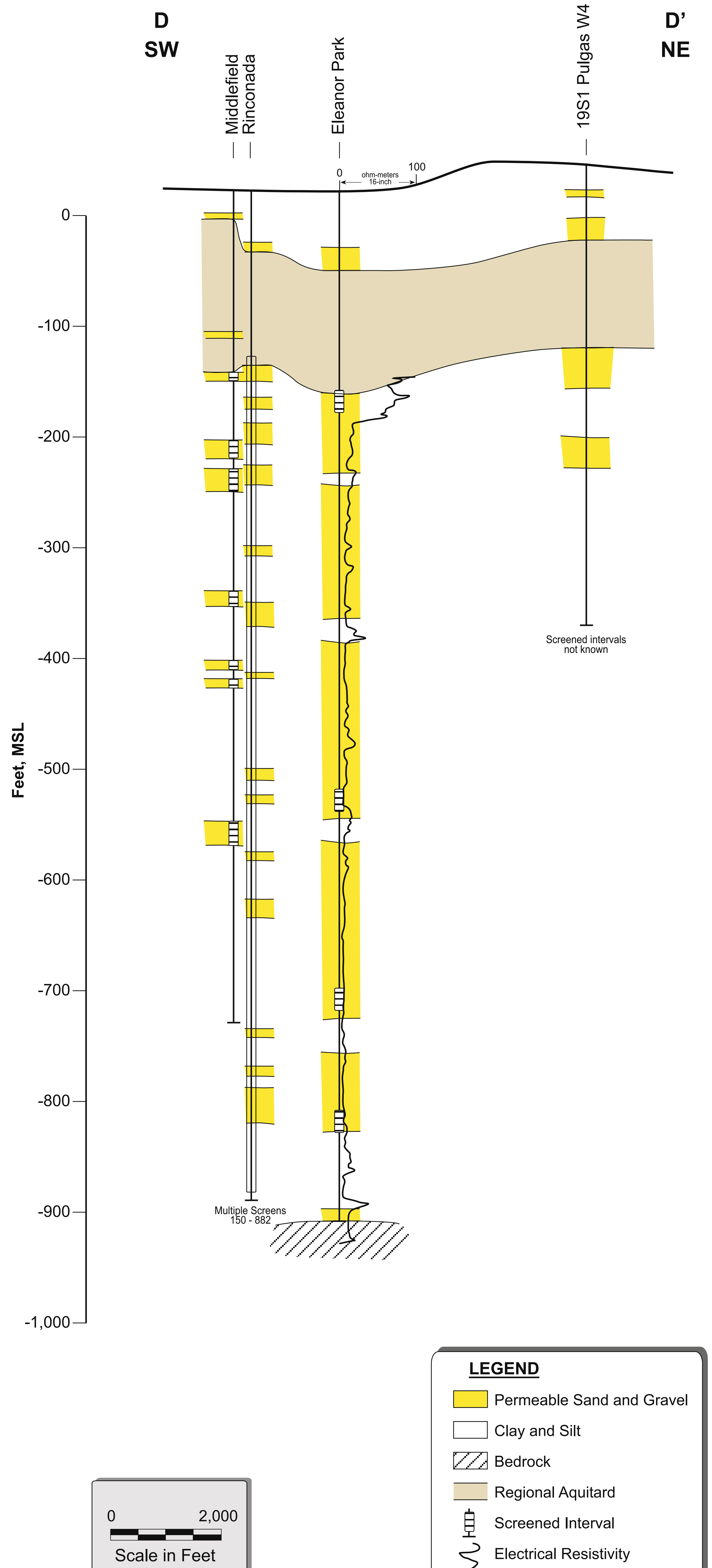


Figure 7
Local Cross Section
D - D'

November 2012

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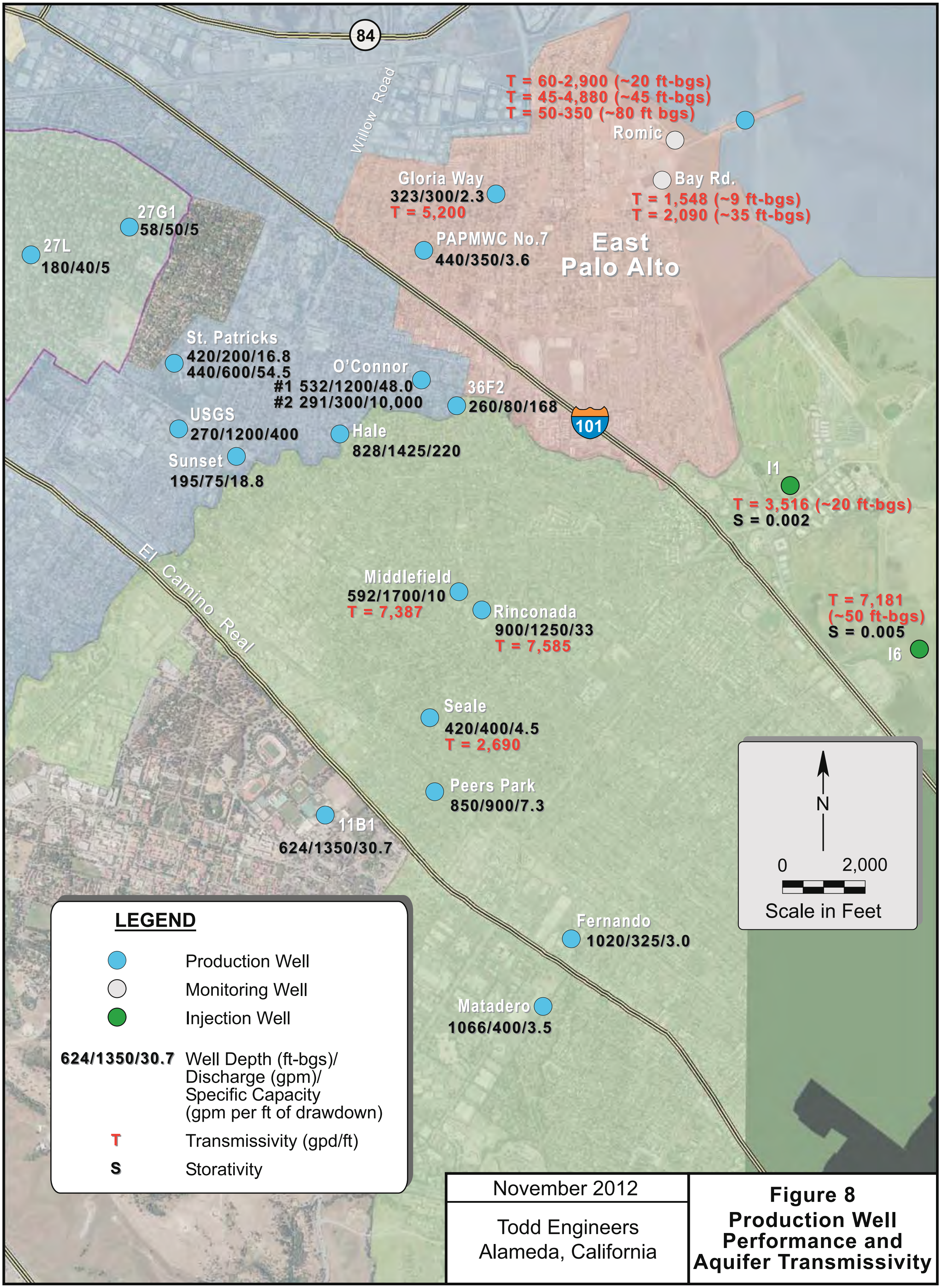
Alameda, California



November 2012

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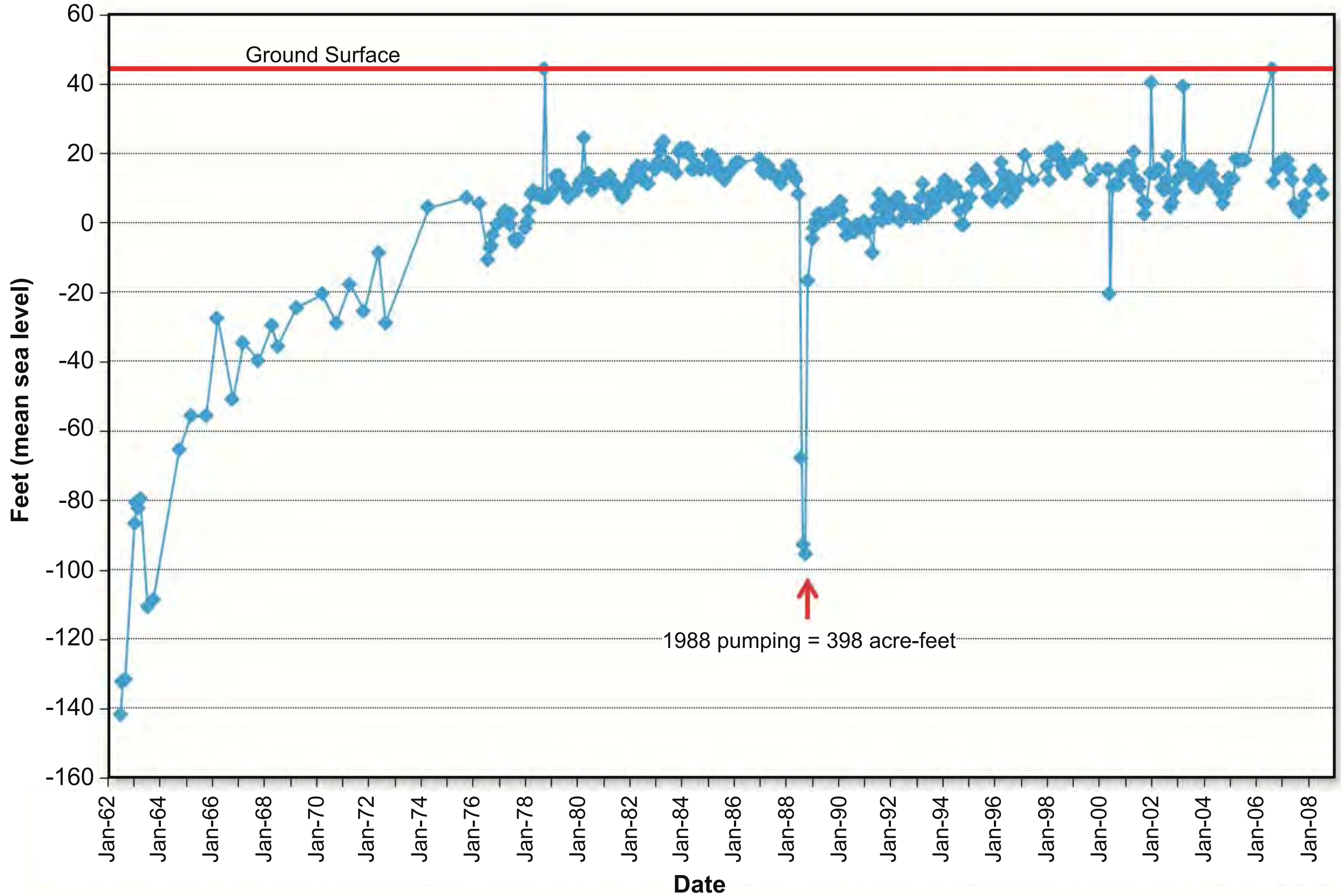
Alameda, California

Figure 8
Production Well Performance and Aquifer Transmissivity



November 2012	**Figure 9**
TODD ENGINEERS Alameda, California	**Historic Groundwater Levels in the Hale Well**

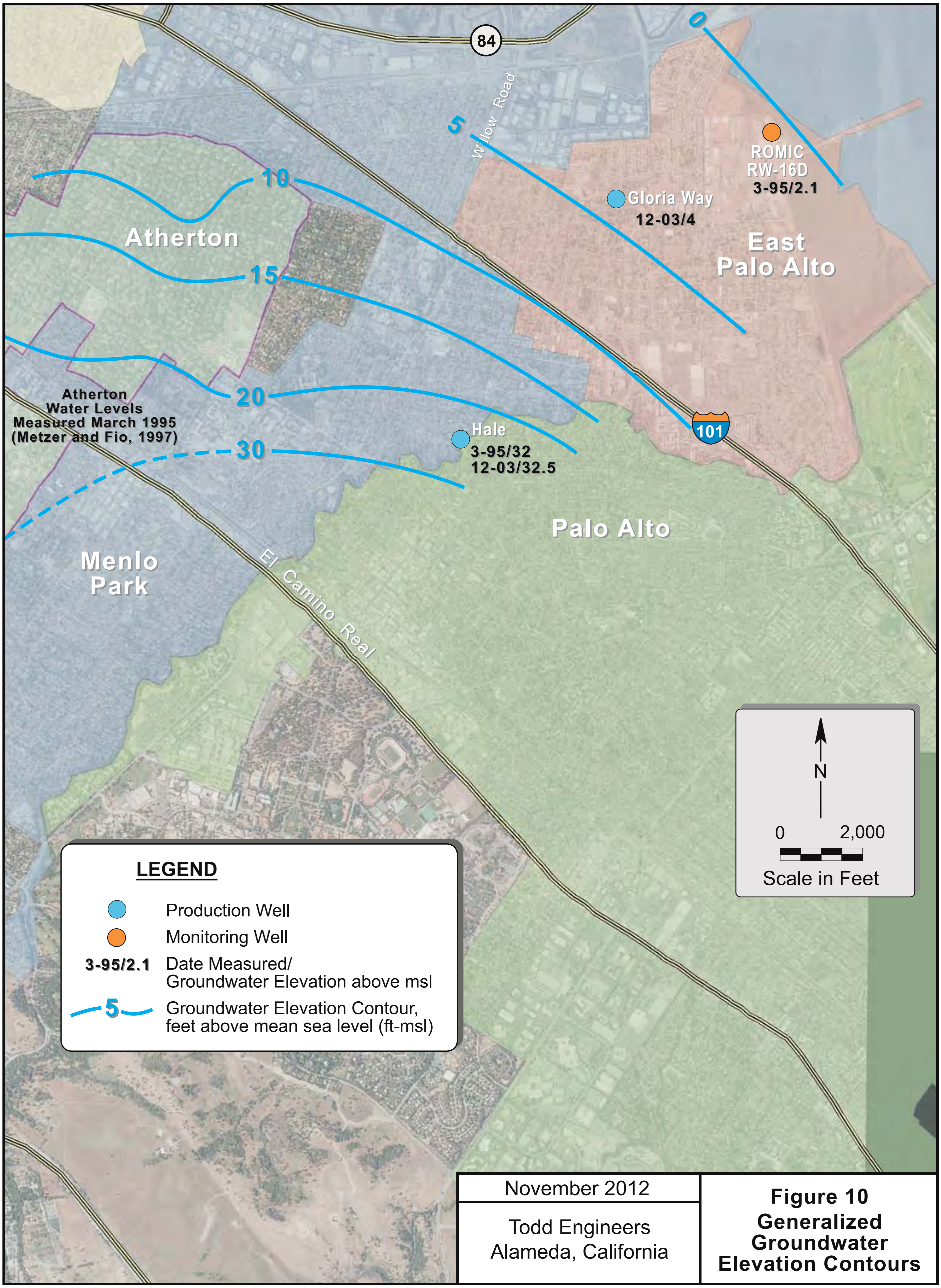


Figure 10
Generalized Groundwater Elevation Contours

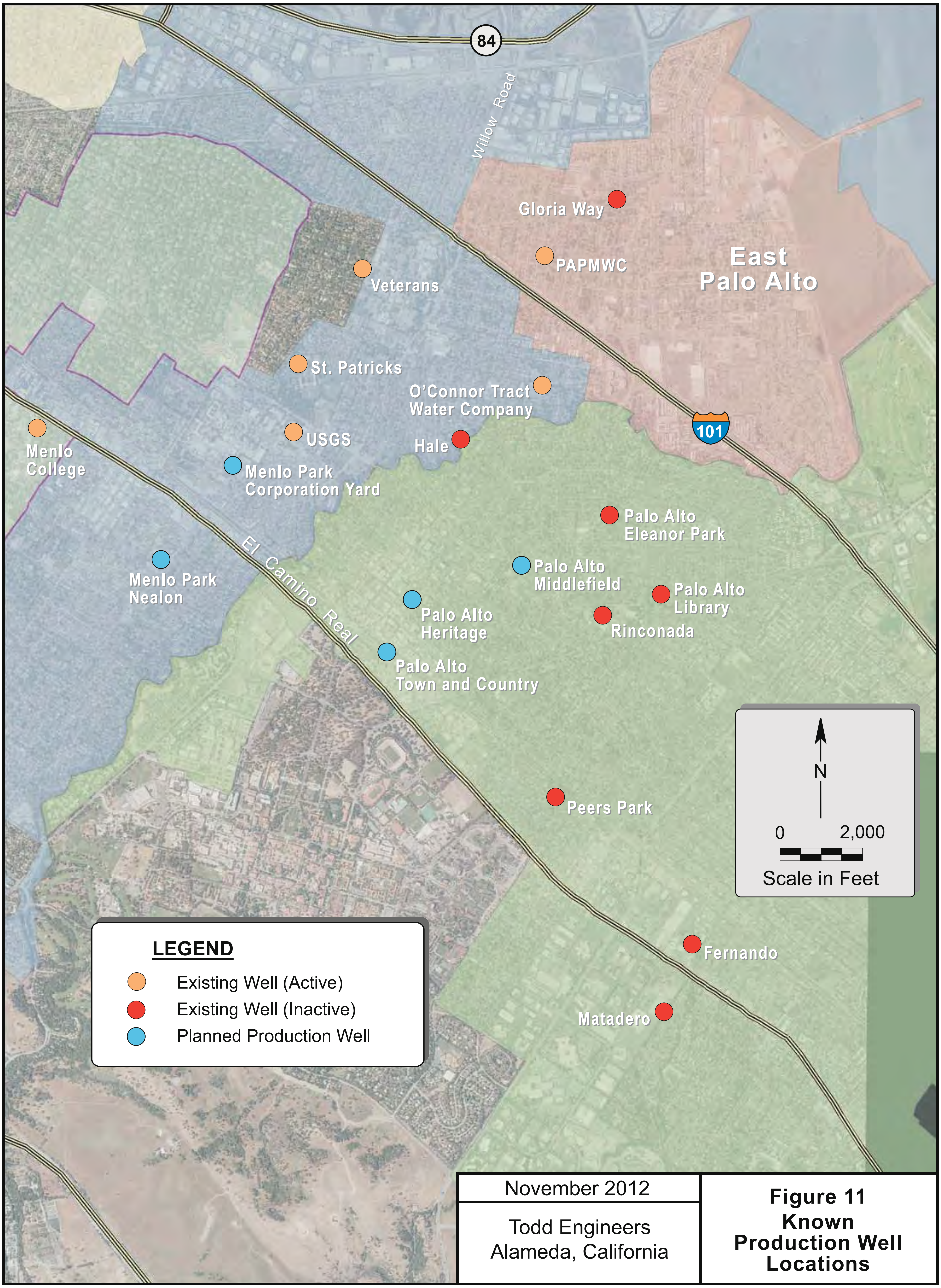


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Figure 11
Known Production Well Locations

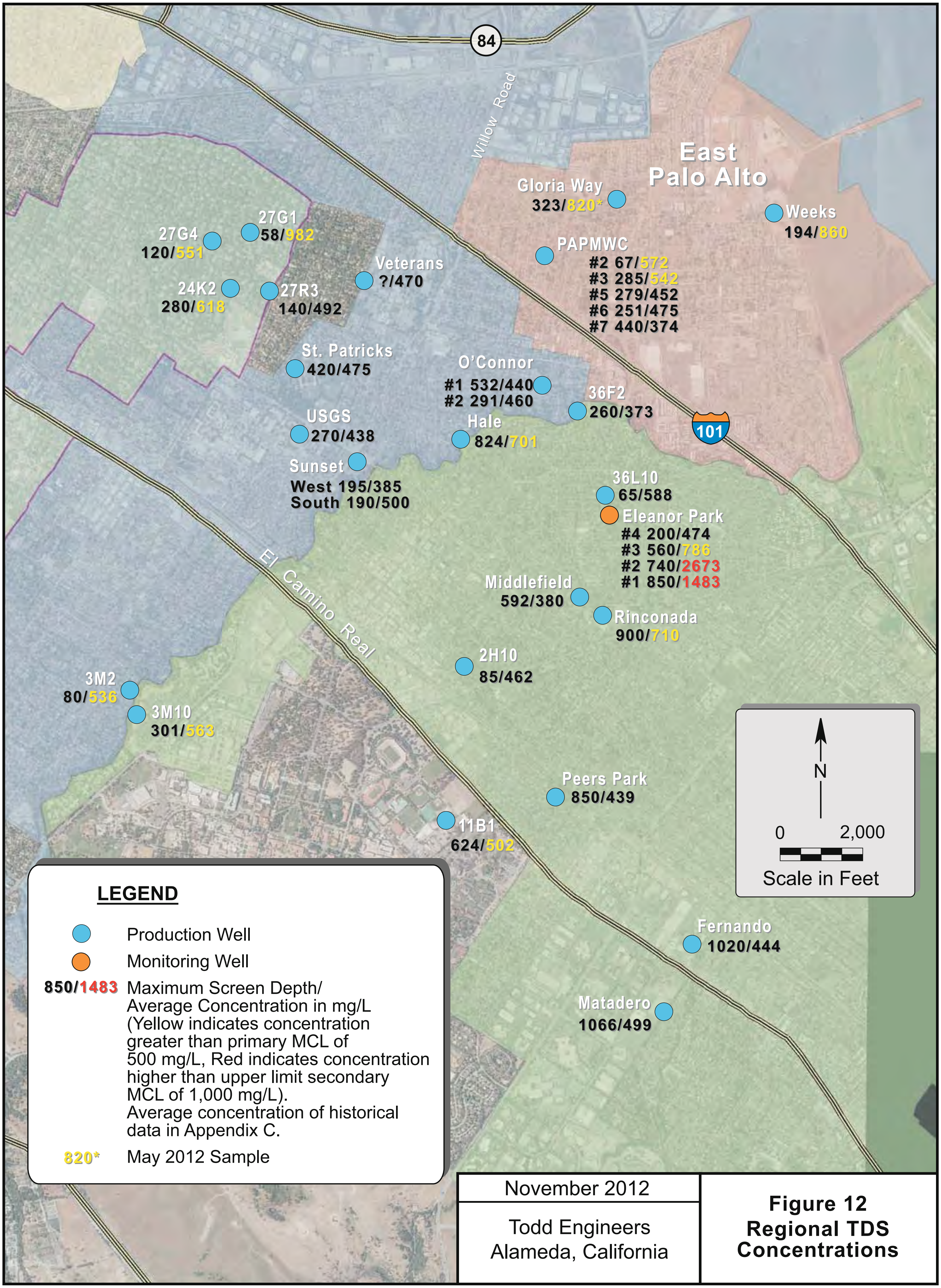

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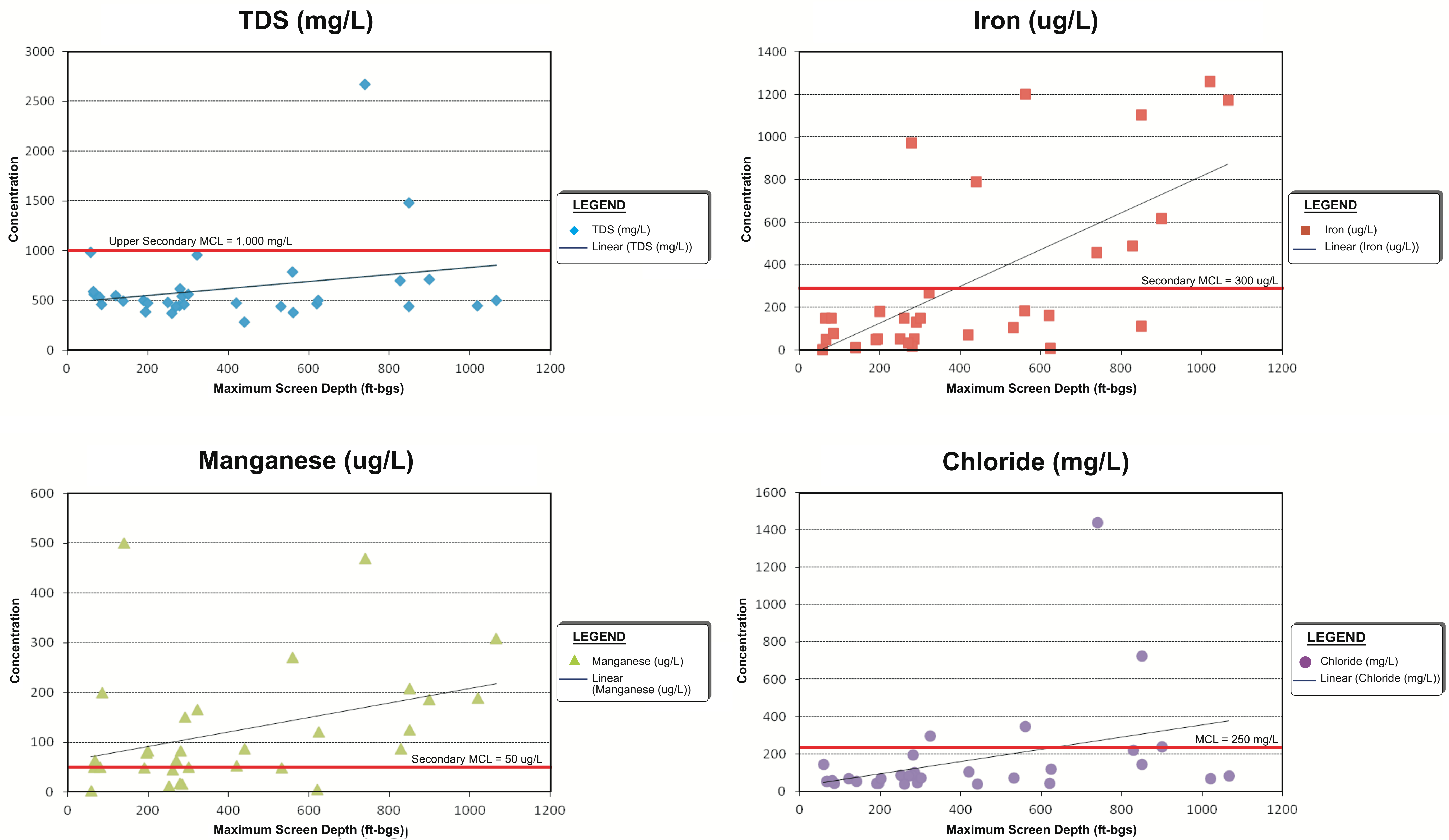
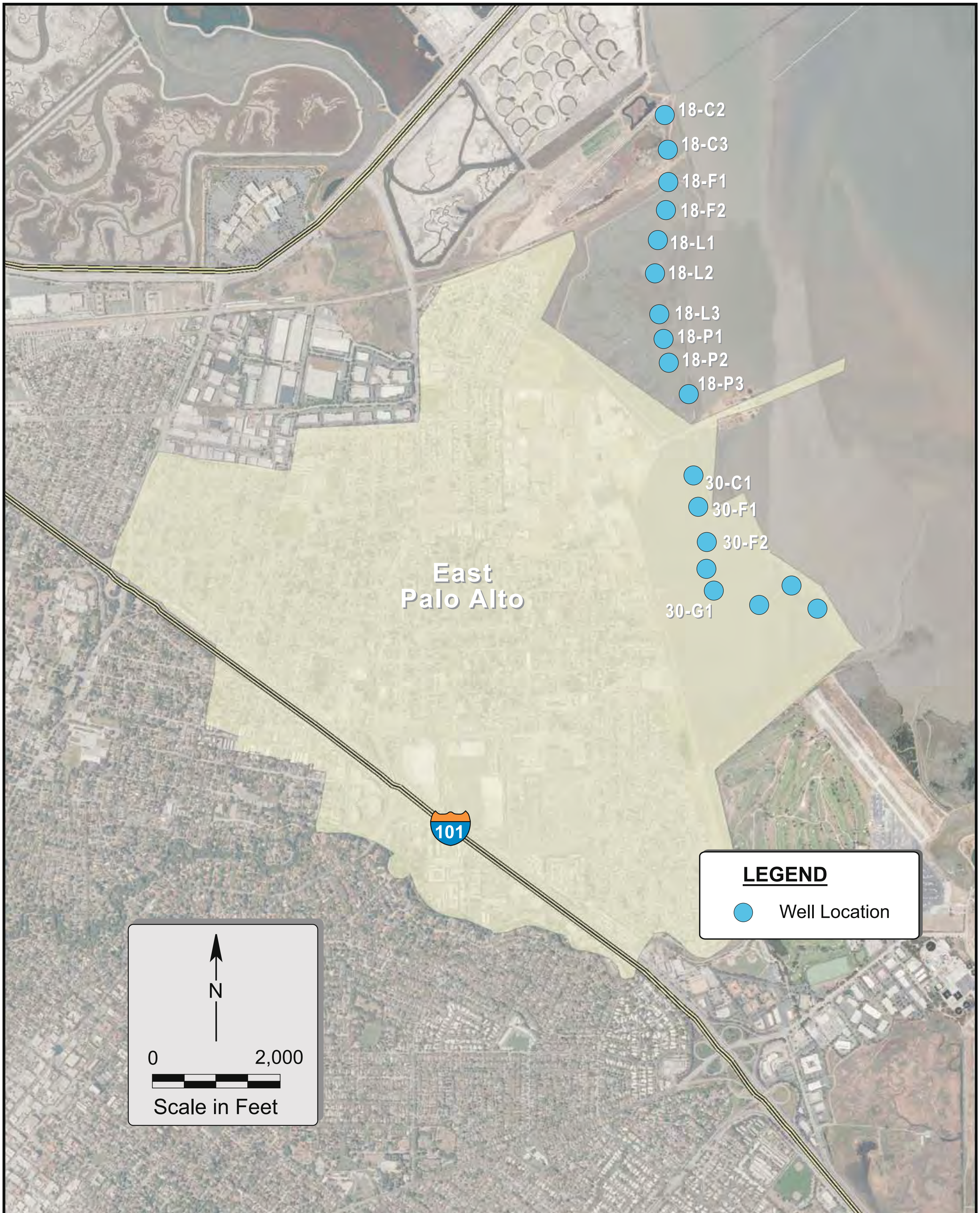
Figure 12
Regional TDS Concentrations



Note: Average concentration of historical data in Appendix C.

November 2012	**Figure 13 Water Quality Trends with Depth**
TODD ENGINEERS Alameda, California	



From: CDWR well logs; Geomatrix and Papadopulos, 1989.

November 2012	**Figure 14 Locations of Ravenswood Wells**
Todd Engineers Alameda, California	

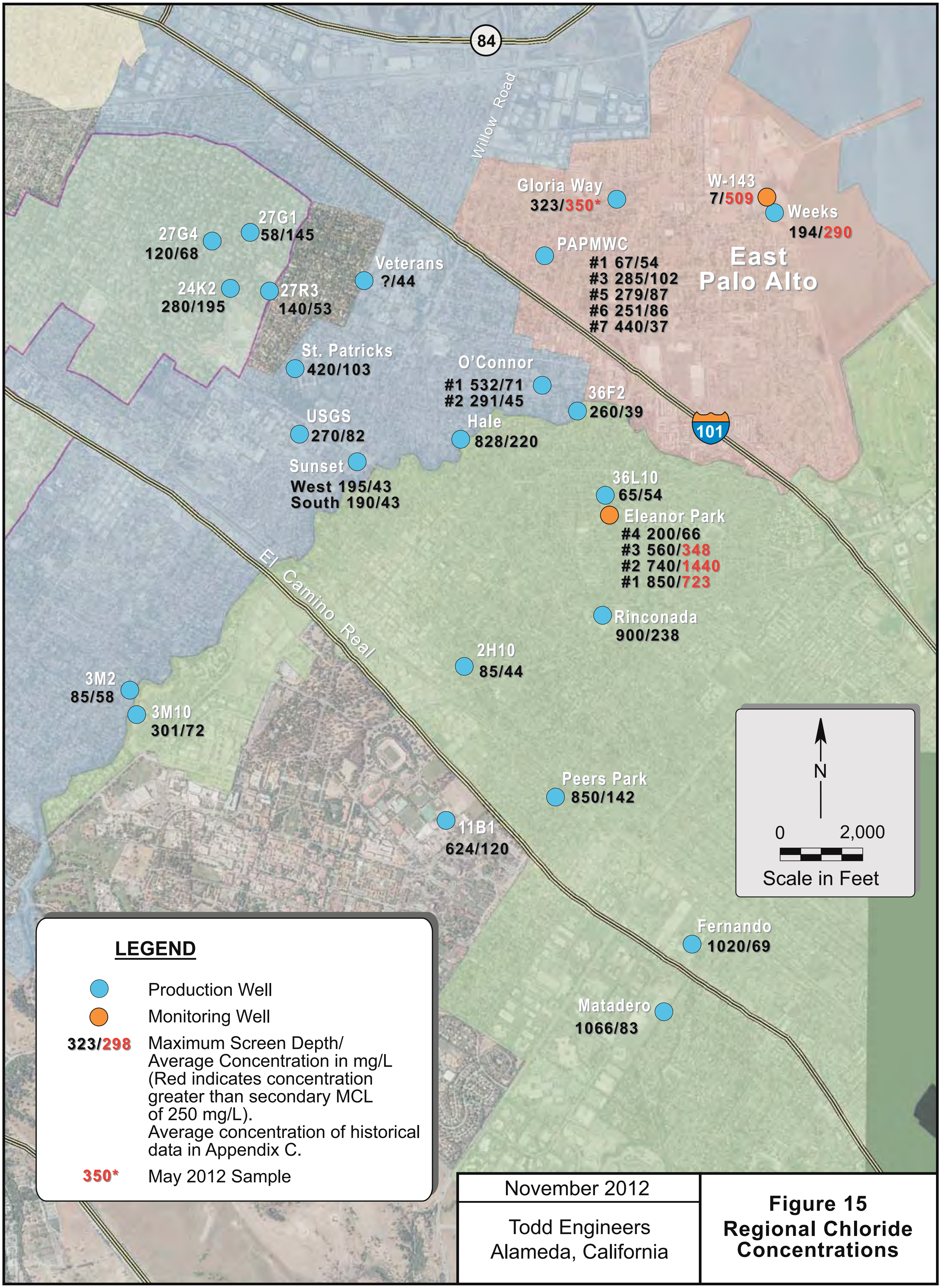


Figure 15
Regional Chloride Concentrations

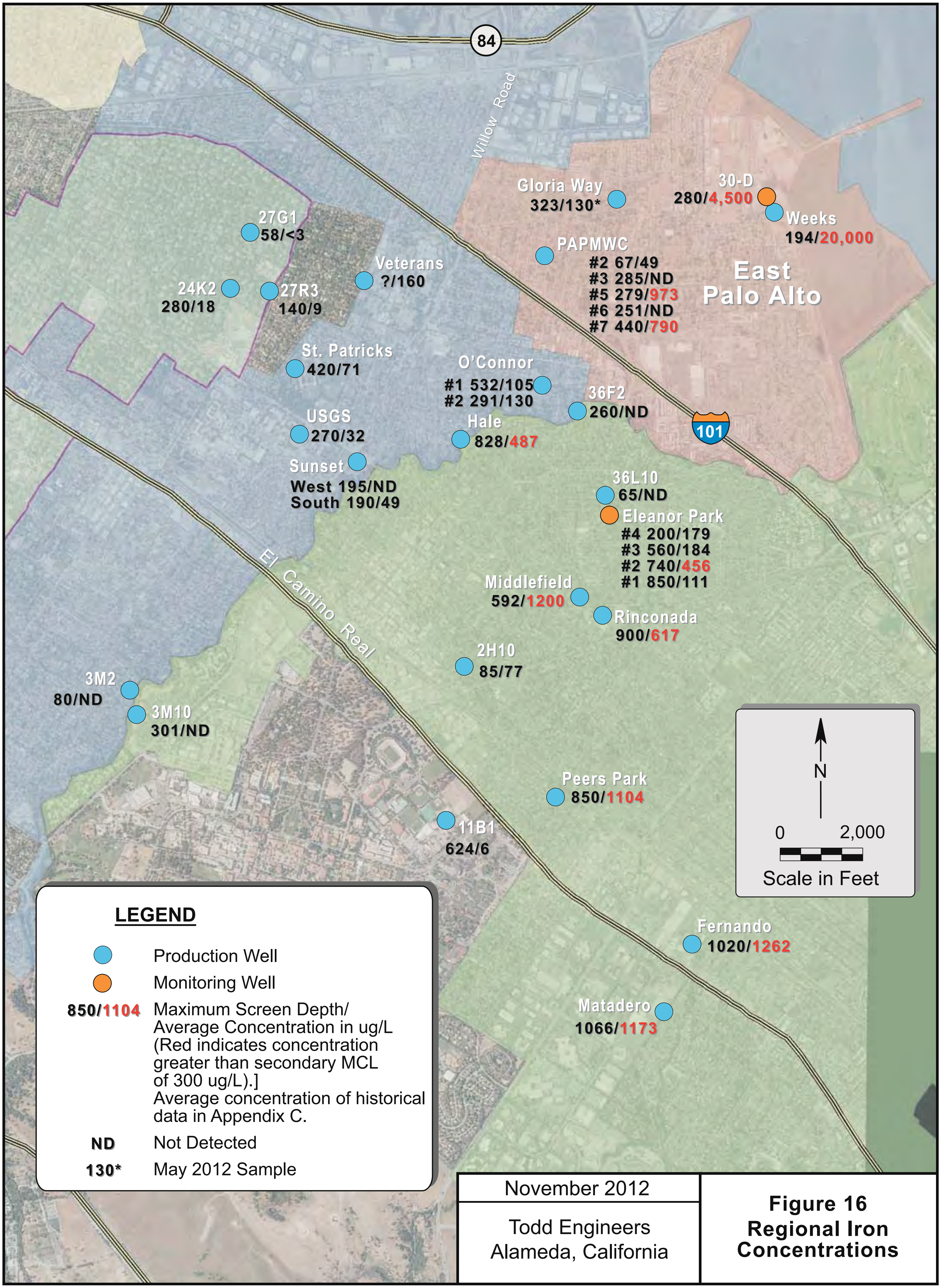


Figure 16
Regional Iron Concentrations

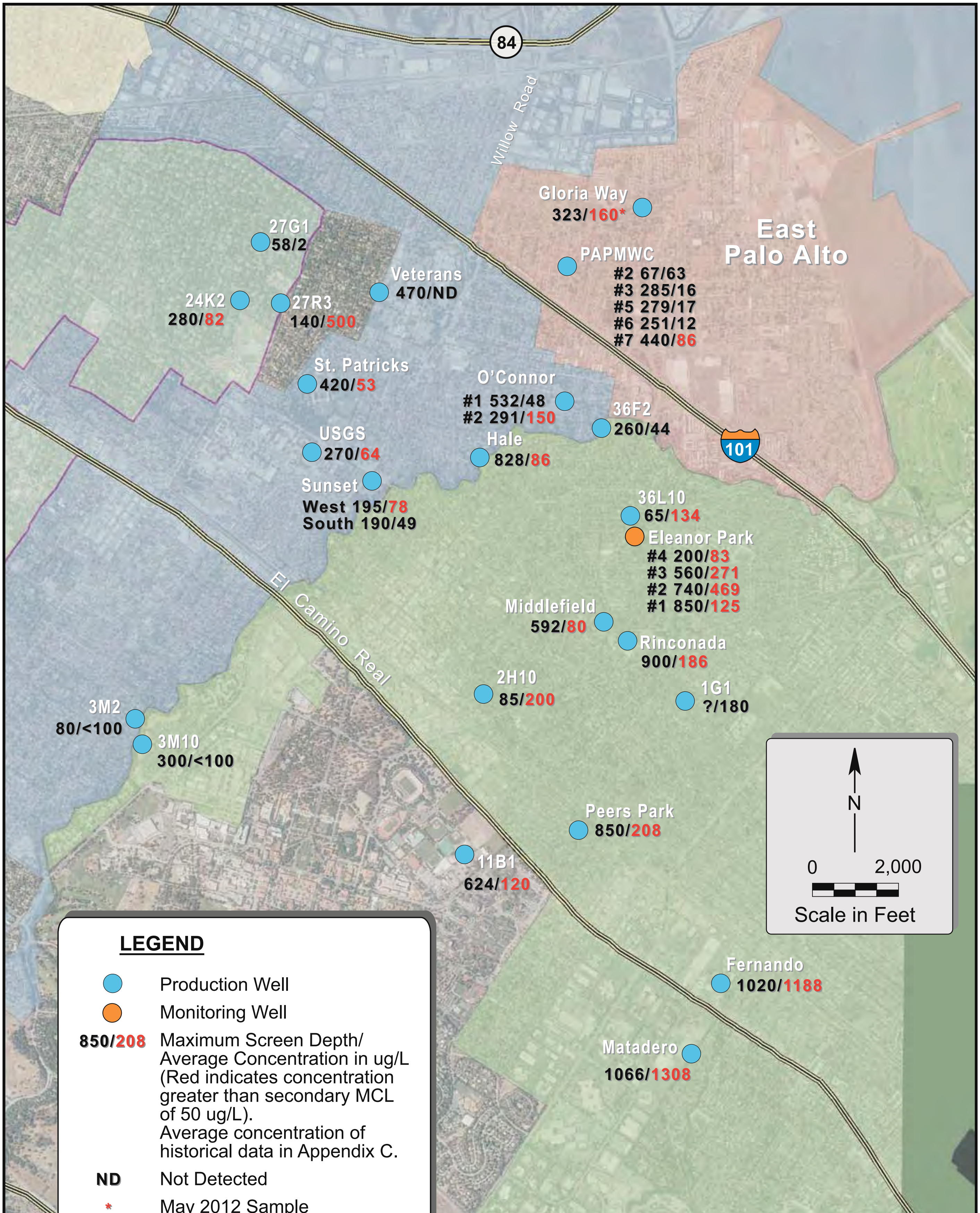


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Figure 17
Regional Manganese Concentrations

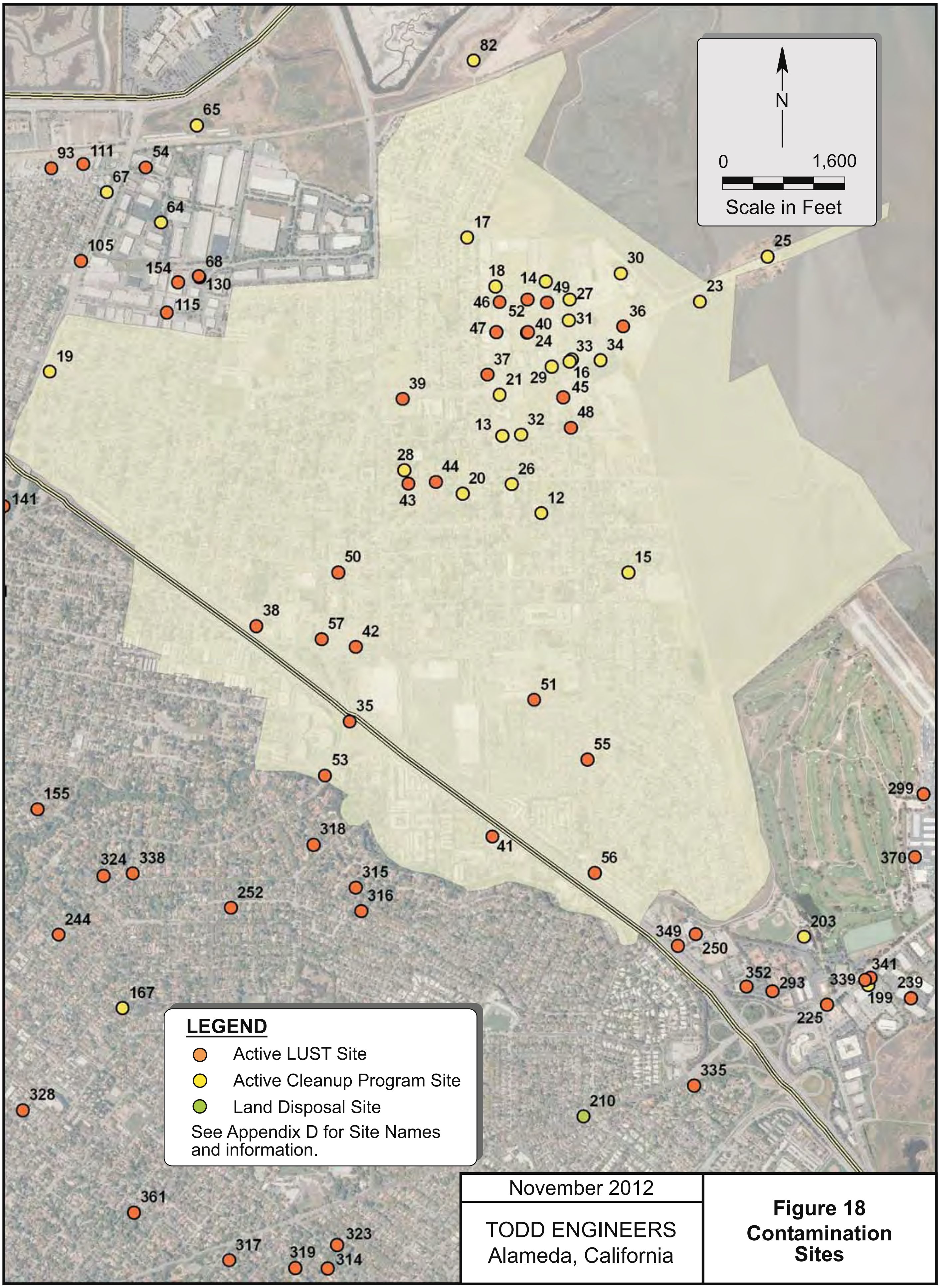

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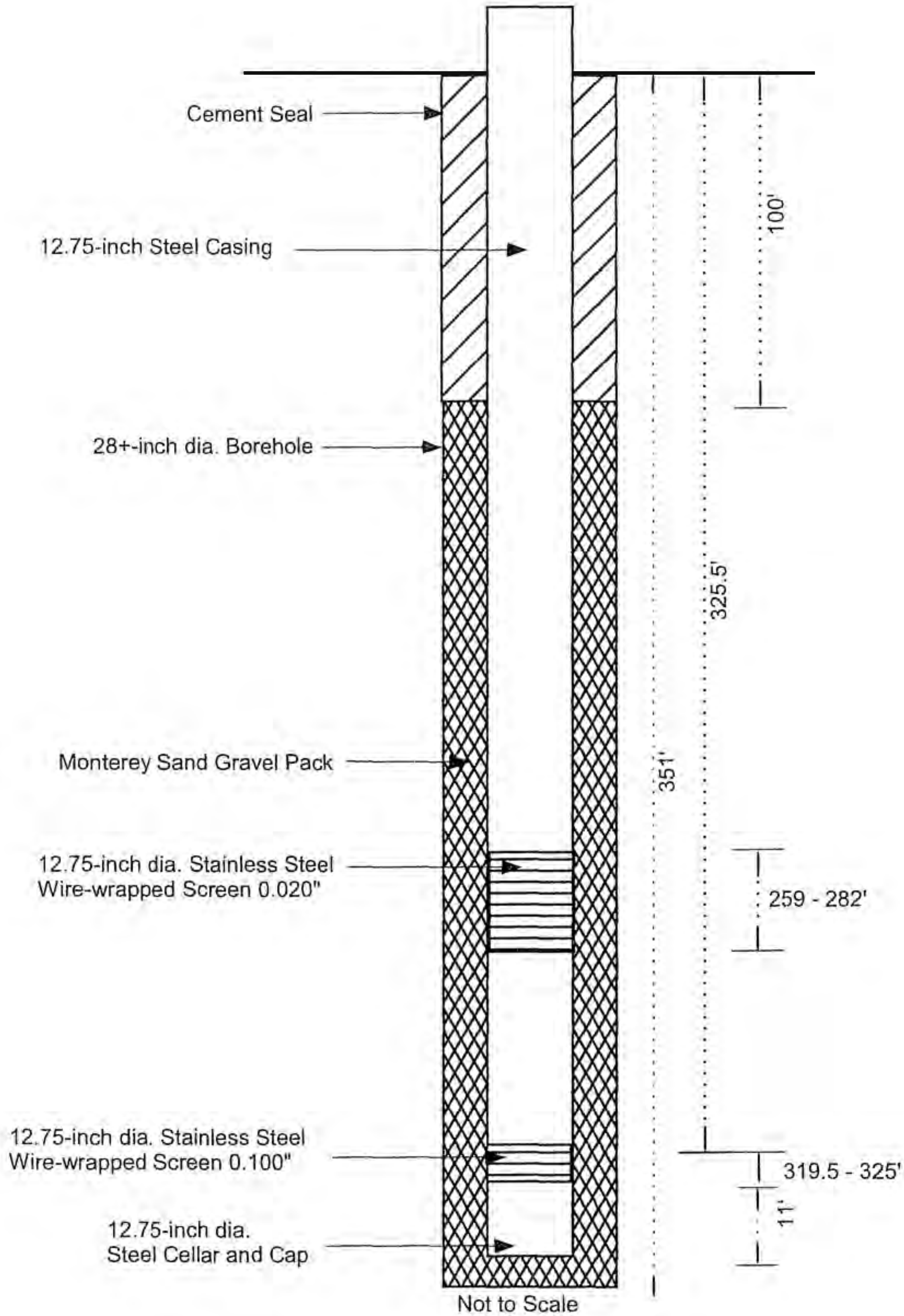
Figure 18
Contamination Sites



Construction details taken from Drilllers
Log as corrected by Video Survey

Source: HDR, 2004.

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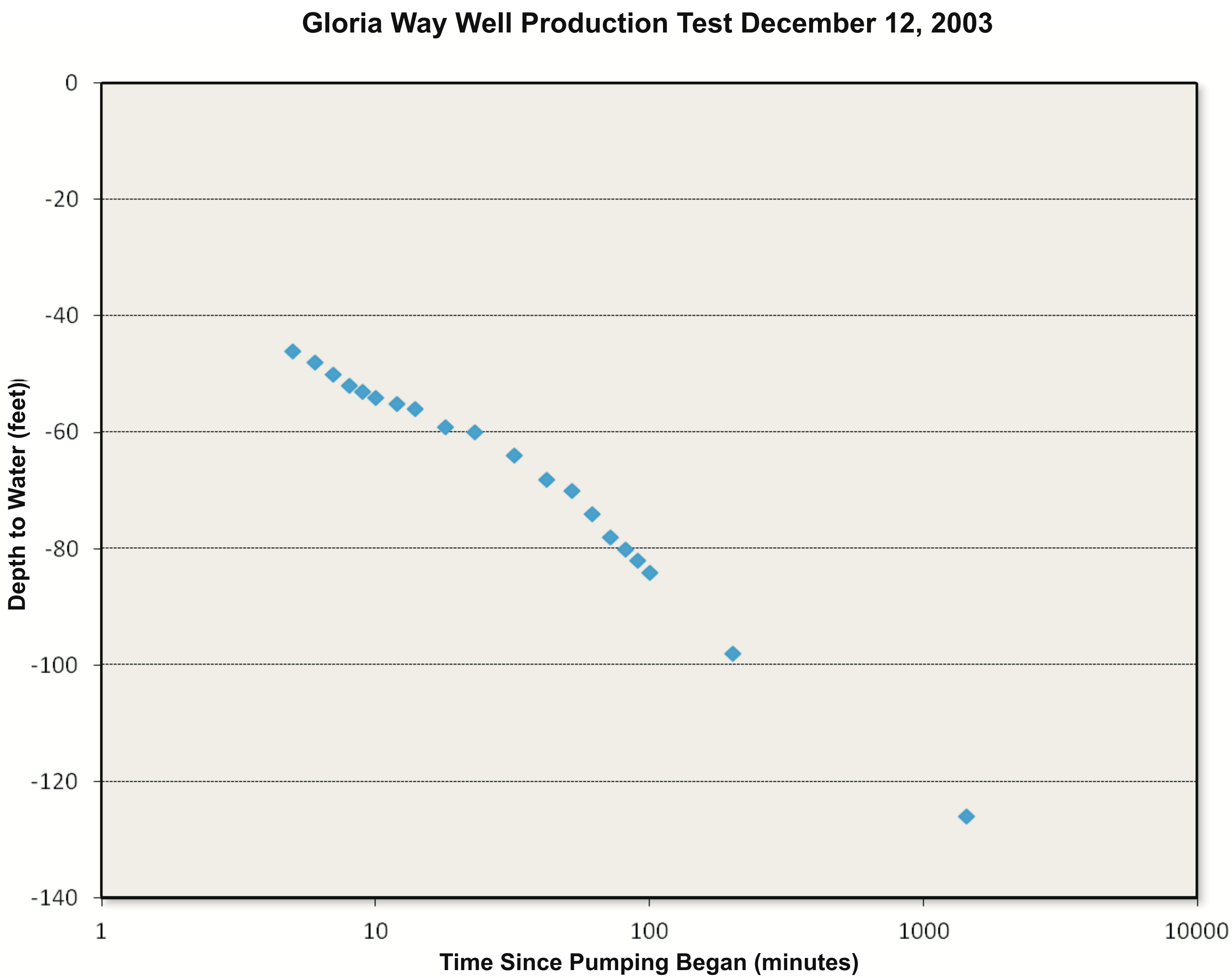
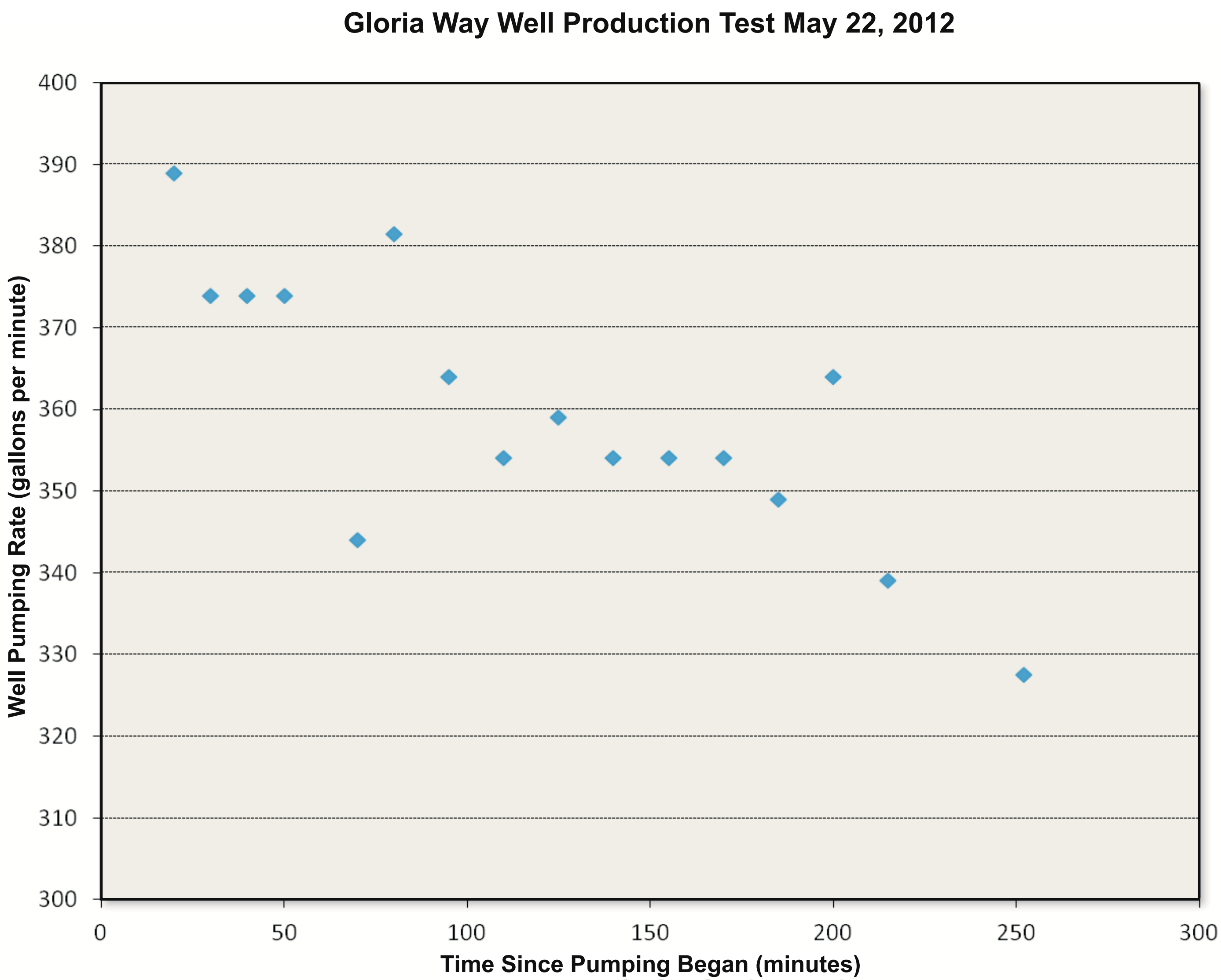
Figure 19
As-built Schematic of Gloria Way Well



November 2012	Figure 20
TODD ENGINEERS Alameda, California	**Gloria Way Well Production Test December 12, 2003**



November 2012

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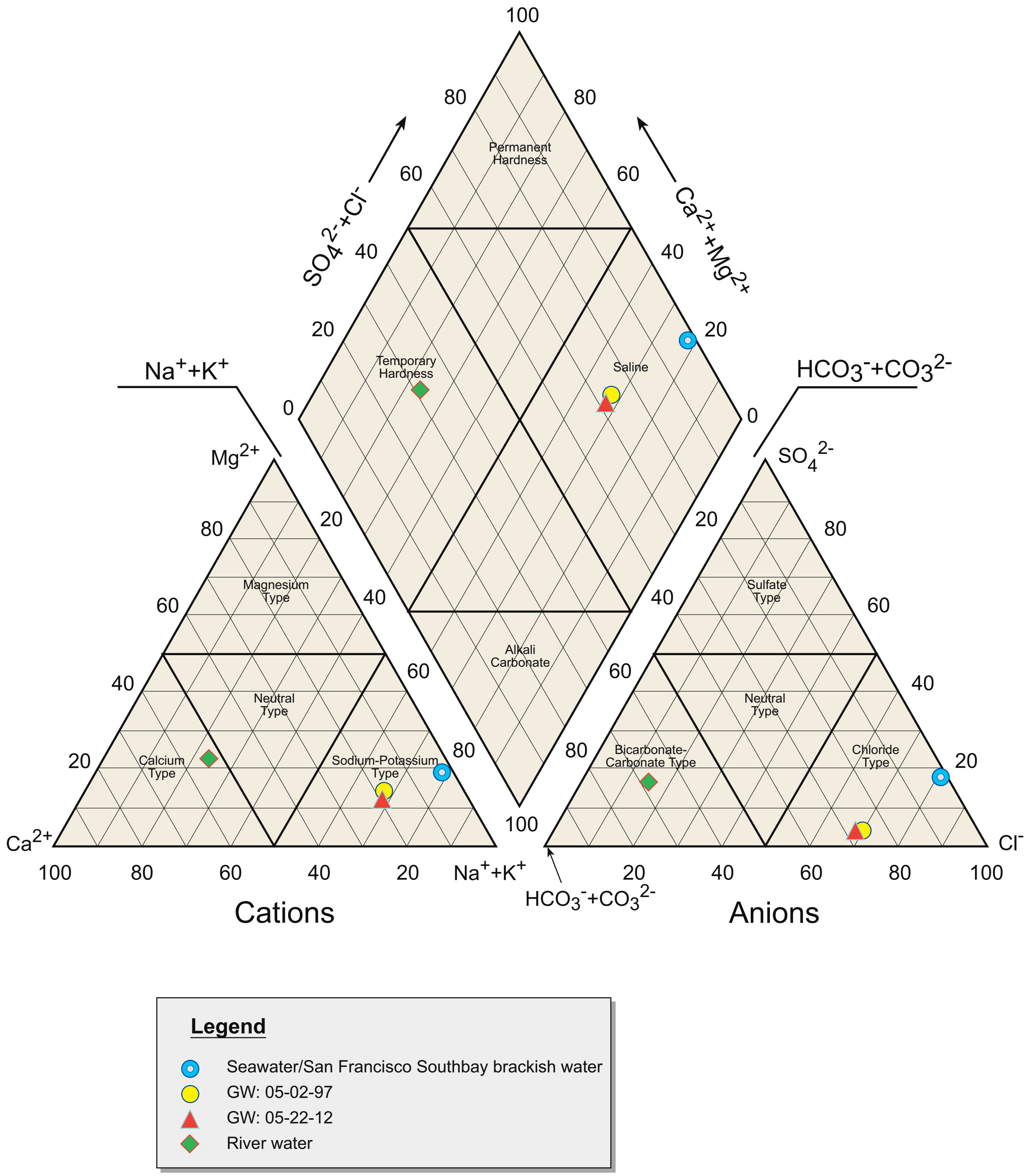
Figure 21
Gloria Way Well Production Test May 22, 2012



Note: Classification by Hownslow (1995)

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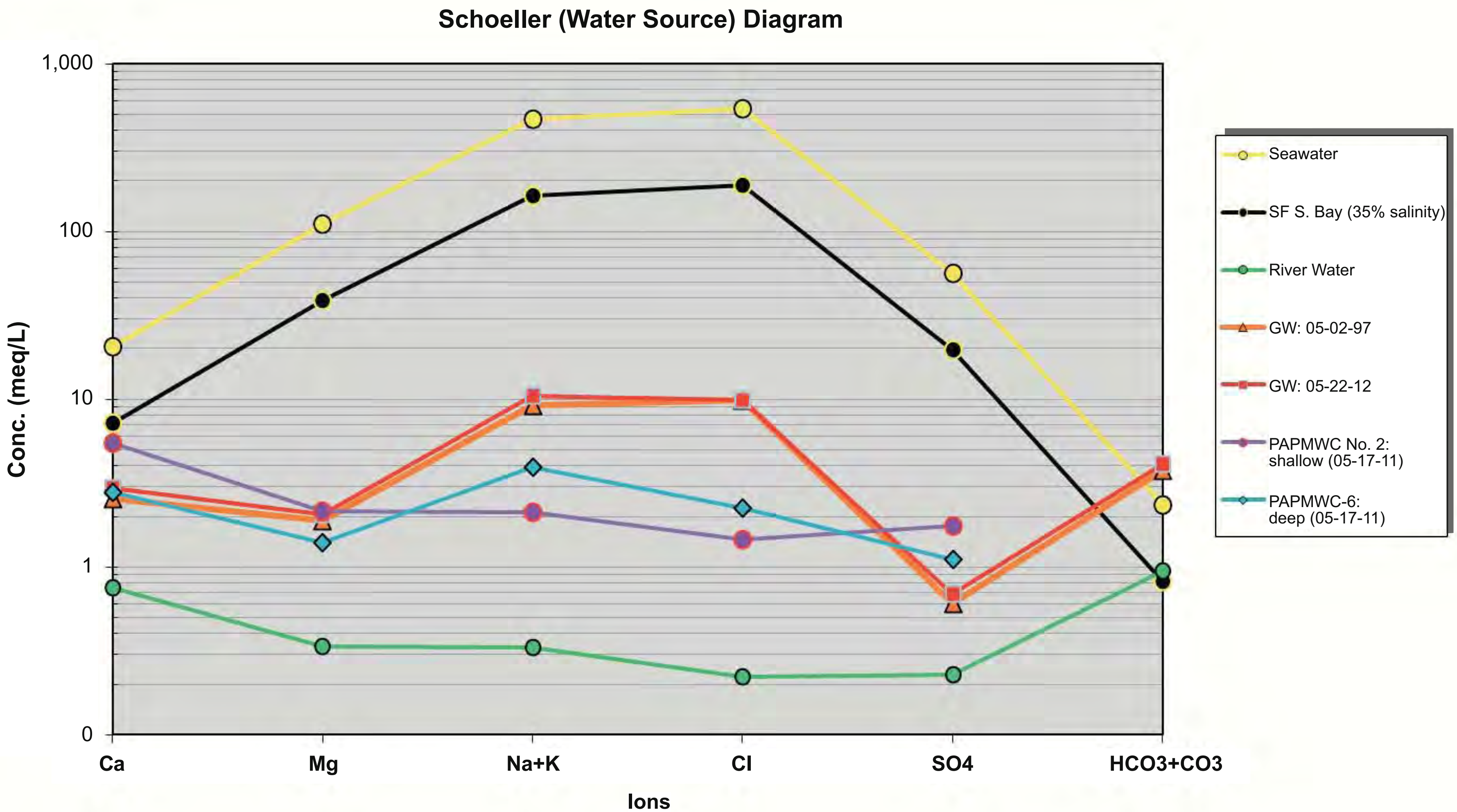
Emeryville, California

Figure 22
Trilinear Diagram for City of East Palo Alto



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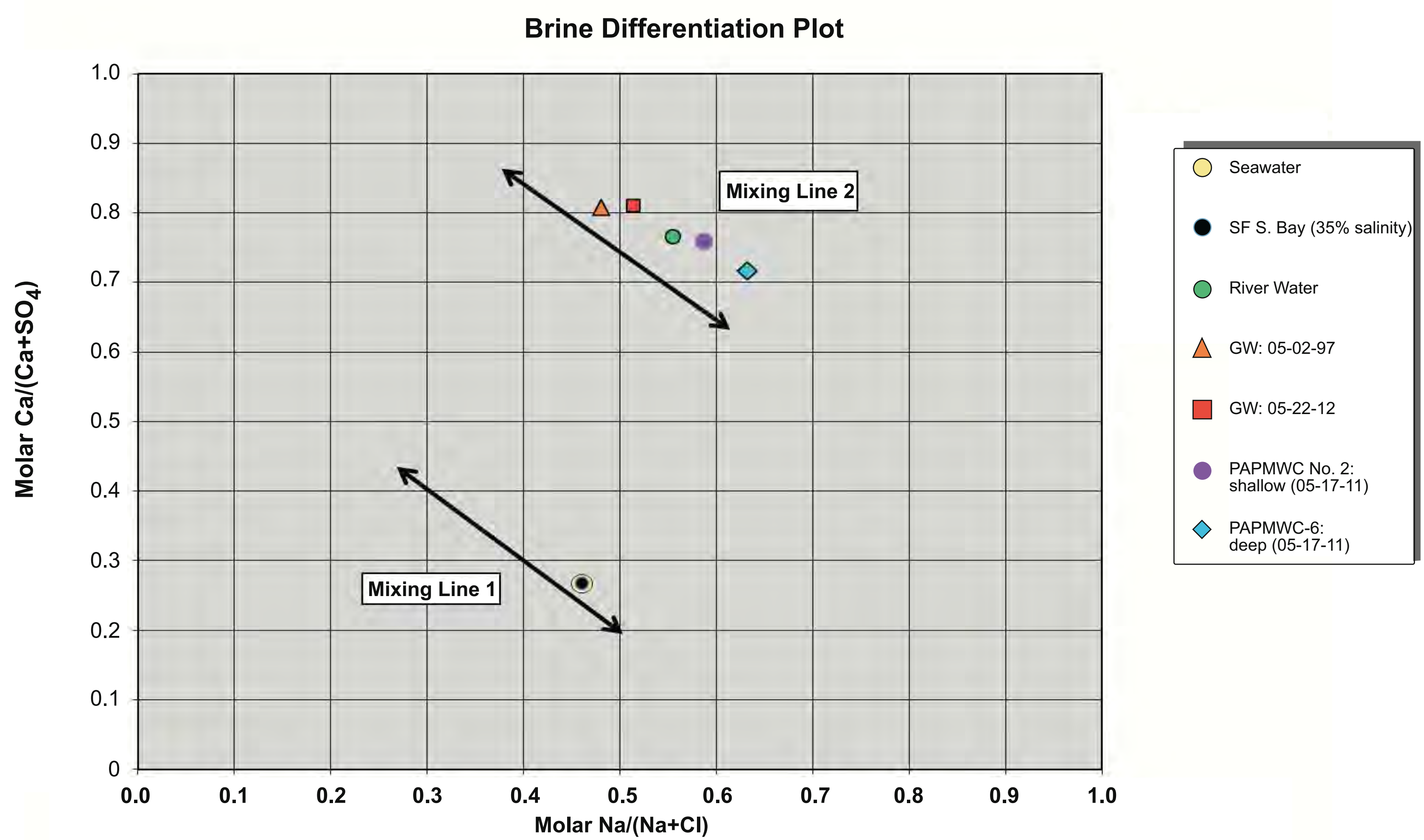
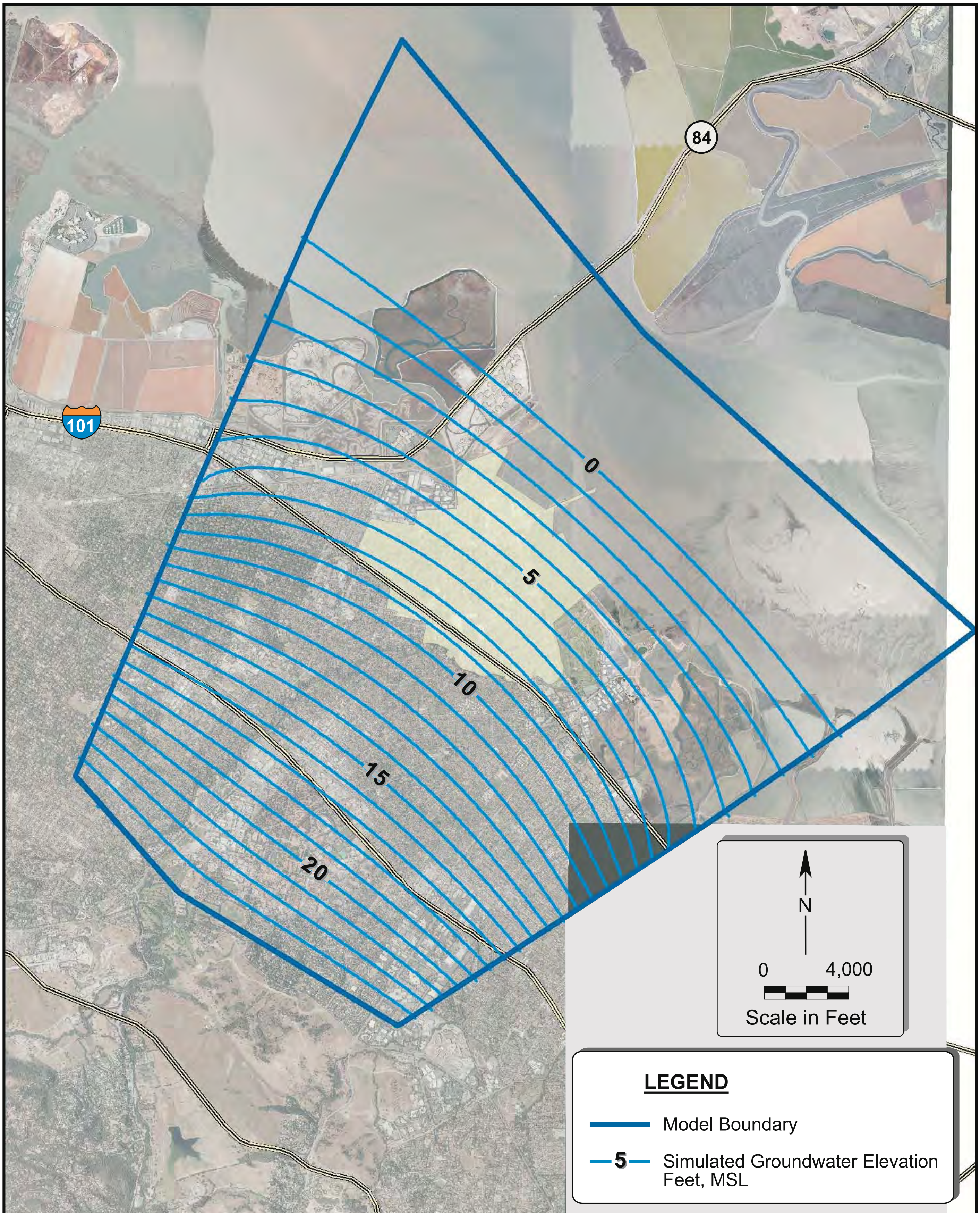
Alameda, California

Figure 23
Water Source (Schoeller) Diagram



November 2012	**Figure 24**
TODD ENGINEERS Alameda, California	**Brine Differentiation Plot**



November 2012

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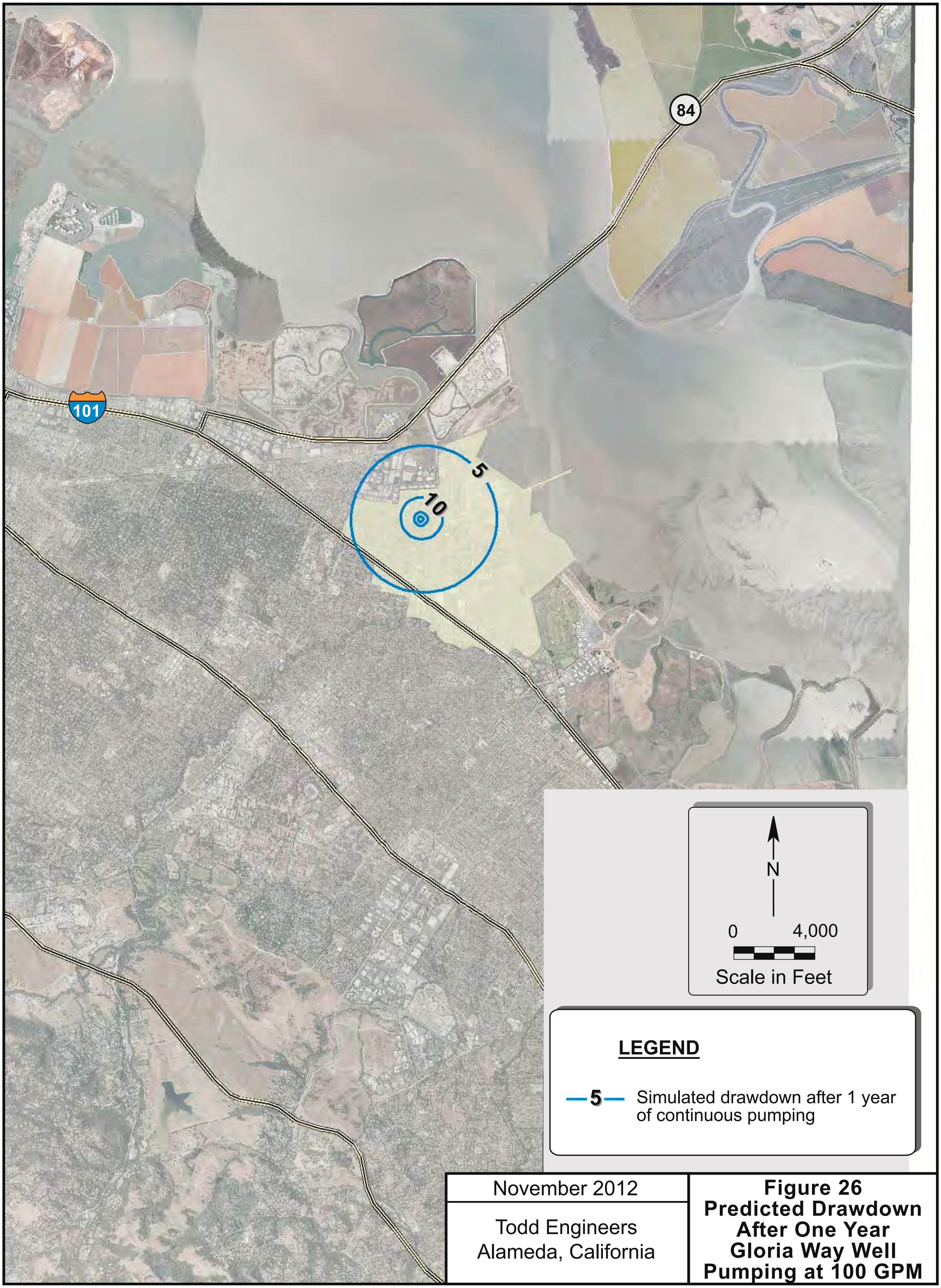
Alameda, California

Figure 25
MODFLOW Model Area and Simulated Steady-State Groundwater Elevations



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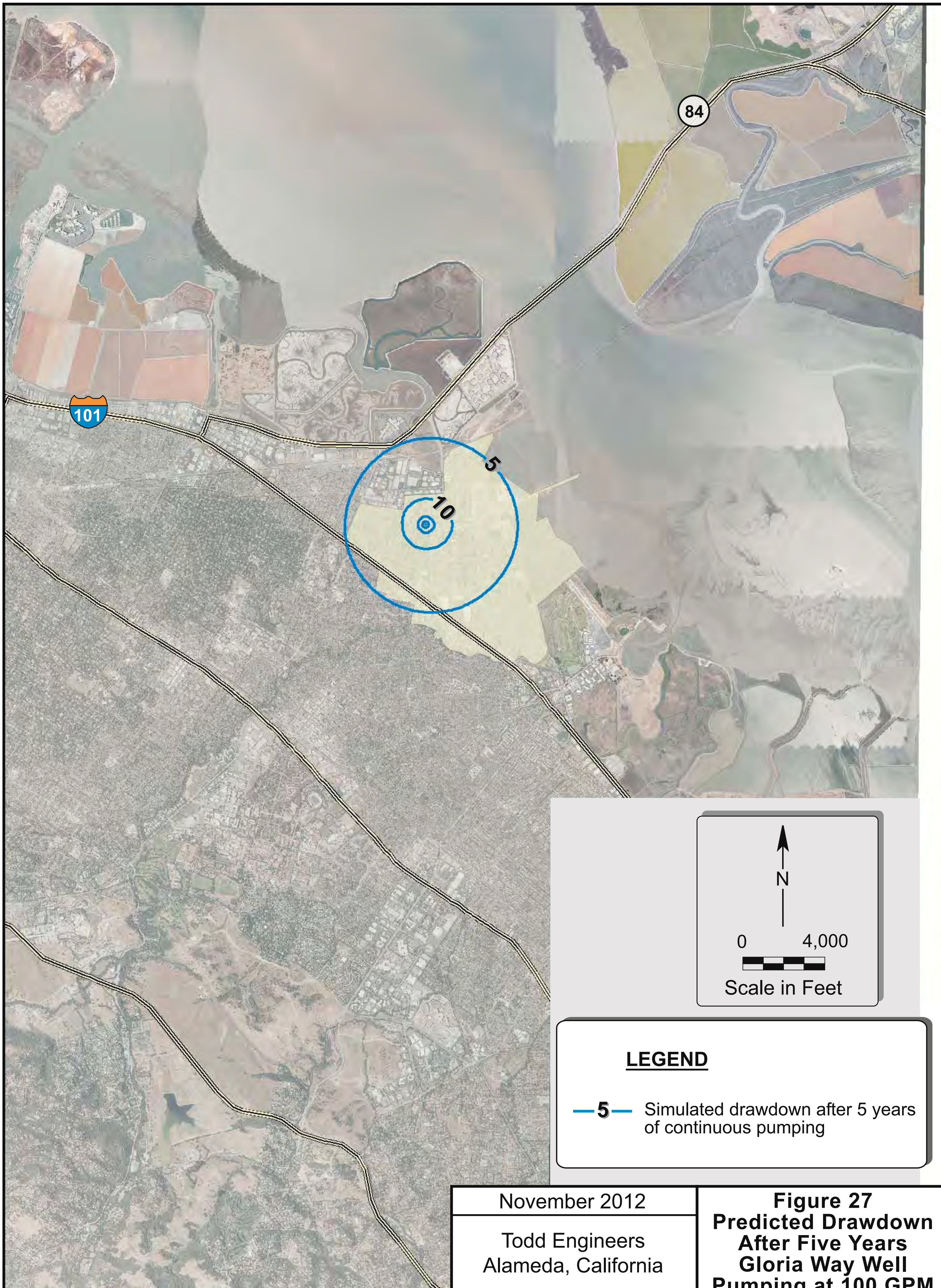
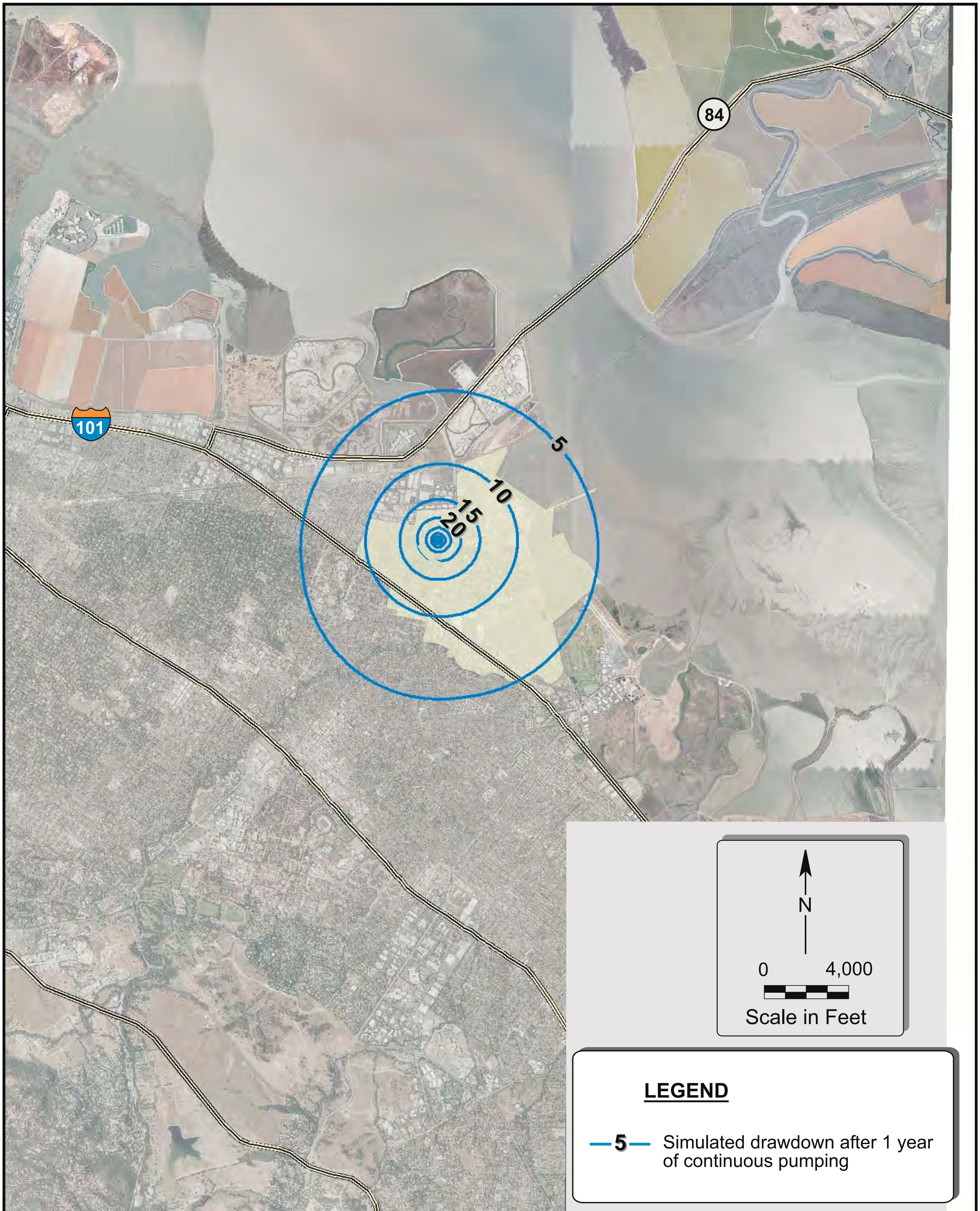
Alameda, California

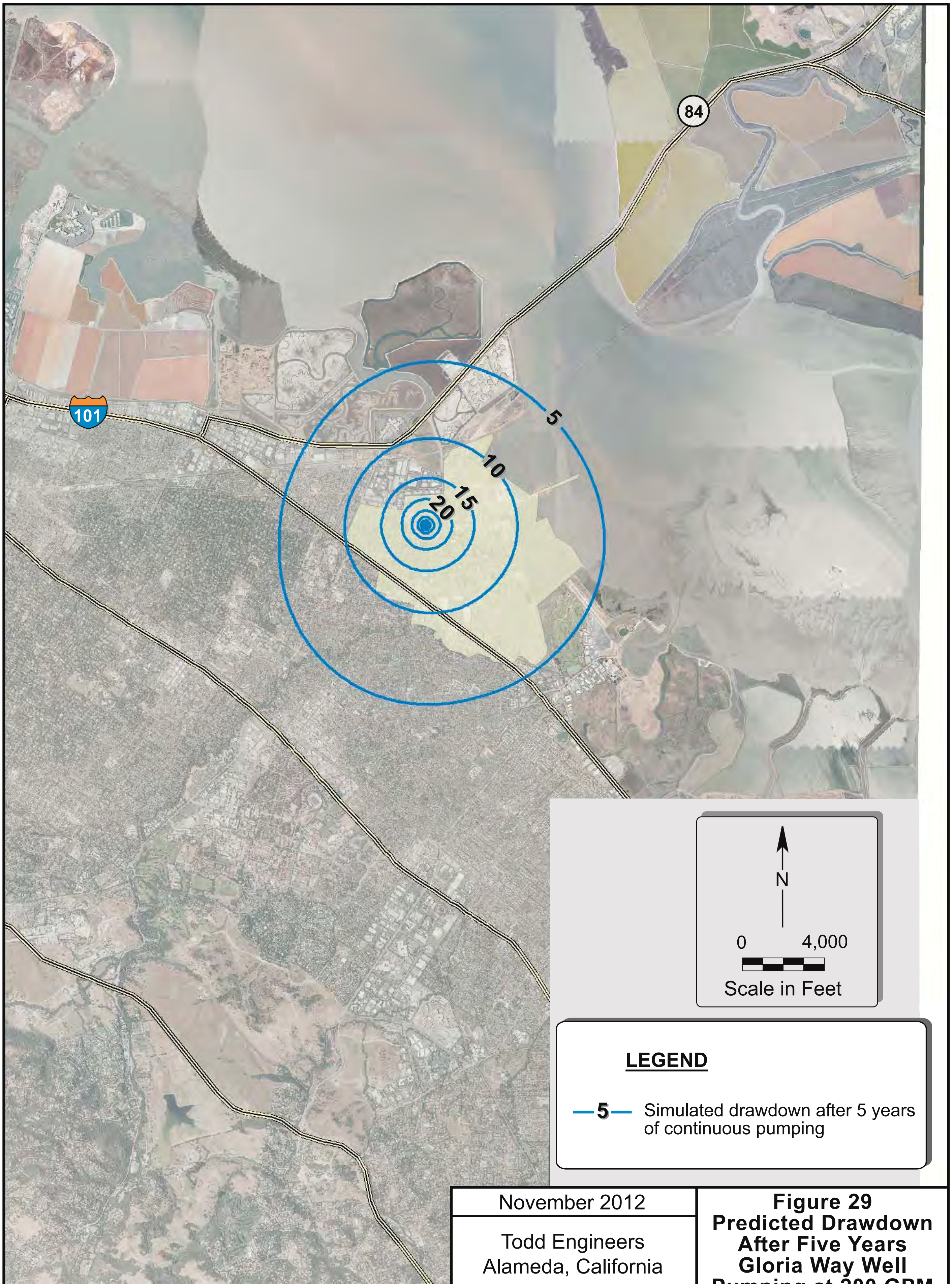
**Figure 26
Predicted Drawdown
After One Year
Gloria Way Well
Pumping at 100 GPM**



November 2012	**Figure 27**
Todd Engineers Alameda, California	**Predicted Drawdown After Five Years Gloria Way Well Pumping at 100 GPM**



November 2012	Figure 28 Predicted Drawdown After One Year Gloria Way Well Pumping at 200 GPM
Todd Engineers Alameda, California	



November 2012

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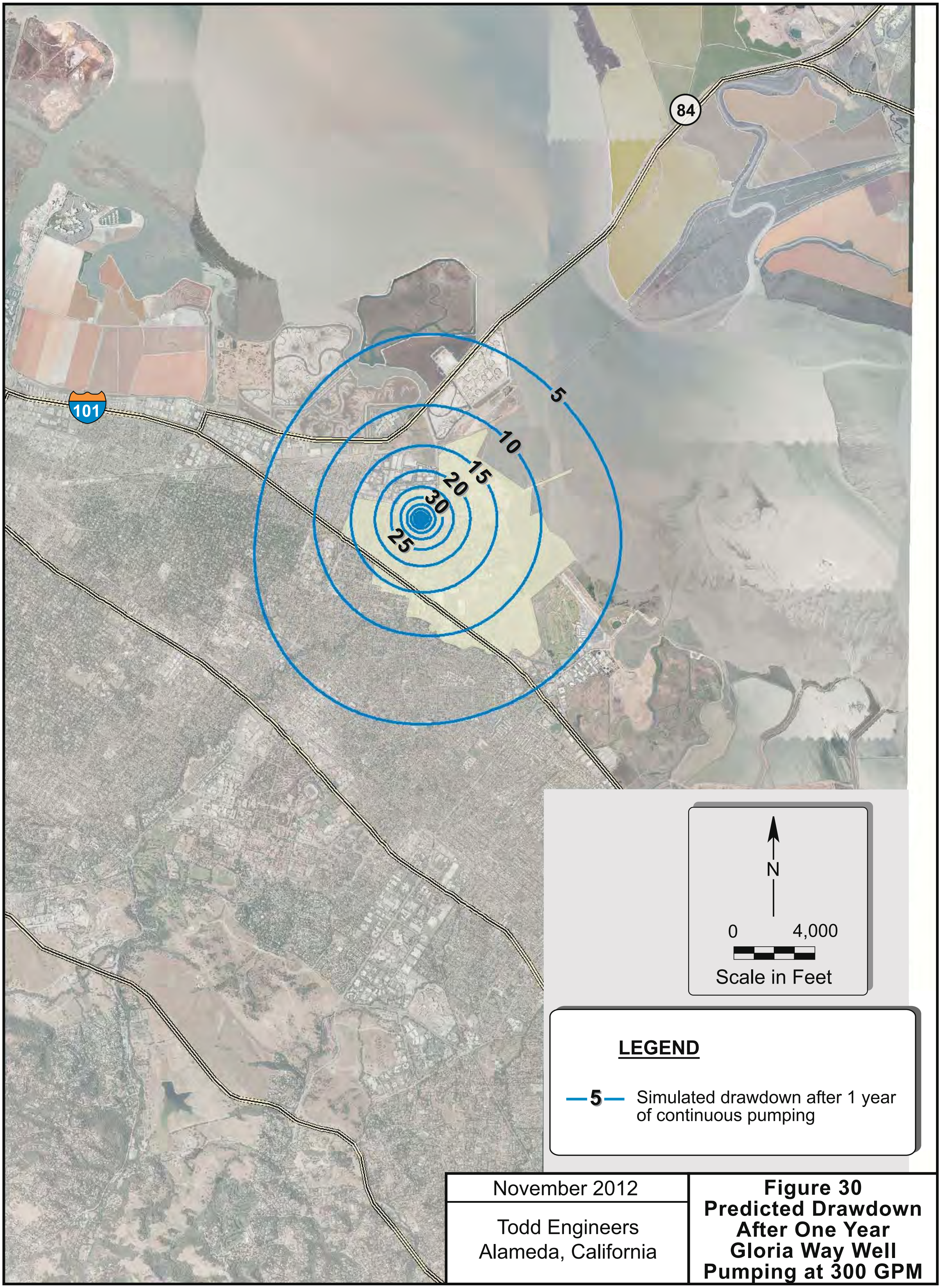
Figure 29
Predicted Drawdown After Five Years Gloria Way Well Pumping at 200 GPM



November 2012

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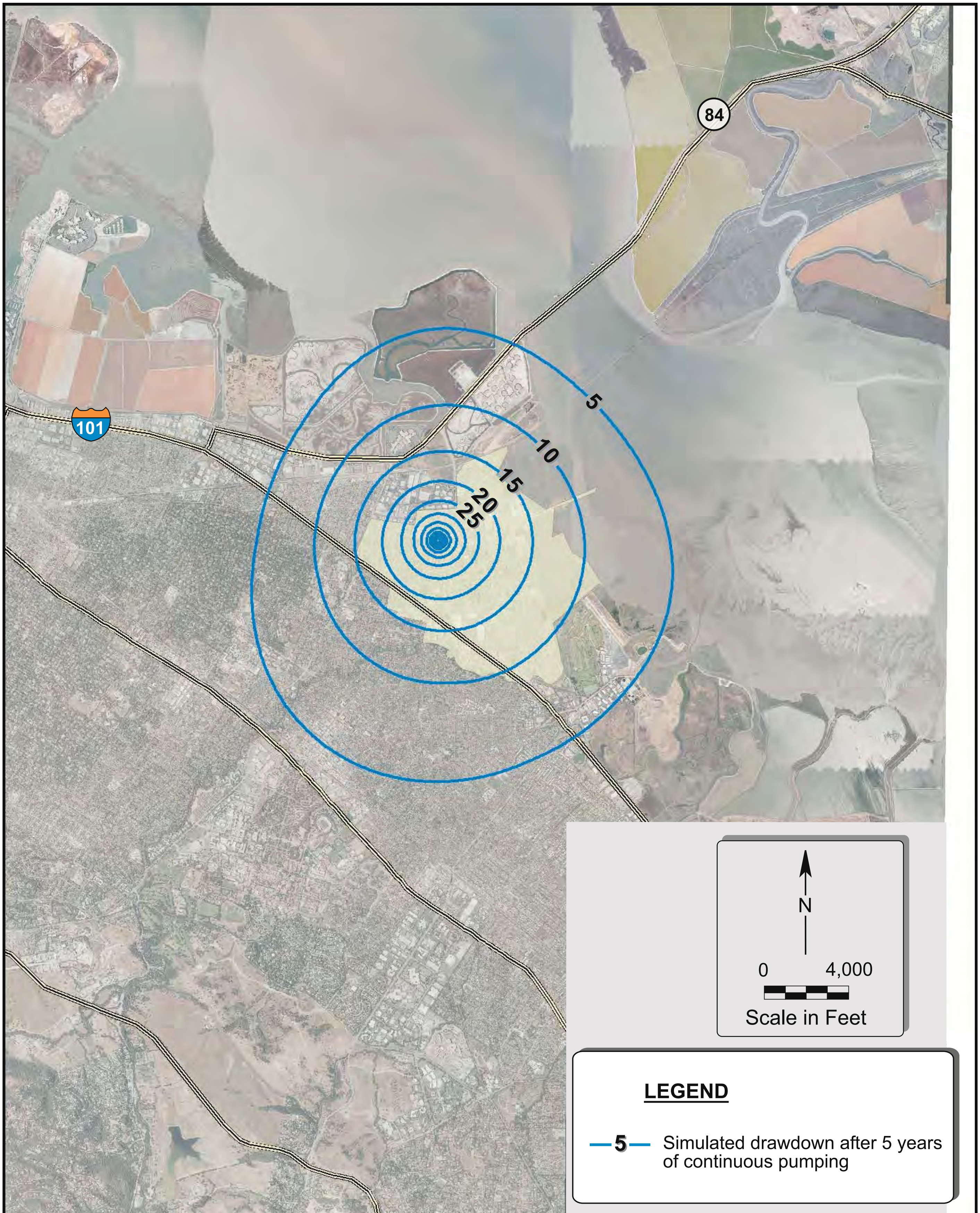
Alameda, California

Figure 30
Predicted Drawdown After One Year Gloria Way Well Pumping at 300 GPM



November 2012

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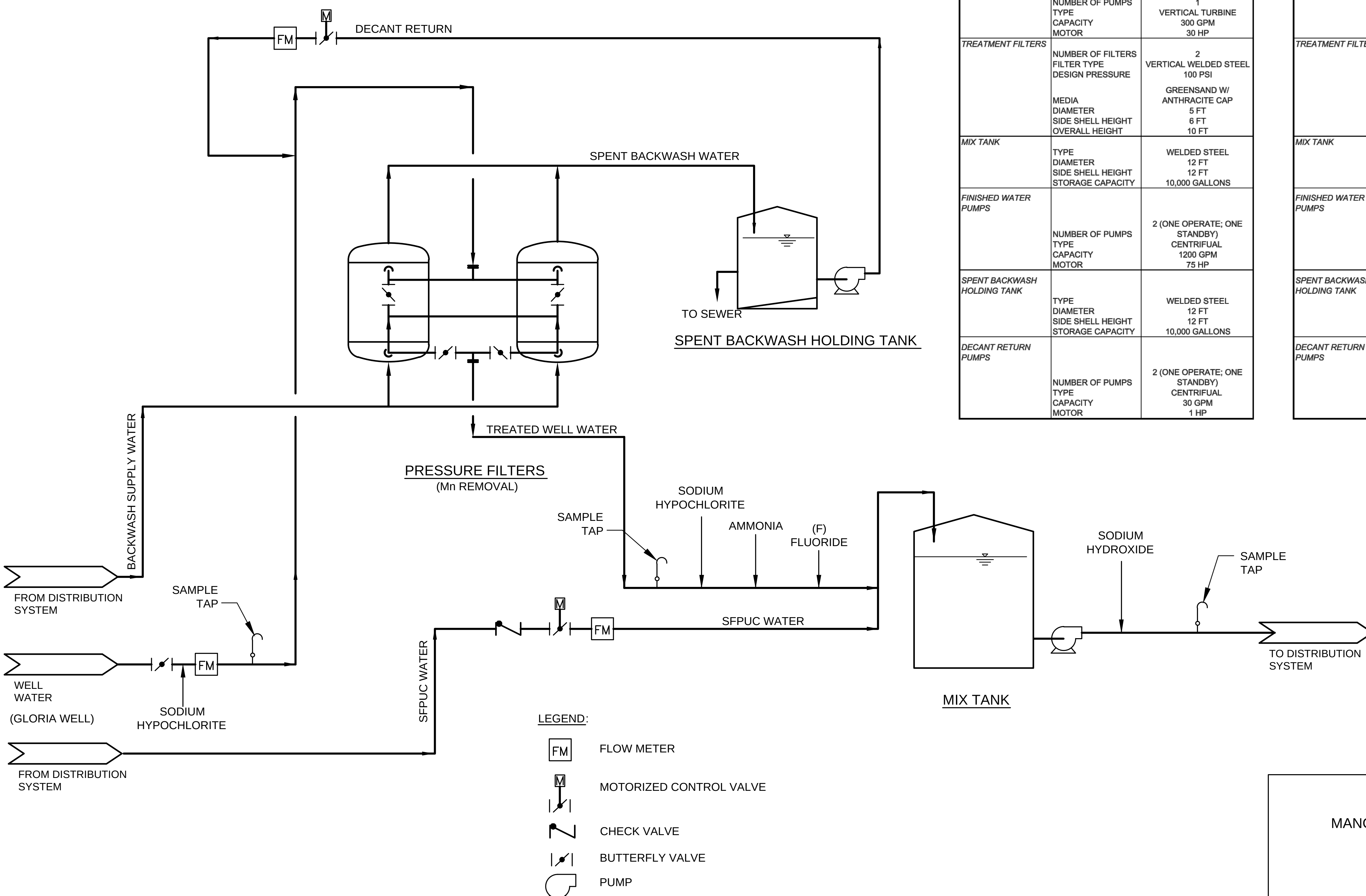
Alameda, California

Figure 31
Predicted Drawdown After Five Years Gloria Way Well Pumping at 300 GPM



GLORIA WELL SITE (300 GPM)		
WELL	NUMBER OF PUMPS TYPE CAPACITY MOTOR	1 VERTICAL TURBINE 300 GPM 30 HP
TREATMENT FILTERS	NUMBER OF FILTERS FILTER TYPE DESIGN PRESSURE MEDIA DIAMETER SIDE SHELL HEIGHT OVERALL HEIGHT	2 VERTICAL WELDED STEEL 100 PSI GREENSAND W/ ANTHRACITE CAP 5 FT 6 FT 10 FT
MIX TANK	TYPE DIAMETER SIDE SHELL HEIGHT STORAGE CAPACITY	WELDED STEEL 12 FT 12 FT 10,000 GALLONS
FINISHED WATER PUMPS	NUMBER OF PUMPS TYPE CAPACITY MOTOR	2 (ONE OPERATE; ONE STANDBY) CENTRIFUAL 1200 GPM 75 HP
SPENT BACKWASH HOLDING TANK	TYPE DIAMETER SIDE SHELL HEIGHT STORAGE CAPACITY	WELDED STEEL 12 FT 12 FT 10,000 GALLONS
DECANT RETURN PUMPS	NUMBER OF PUMPS TYPE CAPACITY MOTOR	2 (ONE OPERATE; ONE STANDBY) CENTRIFUAL 30 GPM 1 HP

500 GPM WELL SITE		
WELL	NUMBER OF PUMPS TYPE CAPACITY MOTOR	1 VERTICAL TURBINE 500 GPM 40 HP
TREATMENT FILTERS	NUMBER OF FILTERS FILTER TYPE DESIGN PRESSURE MEDIA DIAMETER SIDE SHELL HEIGHT OVERALL HEIGHT	2 VERTICAL WELDED STEEL 100 PSI GREENSAND W/ ANTHRACITE CAP 6.5 FT 6 FT 10 FT
MIX TANK	TYPE DIAMETER SIDE SHELL HEIGHT STORAGE CAPACITY	WELDED STEEL 15 FT 12 FT 16,000 GALLONS
FINISHED WATER PUMPS	NUMBER OF PUMPS TYPE CAPACITY MOTOR	2 (ONE OPERATE; ONE STANDBY) CENTRIFUAL 2000 GPM 125 HP
SPENT BACKWASH HOLDING TANK	TYPE DIAMETER SIDE SHELL HEIGHT STORAGE CAPACITY	WELDED STEEL 15 FT 12 FT 16,000 GALLONS
DECANT RETURN PUMPS	NUMBER OF PUMPS TYPE CAPACITY MOTOR	2 (ONE OPERATE; ONE STANDBY) CENTRIFUAL 50 GPM 2 HP

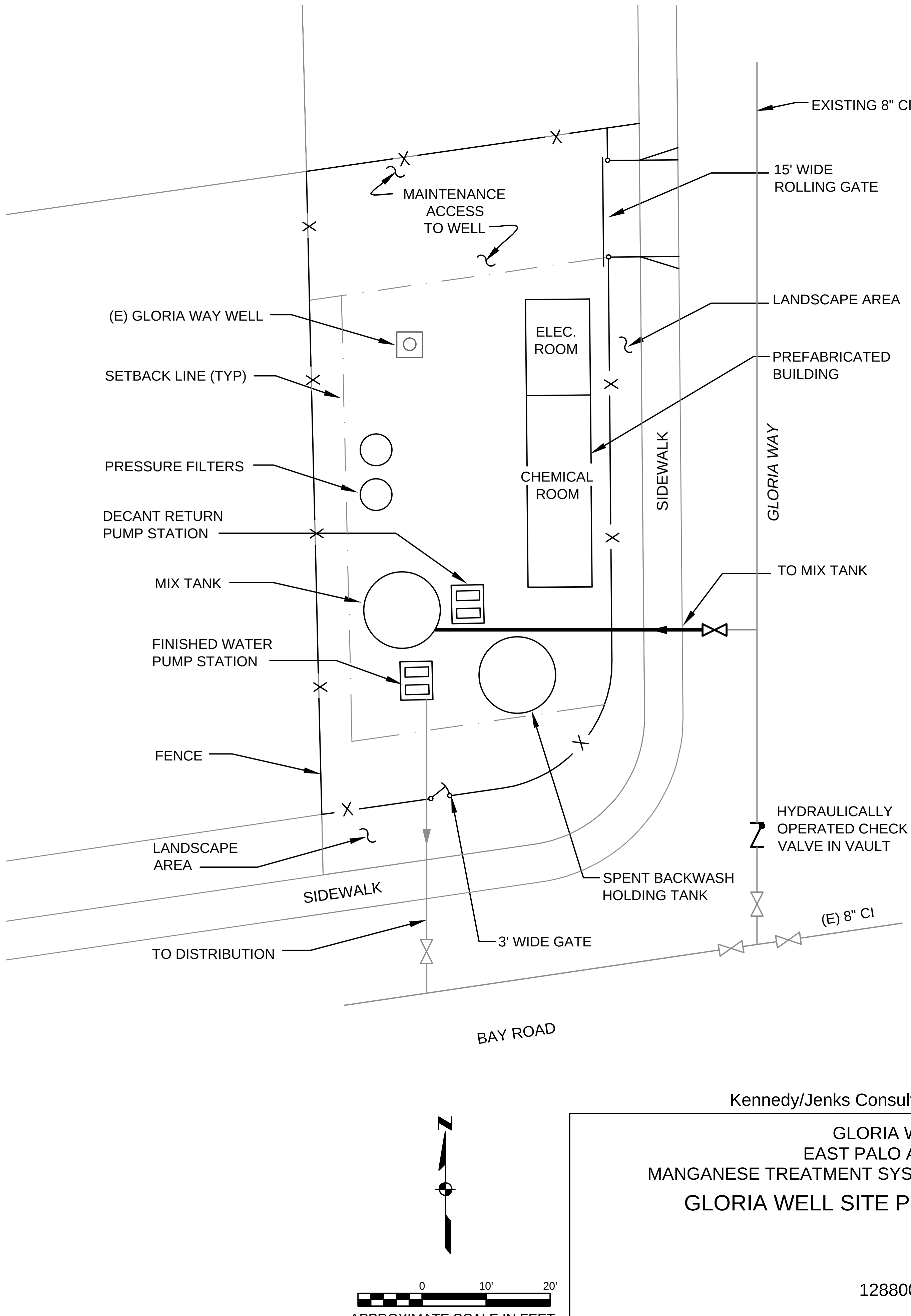
Kennedy/Jenks Consultants

GLORIA WELL
EAST PALO ALTO
MANGANESE TREATMENT SYSTEM

SCHEMATIC FLOW DIAGRAM

K/J 1288007*00

FIGURE 32



\\KJ\KJ-Root\KJ-Cad\Sacramento\2012\1288007.00_East_PaloAlto\1288001-fig28.dwg JEAN LEIPZIG 10/31/2012 9:10 AM

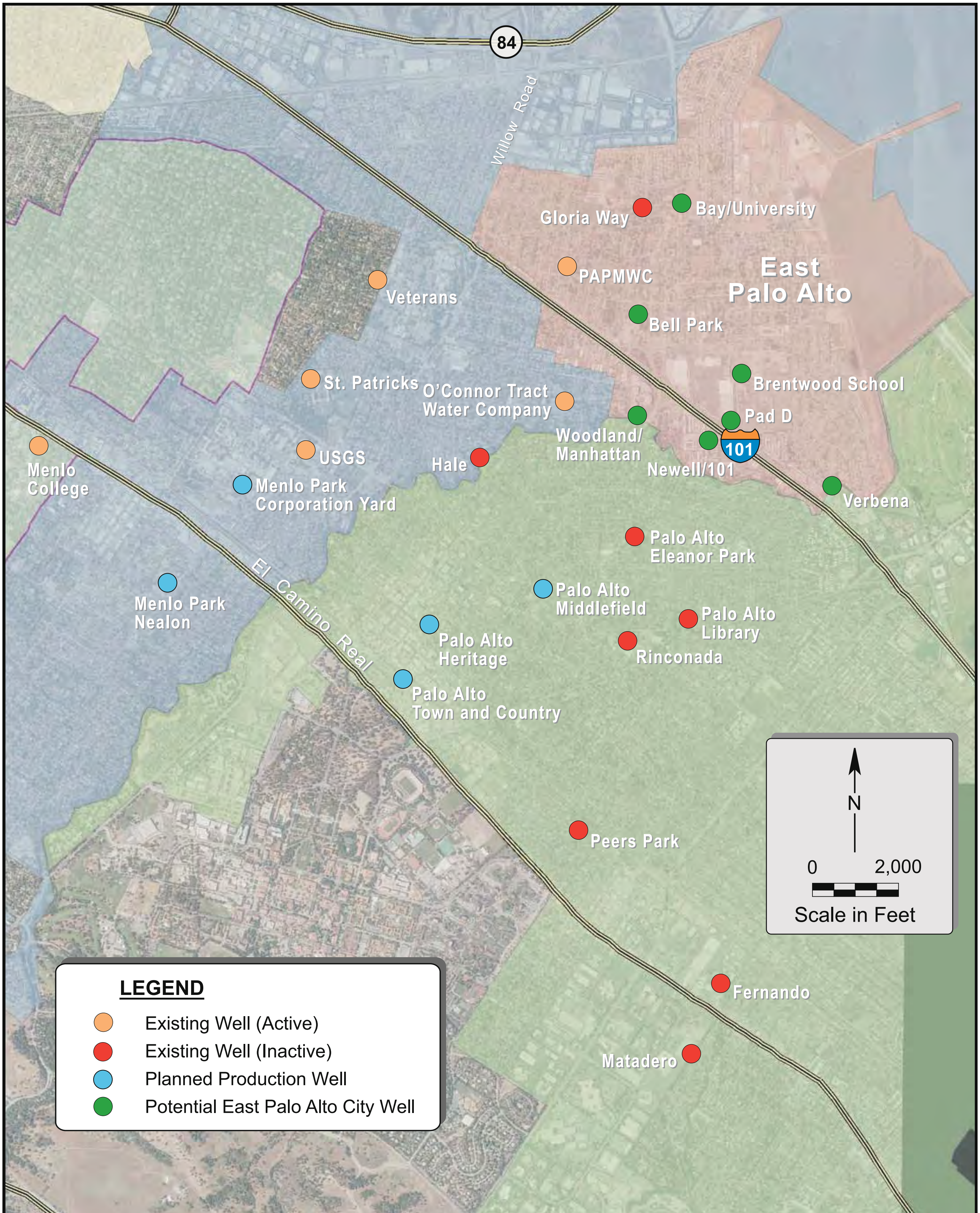
Kennedy/Jenks Consultants

GLORIA WELL
EAST PALO ALTO
MANGANESE TREATMENT SYSTEM

GLORIA WELL SITE PLAN

1288007.00

FIGURE 33



November 2012

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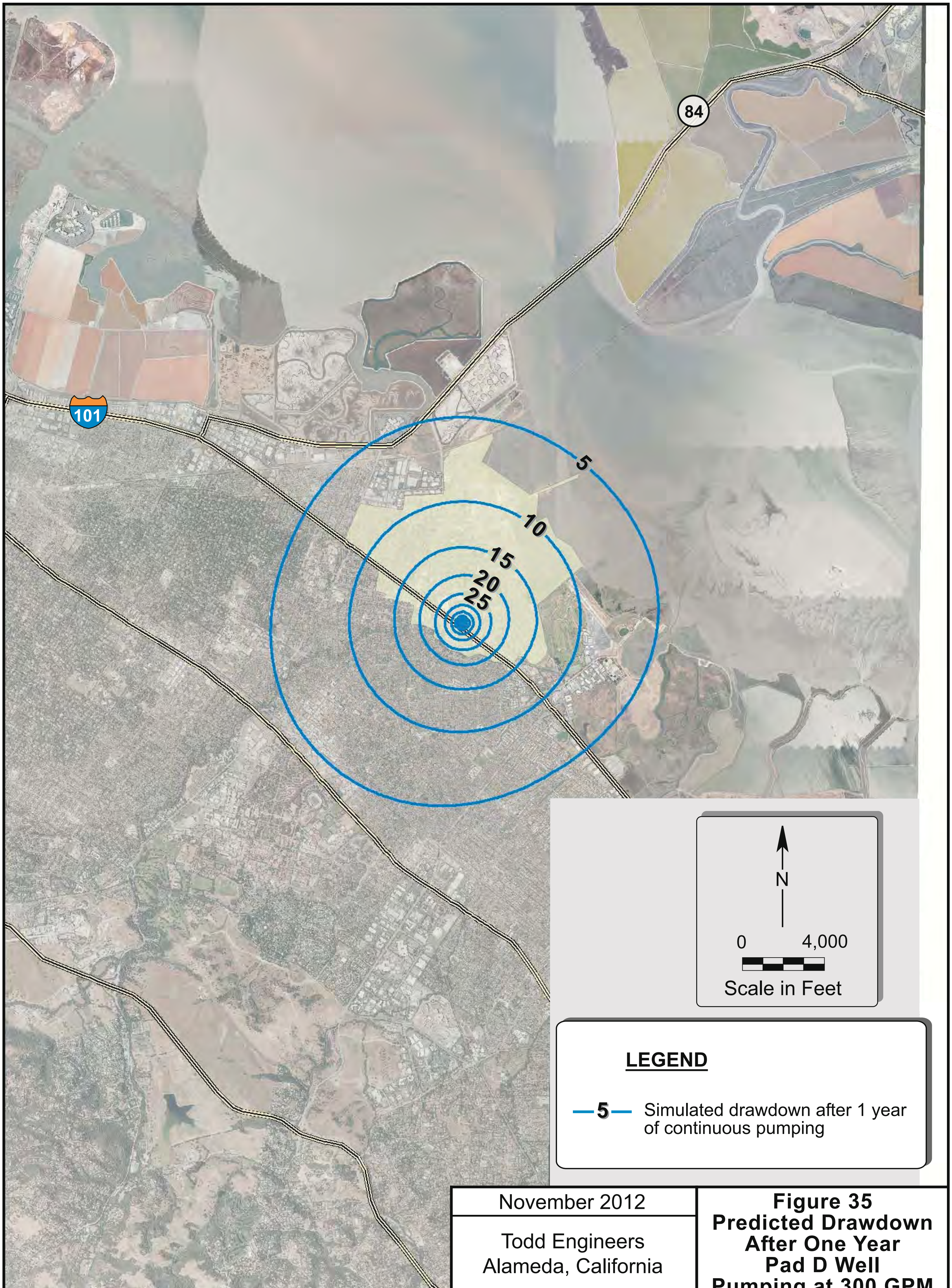
Alameda, California

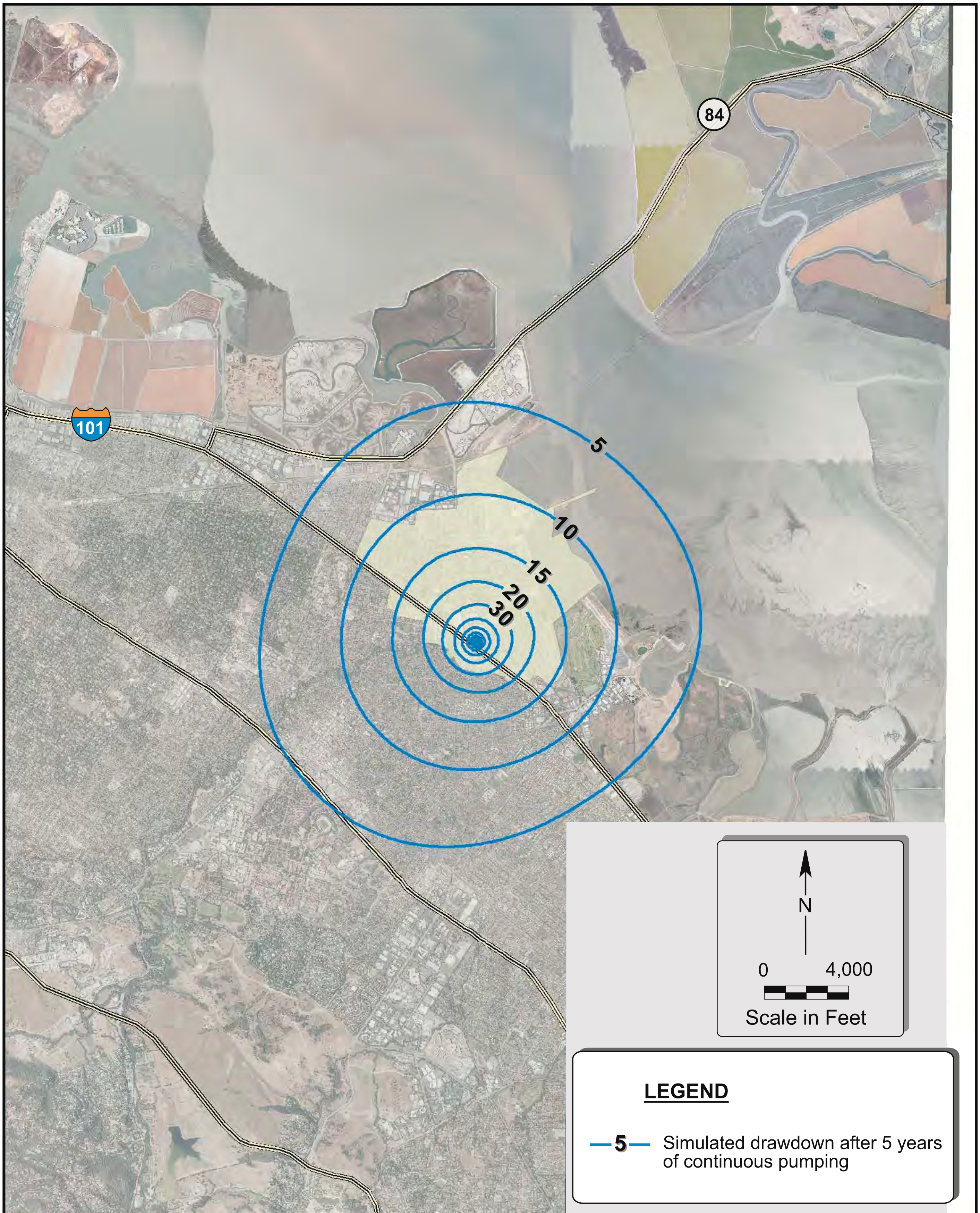
Figure 34
Potential
New Well Sites



November 2012

Todd Engineers
Alameda, California

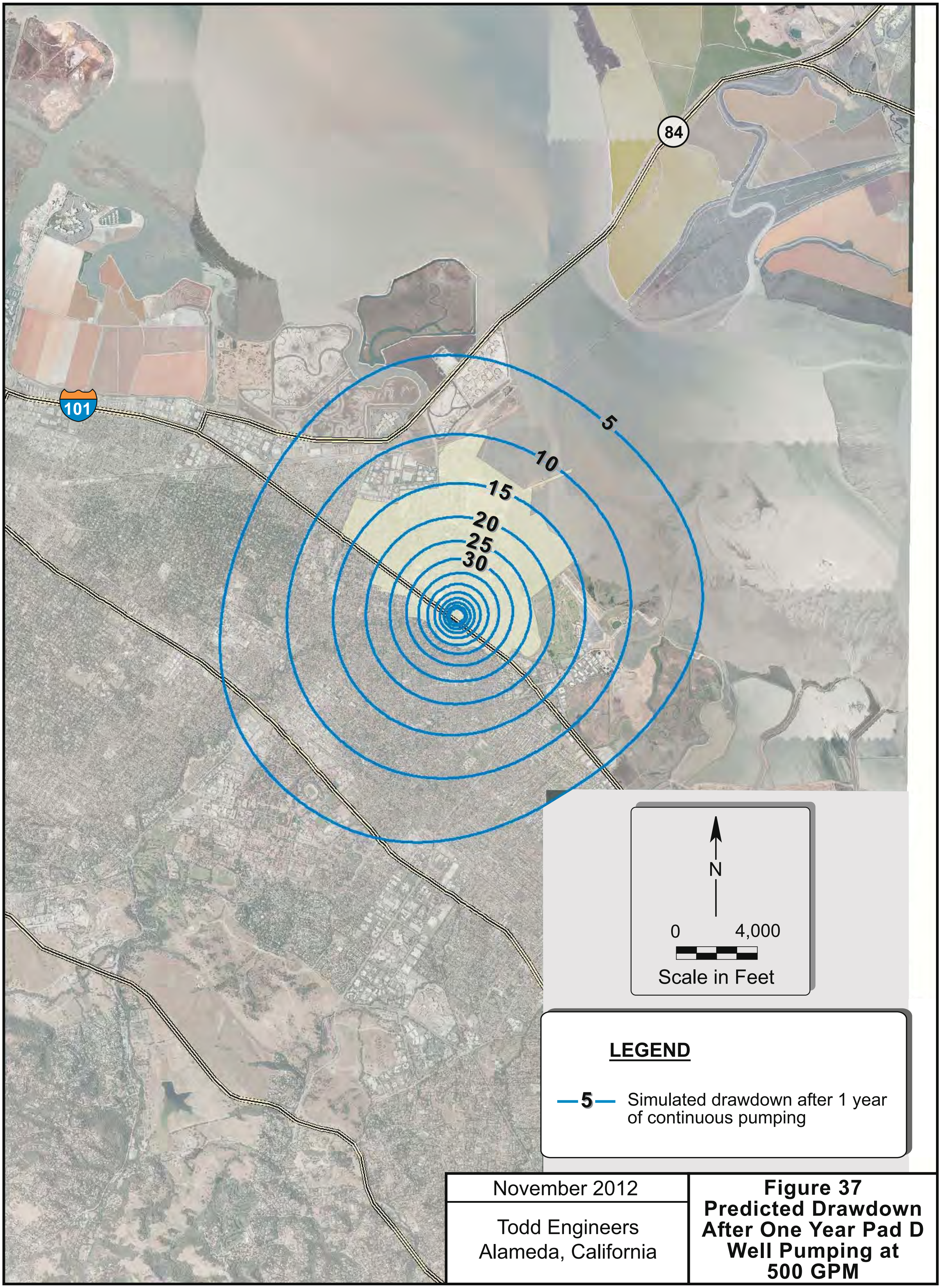
Figure 35
Predicted Drawdown After One Year Pad D Well Pumping at 300 GPM



November 2012

Todd Engineers
Alameda, California

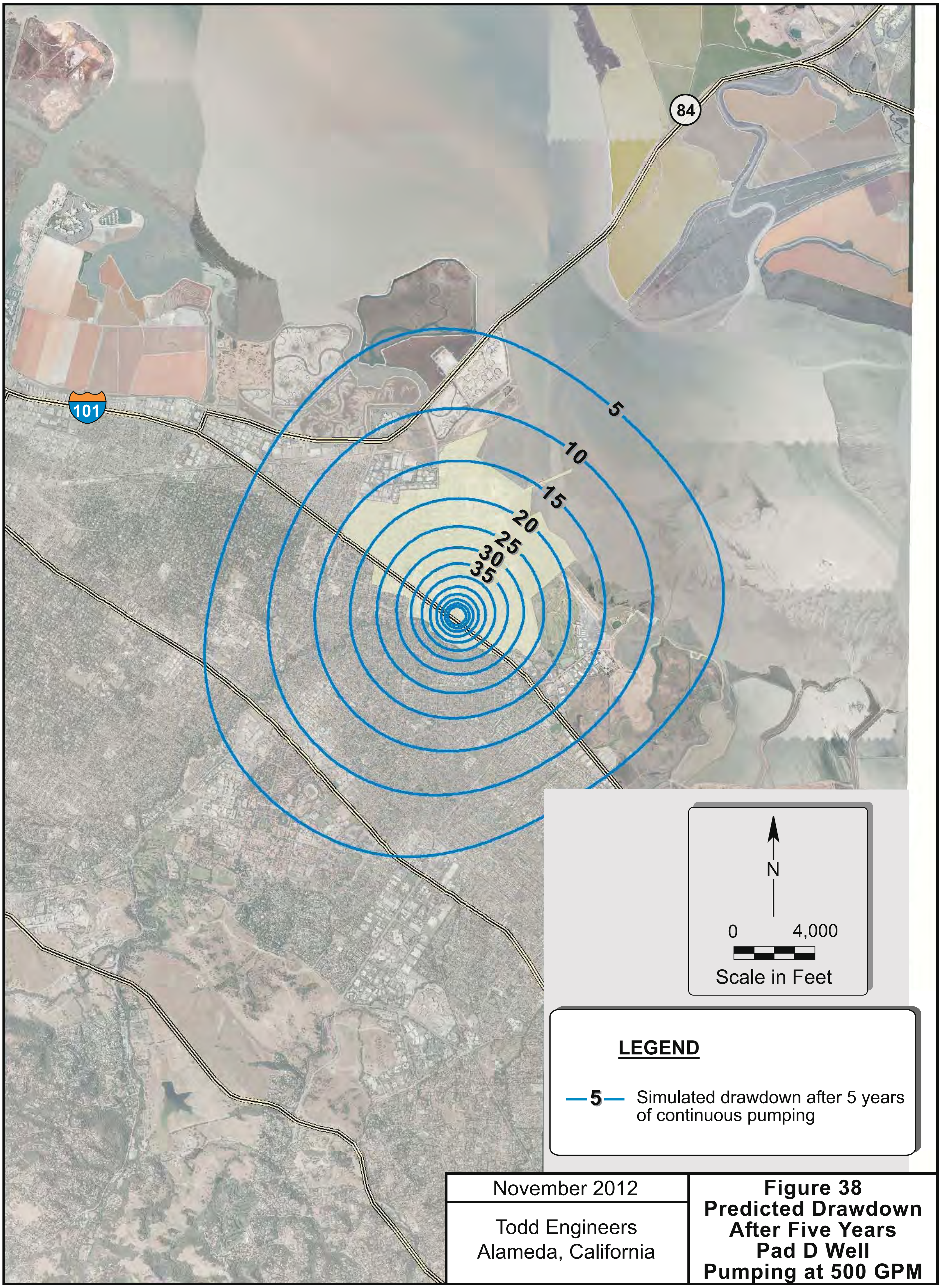
Figure 36
Predicted Drawdown After Five Years Pad D Well Pumping at 300 GPM



November 2012

Todd Engineers
Alameda, California

Figure 37
Predicted Drawdown After One Year Pad D Well Pumping at 500 GPM



November 2012

Todd Engineers
Alameda, California

Figure 38
Predicted Drawdown After Five Years Pad D Well Pumping at 500 GPM

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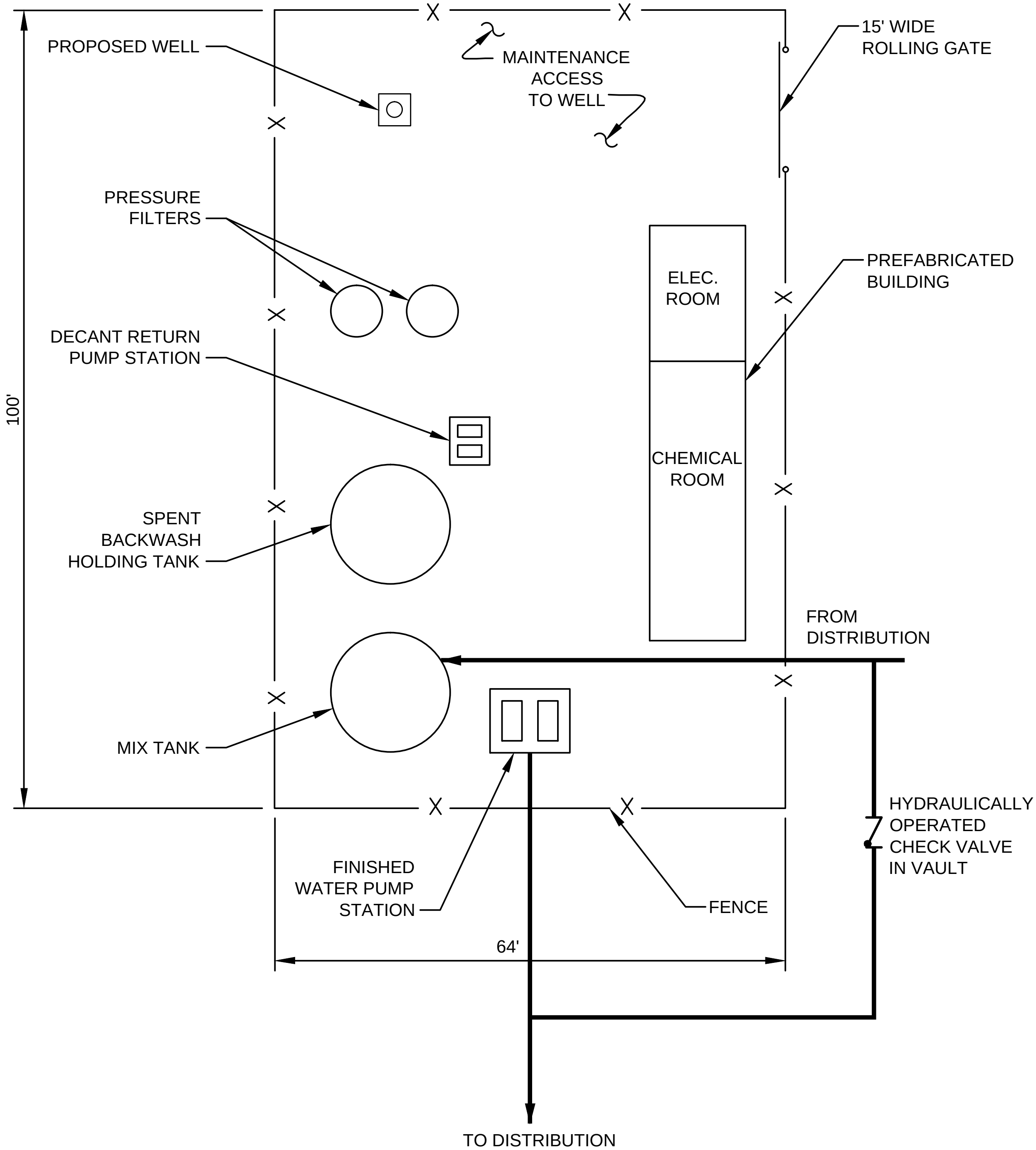

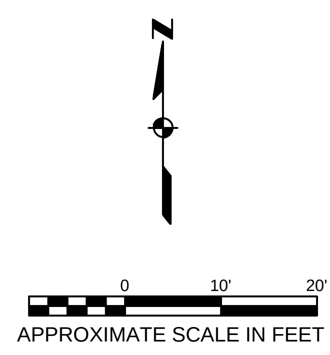

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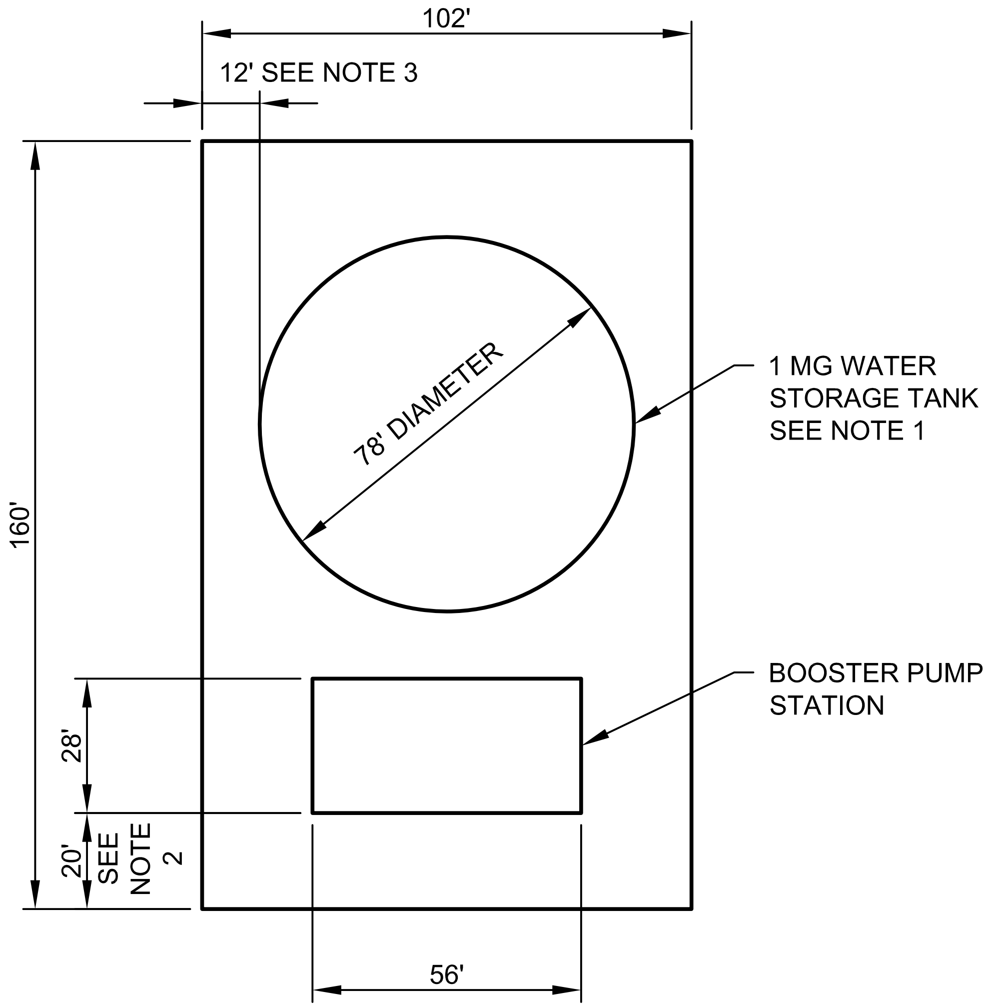
PROPOSED 500gpm WELL
EAST PALO ALTO
MANGANESE TREATMENT SYSTEM

WELL SITE PLAN

1288007.00

FIGURE 39



NOTES:

1. FOR DOME ROOF WATER STORAGE TANK HEIGHT = 43FT
FOR FLAT SLAB ROOF WATER STORAGE TANK HEIGHT = 36FT
2. 20FT FRONT AND BACK YARD SETBACKS
3. 12FT CLEARANCE FOR ACCESS INCLUDES 5FT SIDEYARD SETBACK
4. MINIMUM SITE = 0.4AC

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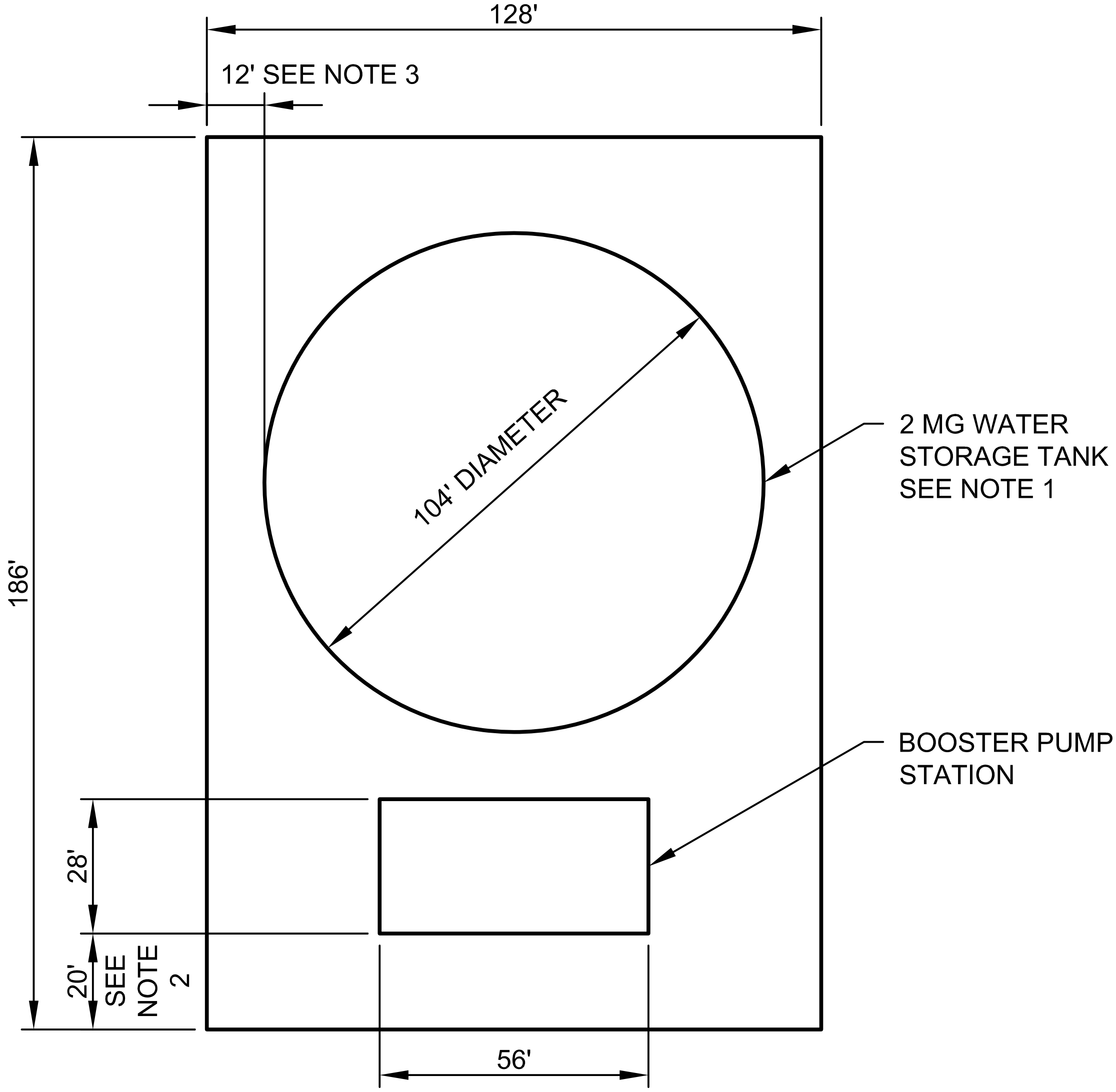
City of East Palo Alto
East Palo Alto, CA

Plan View of 1 MG Water Storage Tank

1288007.00

Figure 40

P:\12\1288007.00_Todd_Engs-EPA_Wtr_Supply&Wtr_Storage_Analysis\Section_09-Report_Preparation\Figures_Tables\1288007-FIG-41.dwg JEAN LEIPZIG 10/31/2012 9:14 AM



NOTES:

1. FOR DOME ROOF WATER STORAGE TANK HEIGHT = 50FT
FOR FLAT SLAB ROOF WATER STORAGE TANK HEIGHT = 40FT
2. 20FT FRONT AND BACK YARD SETBACKS
3. 12FT CLEARANCE FOR ACCESS INCLUDES 5FT SIDEYARD SETBACK
4. MINIMUM SITE = 0.5AC

0 20 40
APPROXIMATE SCALE IN FEET

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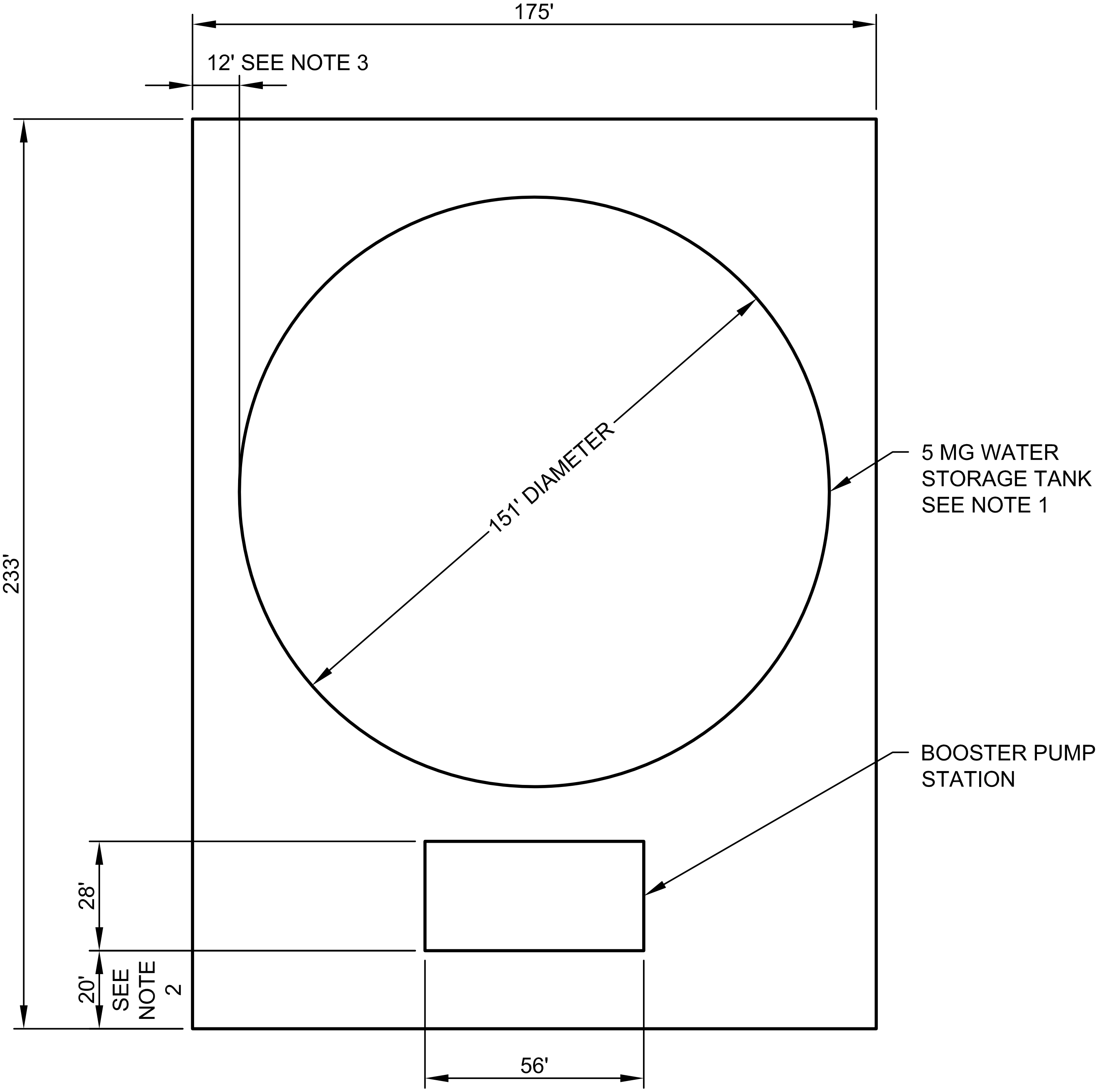
City of East Palo Alto
East Palo Alto, CA

Plan View of 2 MG Water Storage Tank

1288007.00

Figure 41

10/31/2012 9:15 AM JEAN LEIPZIG P:\12\1288007.00_Todd_Engs-EPA_Wtr_Supply&Wtr_Storage_Analysis\Section_09-Report_Preparation\Figures_Tables\1288007-FIG-42.dwg



NOTES:

1. FOR DOME ROOF WATER STORAGE TANK HEIGHT = 61FT
FOR FLAT SLAB ROOF WATER STORAGE TANK HEIGHT = 48FT
2. 20FT FRONT AND BACK YARD SETBACKS
3. 12FT CLEARANCE FOR ACCESS INCLUDES 5FT SIDEYARD SETBACK
4. MINIMUM SITE = 0.9AC

0 20 40
APPROXIMATE SCALE IN FEET

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City of East Palo Alto
East Palo Alto, CA

Plan View of 5 MG Water Storage Tank

1288007.00

Figure 42

Appendix A

Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN

Form A: Title and Approval Page

Project Name: City of East Palo Alto
Gloria Way Well Production Alternatives Analysis and
East Palo Alto Water Security Feasibility Study
Revision: 2.0
Date: April 16, 2012
Page 1 of 15

Prepared By:

Todd Engineers, 2490 Mariner Square Loop, Suite 215

Alameda, California 94501 (510) 747-6920

Project Manager
Signature: Kamal Fallaha
Printed Name: KAMAL FALLAHA **Date:** 5-21-2012

Project QA Officer:
Signature: [signature]
Printed Name: Bret Swain **Date:** 5/21/2012

U.S. EPA Project Manager Approval:
Signature: Cheryl McGovern
Printed Name: Cheryl McGovern **Date:** 5/11/12

U.S. EPA QA Manager Approval:
Signature: Eugenia McNaughton
Printed Name: Eugenia McNaughton **Date:** 4/30/12

Table of Contents

List of Tables

Section 1: Introduction

1.1 Introduction

This Quality Assurance Project Plan (QAPP) has been prepared on behalf of the City of East Palo Alto (the City) by Todd Engineers (Todd), for use in support of implementation of groundwater data collection activities for the Gloria Well Evaluation, Rehabilitation, and Upgrade Project (Project). The QAPP purpose is to document the results of the technical planning process, providing in one place a clear, concise, and complete plan for the environmental data operation and its quality objectives, identify specific quality assurance (QA) and quality control (QC) procedures during data collection, and identifying key project personnel (EPA, 2011). The procedures described in this QAPP are designed to allow for the collection of data during sampling and analysis activities that are sufficiently accurate and representative to support the data quality objectives.

This QAPP is being prepared in a phased approach according to Chapter 1.5 of the Guidance on Quality Assurance Project Plans CIO 2106-G-05 QAPP (EPA 2011). The first phase of this project proposes sampling of groundwater from an existing water supply well (the Gloria Way Well), potentially drilling a deep soil boring, collection and laboratory analysis of soil and groundwater samples for physical properties and water quality parameters. If additional studies are required for the evaluation of groundwater supply alternatives, a modification to the QAPP will be prepared according to Section 1.8 of the Guidance (EPA 2011). This QAPP provides field personnel with instructions regarding activities to be performed before, during, and after field investigations.

1.2 QAPP Objectives

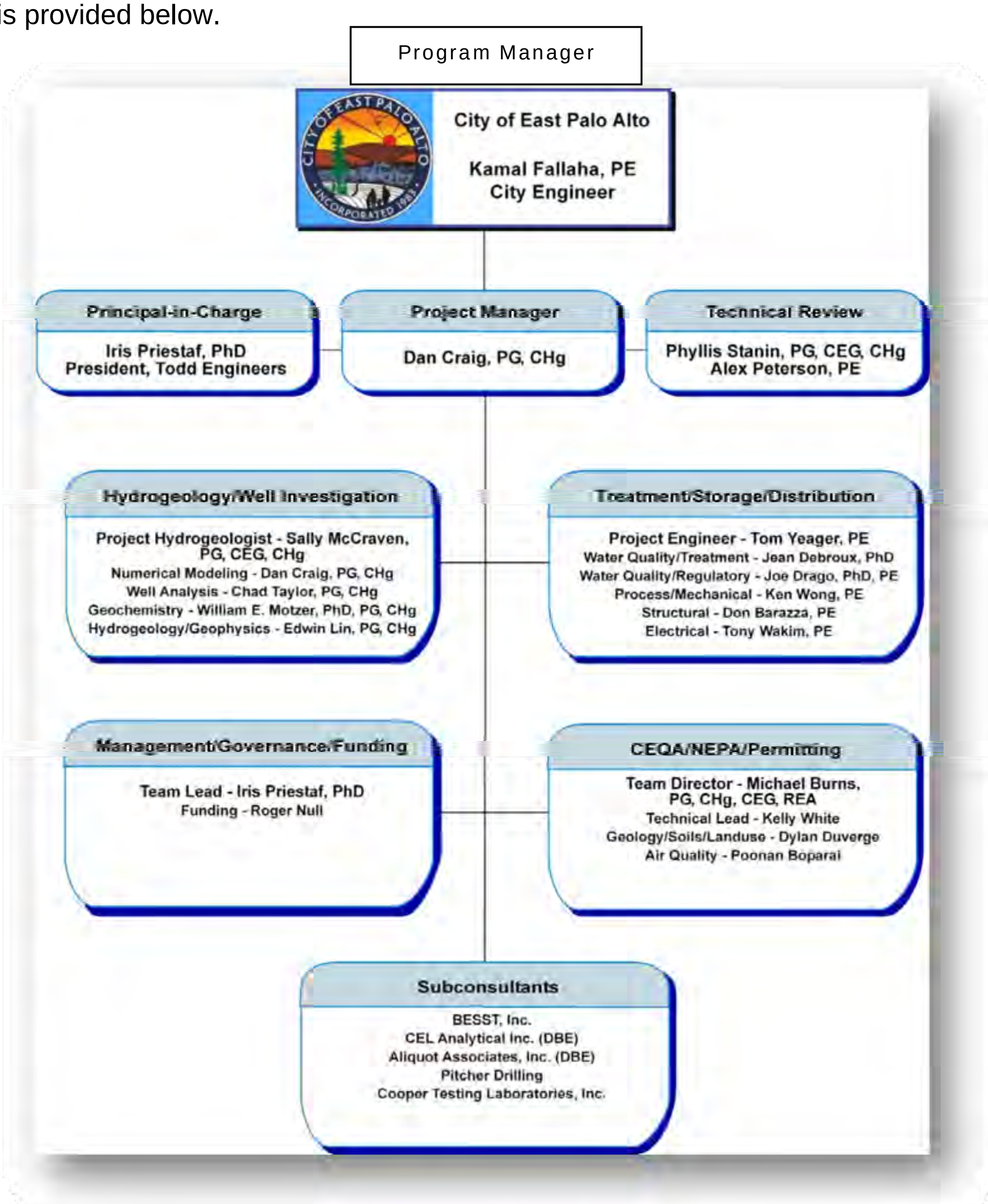
The objective of this QAPP is to present quality assurance (QA) and quality control (QC) procedures that will assure that the environmental data used for the project are of a known and acceptable quality to meet the objectives of the evaluation of groundwater resources within the City. The scope of the Project is intended to provide sufficient additional information necessary to accomplish the following objectives:

- Characterize groundwater quantity and quality conditions within the City to support water supply planning and development;
- Determine sustainable groundwater yield and water quality conditions at the Gloria Way Well site and potentially other sites in the City;
- Identify water treatment and blending alternatives.

The data generated will be documented in a final Project Report and may be used to support California Environmental Quality Act (CEQA) and National Environmental Protection Act (NEPA) documents.

1.3 Project Organization

This section provides a description of the organizational structure and responsibilities of the individual positions the Project. This description defines the lines of communication and identifies key personnel assigned to various activities. An organization chart for the Project is provided below.



The City of East Palo Alto will work with the consultant team to identify preferred groundwater supply alternatives associated with Project implementation. Together, the management team (Principal-in-Charge, Project Manager, Technical Reviewers, and Project Staff) will be responsible for the technical planning and implementation of the work.

Program Manager: The Program Manager will serve as the primary contact for the City and is responsible for the overall project execution. Some general responsibilities of the Program Manager include strategy development, budget control, and document review.

Principal-in-Charge: The Principal-in-Charge has responsibility for effective planning, verifying, and managing QA activities associated with the assigned project on behalf of the City's consultant. The Principal-in-Charge will serve as the primary contact on behalf of City and is responsible for project execution. Some general responsibilities of the Principal-in-Charge include supporting the Program Manager with strategy development, budget control, and document review.

Project Manager: The Project Manager is responsible for the implementation of the field program and will provide day-to-day management and tracking of the project schedule and budget. Other responsibilities include coordination and preparation of the required reports, and assignment of technical responsibilities to appropriate personnel or subcontractors. The Project Manager will maintain communication with the City throughout the course of the project, providing project status updates and notifying the City of any issues that may arise. The Project Manager is also responsible for the oversight of the QA and QC aspects of the project. It is the responsibility of the Project Manager to ensure that all required QA/QC protocols are met in the field and office.

Project Chemist: The Project Chemist is responsible for reviewing the laboratory data QA/QC results to ensure that the analytical data are accurate and representative, and can be used to meet the data quality objectives for the project.

Technical Reviewers: The Technical Review team is responsible oversight of the QA and QC aspects of the project throughout data collection, evaluation and reporting. It is the responsibility of these senior individuals to ensure that all required QA/QC protocols are met and that the final Report(s) meet all QA standards and DQO objectives.

Project Staff: The Project Staff is to carry out all data collection, analysis, and report preparation assigned by the Project Manager. In addition, the Project Staff are responsible for the overall quality and consistency of procedures and products. This includes providing guidance on quality control operations for field activities.

Table 1 identifies all individuals who will get a copy of the approved QAPP, either in hard copy or electronic format, as well as any subsequent revisions.

1.4 Project Background, Overview, and Intended Use of Data

As stated in the Request for Proposal (City, 2011), the City of East Palo Alto is seeking to develop local groundwater supplies to meet a portion of their water demand. The City has been using more water than its dry-year allocation of San Francisco Public Utilities District (SFPUC) supply, and the City lacks supplemental water to serve any proposed new projects. Additionally, the City contains no emergency storage facilities to provide water for consumption or fire suppression if the SFPUC system experiences a catastrophic disruption. The City owns a water supply well, Gloria Way Well, which produces relatively poor quality water with high iron and manganese. As a part of this project, current water quality data will be collected from the well, and the quality data will support evaluation of treatment or blending alternatives for utilization of the existing well as-is, or rehabilitation or deepening of the Gloria Way well.

A second objective of this project is to identify other potential well sites within the City service area. Sites will be identified based on land availability, with consideration for subsurface properties, potential aquifer yield, water quality distribution, conveyance system capacities, and major environmental constraints.

In order to evaluate subsurface conditions at either the Gloria Way site or other sites in the City, a deep exploratory soil boring may be drilled, and soil and water samples collected for laboratory analysis of soil properties and water quality.

The soil property and water quality data will support evaluation of treatment and blending alternatives for utilization of the Gloria Way well and/or a new supply well(s). The alternatives may include:

- Treatment on the Gloria Well site
- Treatment off the Gloria Well site
- No treatment, and blending at a San Francisco turnout
- Production from a new well site with or without treatment or blending

This Project will make use of existing data (secondary data), such as lithologic and completion logs for existing wells, previous measurements of groundwater elevations, quality, pumping rates, and meteorological data. Sources of secondary data may include:

- Geologic reports published by the State of California and United States Geologic Survey, and other sources
- Well logs obtained from the California Department of Water Resources (DWR)
- Groundwater elevations obtained from the DWR
- Well construction information obtained from the San Mateo County Environmental Health Department
- Well construction information obtained from the Santa Clara Valley Water District
- Well construction and yield information from the Cities of Menlo Park and Palo Alto, California and from the Palo Alto Park Mutual Water Company
- Historical well construction, pumping, water level and water quality information on the Gloria Way Well obtained from the City of East Palo Alto

All secondary data used in this project will be documented in the final report. Prior to use, all secondary data will be reviewed to assess potential impacts on quality-related project decisions.

1.5 Project Schedule

Groundwater sampling and soil boring investigations will begin after project funding is secured and the contract approvals are finalized (expected by the end of January 2012). The well sampling and soil boring activities will occur over a period of approximately three months during the first and second quarters of 2012.

1.6 Qualifications and Training of Project Personnel

Todd project personnel will be qualified and adequately trained to perform the work to which they are assigned. The Todd Project Manager in conjunction with the Program Manager from the City will determine the minimum qualifications and training required for project personnel. All field personnel assigned to a project will receive the appropriate guidance plans, including this QAPP, in time for thorough review prior to commencing work in the field. Prior to work initiation, the Project Manager or their respective designees, will document that all field and analytical personnel have received, read, and understood all procedures pertinent to the work that project personnel are assigned to perform. The Todd Project Manager has the ultimate responsibility for the qualification and training of project personnel, for the allocation of the resources necessary to provide training, for verifying that the adequacy of this training is periodically evaluated, and for verifying that refresher training is provided, as appropriate. The Project Manager will support the QA Officer by providing all necessary documentation to demonstrate the adequacy of qualifications and training of project personnel.

Soil and Water Sampling and Analysis

All soil and groundwater sampling will be performed by a Professional Geologist and Certified Hydrogeologist licensed by the California Department of Consumer Affairs. All water chemistry analyses will be performed by an analytical laboratory certified under the California Department of Public Health ELAP program.

1.7 Data Quality Objectives

Consistent with US EPA guidance, we have developed a data collection and QA/QC process such that the project Data Quality Objectives (DQOs) are met. The DQOs are based on the project background information and objectives, and the conceptual site model. DQOs for this project were developed following the seven steps of the DQO process as defined by US EPA guidance:

1) State the Problem – Historical groundwater quality is beneath the City and in the Gloria Way well varies. Groundwater quality needs to be characterized in order to evaluate treatment or blending alternatives. Groundwater yield from the current Gloria Well alone will not meet the City’s future water demand requirements.

2) Identify Decisions/Study Questions – What is the quality of groundwater in the Gloria Way Well. What is the quality of groundwater in other areas of the City ? What is the likely yield of groundwater from new wells in other areas of the City ?

3) Identify Inputs to Decisions - Measurements of groundwater chemical concentrations that will conform to laboratory method reporting limits and will be compared with regulatory concentration requirements. Groundwater sample chemical constituent analyses will be selected to conform to current California Department of Public Health (CDPH) requirements for drinking water (DW).Soil physical property data, if collected, will also be included.

4) Define Study Boundaries - The study area boundaries include the Gloria Way site and other areas of the City.

5) Develop Decision Rules · If the groundwater concentrations for chemicals exceed primary of secondary drinking water standards treatment or blending may be required.

6) Specify Limits on Decision Errors - Decision errors could occur if measurements of chemical

concentrations or aquifer hydraulic properties are inaccurate. Decision errors associated with chemical concentration data will be minimized using the following procedures: · SOPs and QA/QC procedures for all field sampling activities; · Analytical data QA/QC and laboratory data validation. A 95% confidence against Type I errors (alpha = 0.05) and an 80% confidence against Type II errors (beta = 0.20) will be targeted.

Data Quality indicators will be required by the analytical laboratory. These include possible bias, analytical sensitivity, and precision and accuracy. These are briefly summarized below.

Bias: calibrations, serial dilutions, interference check samples, matrix spikes, and blanks will be reviewed as potential data bias indicators. The possibility of contamination of laboratory blanks will be reviewed. Negative blank contamination creates a potential low bias. Data reported a less than will also be reviewed because potential bias may exist from J values indicated by a "J-" (estimated, biased low) or "J+"(estimated, biased high) qualifier in the data set.

Sensitivity: method reporting limits will be reviewed to determine if elevated detection limits have been reported that could potentially impact the data. However, this may not be a problem if the affected analyte is below regulatory action levels.

Precision is monitored by instrument calibration and spike samples. All precision criteria will be reviewed to determine if it meets analytical method requirements.

Accuracy: all laboratory duplicates will be reviewed to determine if the meet the required criteria. Field duplicates will be reviewed to determine if relative percent differences (RPDs) are greater than set criteria.

The analytical laboratory will also be responsible for reporting surrogates, duplicates, matrix and spike in percent R ranges and RPD data results for each of the reported analytes.
7) Optimize the Design for Obtaining Data - Through the data collection planned, the City will augment the existing information on site hydrogeology and groundwater quality using the proposed additional sampling. The team will also evaluate past water quality data collected by the City and review historical operations in the study area boundaries, including any historical water quality data.

1.8 Data Use

Data collected through implementation of this QAPP will satisfy the DQOs for the site.
These data may be used to characterize the groundwater quantity and quality at the Gloria Way site and other areas of the City that are investigated, and support evaluations of water treatment and blending alternatives. Existing background or historical data will be evaluated to determine data quality and possible limitations.

1.9 Records

The records to be used for Project documentation include project field notebooks, data collection worksheets, photographs, and laboratory reports. Records (including raw data – hard and electronic copies) will be managed by the Project Manager throughout the project. Copies of the data will be provided to the City upon request. Within 60 days of the conclusion of the field and laboratory, project data collected will be provided to the City . Todd also will retain records generated during investigation activities for five years following project completion.

Section 2: Groundwater Well Sampling

2.1 Gloria Way Well Sampling

A groundwater sample will be collected by Todd from the Gloria Way Well. Sampling and analysis procedures have been developed to ensure that the water chemistry data are representative of groundwater quality and that the data are of sufficient quality to ensure they are appropriate for analysis of water treatment or blending alternatives. All groundwater samples will be analyzed by CEL Analytical, Inc, a California Department of Public Health Certified Environmental Laboratory Accreditation Program (ELAP) analytical laboratory. Analytical methods and QA/QC procedures for laboratory analyses are further described in Section 4.0.

2.2 Sampling Procedures

Preparation

Preparation for groundwater sampling will begin with notification to City of our sampling schedule. We will provide notification two weeks in advance of sampling so that the City and water company can make sure the well is online and operational on the sampling date. We will also notify the analytical laboratory of our sampling program two weeks in advance so that they can prepare the sample bottles. The laboratory will prepare the sample bottles with appropriate preservatives and affix labels. Todd will collect and drop off sample bottles from and at the outside contract analytical laboratory and fill in the sample date and time upon collection.

Prior to Sampling

The project staff performing the sampling will examine the wellhead for signs of tampering or deterioration and note observations in the log book. Depth to groundwater will be measured using a well sounder. The depth will be measured to the nearest 0.01 foot. Initiate purging at a rate of 300 gallons per minute (gpm), the anticipated flow rate of the well. Purge water will be discharged to the storm or sanitary sewer in accordance with City well purging procedures. The well will be operated for a period of at least 10 minutes prior to sampling. Water quality field parameters (pH, specific conductivity, temperature, turbidity) will be measured using calibrated field instruments, and recorded in the field log book or on a sample data sheet.

Sampling

A groundwater sample will be collected from the sample port at the wellhead and the sample bottles supplied by the laboratories will be filled. Sample bottles intended for VOC analysis will be filled with zero headspace.

2.3 Sample Handling and Control

When the groundwater samples are collected, the project staff will complete the sample labels with date and time collected, and sampler's initials. The sample containers will be stored in a cooler with ice and kept chilled to 4 ^{o}C until they are delivered to the laboratory.

The sampler will prepare a chain of custody form that will list the samples collected with dates and times. The form will also indicate the destination laboratory, the requested analyses, and the analytical turnaround time. The form will be used to track the custody of the samples from the time they are collected until their arrival at the destination laboratory. Each time the samples change hands, the relinquishing party and the receiving party will sign and date the form.

2.4 Quality Control Sampling

Quality control samples will include a trip blank. Because only one sample will be obtained from the Gloria Way Well, duplicate and split samples will not be collected. A trip blanks will be analyzed to provide a check on cross-contamination of the samples during shipment to the laboratory. One trip blank sample will be included with each shipment of samples that is transported to the laboratory for VOC analysis. Trip blanks consist of deionized water prepared by the laboratory in a clean environment and kept sealed in the cooler used to ship samples. The trip blanks will be transported to the laboratory with the other samples and analyzed for VOCs.

Section 3: Sampling During Soil Boring Installation

3.1 Soil Sampling

Todd may drill and sample a deep soil boring (up to 600 feet deep) as a part of this project. The drilling method will be mud-rotary, and discrete soil samples will be obtained using a wire-line coring system. Soil samples will be collected for lithologic logging and geotechnical analysis. Soil physical properties will be measured by Cooper Testing Laboratories in Palo Alto, California. The following sections describe the soil sampling methods.

3.2 Soil Sampling Procedures

Soil lithologies in the boring will be continuously logged by a California Professional Geologist using cuttings. Depth specific soil samples will be collected at discrete intervals using a split-spoon sampler, California-modified split-barrel sampler, or other coring system loaded with 6-inch long brass sleeves. When the driven or pushed sampler is retrieved from the soil boring, the sampler will be opened and the sleeves removed. Usually the amount of soil recovered is less than the total available space in the sampler. The geologist will note the amount of soil recovered in the sleeves and record the percent recovery on the boring log. The geologist will then select a representative sample for laboratory analysis. Generally the sleeve selected is the one that was closest to the bottom of the sampler as this typically will provide the best sample recovery. The geologist will not select a sleeve that contains slough or other material that may not be representative of in-situ conditions.

Once a sleeve is selected for sample collection, the geologist will preserve the sample by covering the ends with Teflon™ sheets and plastic end caps. The sample will then be labeled using either a marker on the end cap or an adhesive paper label. The label will indicate the boring/well number, depth, date and time collected, and geologist's initials.

3.3 Sample Handling and Control

The collected soil samples will be stored in an appropriate container during the fieldwork. Cold storage that is commonly used for environmental sampling will not be necessary since the soil samples will only be analyzed for physical properties. The geologist will prepare a chain of custody form that will list the soil samples collected with dates and times. The form will also indicate the destination laboratory, the requested analyses, and the analytical turnaround time. The form will be used to track the custody of the samples from the time they are collected until their arrival at the destination laboratory. Each time the samples change hands, the relinquishing party and the receiving party will sign and date the form.

Section 4: Analysis of Water and Soil Samples

4.1 Laboratory Analyses

The groundwater samples from the Gloria Way Well will be analyzed by CEL Analytical, Inc, in San Francisco, California. CEL is a California Department of Public Health Certified Environmental Laboratory Accreditation Program (ELAP) analytical laboratory.

4.1.1 Water Samples

Tables 2a through 2m presents the water quality parameters proposed for the Gloria Way Well groundwater sample. The Tables include water quality comparison criteria (i.e., current California maximum contaminant levels or MCLs, public health goals or PHGs, and secondary MCLs. Also included are EPA analytical methods, proposed and/or recommended laboratory reporting limits, required sample quantity, container, preservation, and holding times or limitations requirements.

4.1.2 Soil Samples

All soil sample physical property testing will be conducted by Cooper Testing Laboratories in Palo Alto, California. The physical property testing will be conducted in accordance with the latest specifications of the American Society For Testing Materials (ASTM), Caltrans, U.S. Army Corps of Engineers or other pertinent entities.

Table 3 presents the soil sample physical properties testing proposed for the deep exploratory boring.

4.2 Laboratory Quality Assurance/Quality Control

Internal QC procedures will be used at both the water quality laboratory and soil testing laboratory. The following summarizes the internal QA/QC procedures used at each laboratory.

4.2.1 Water Quality Lab QA/QC

For the water samples, a trip blank will be submitted to the analytical laboratory to assess the quality of the data resulting from the field sampling program. Trip blanks are generated at the analytical laboratory, and consist of VOA containers filled with reagent-free water. The trip blanks travel with the sample containers from the laboratory, to the field during sampling, and back to the laboratory for analysis. The trip blanks are submitted to the laboratory “blind” and are analyzed for evidence of contamination during sample transport. A trip blank will be submitted with each shipment of samples for VOC analysis.

Likewise, the laboratory will produce internal samples consisting of laboratory control samples, laboratory duplicates, matrix spikes and matrix spike duplicates, method blanks, and surrogate to assess the quality of data resulting from laboratory procedures and matrix effects from the site. QA/QC check samples (method blanks, Matrix Spike/Spike Duplicates (MS/MSD), duplicates, etc.) will be analyzed concurrently and on the same instrument as the sample batch to which they are assigned. Any deviations or modifications from the published EPA analytical procedures or the SOP must be documented and clearly noted in the case narrative.

MS/MSD samples are used to evaluate the effect of the sample matrix on the accuracy and precision of the laboratory method. An MS/MSD is an environmental sample to which known concentrations of target analytes have been added. The MS/MSD is taken through the entire sample preparation and analytical procedure and the recovery of the spiked analytes calculated. Results are expressed as a percentage of the recovery of the known amount spiked. The laboratory will be required to simultaneously run a laboratory control sample spiked at the same level as the MS. MS/MSD analysis will be conducted at a rate of one set for every batch of 20 samples of the same matrix. Wherever possible, additional sample volume will be provided to allow for MS/MSD analysis to be performed on a site specific sample.

Method blanks consist of reagent-free water that is extracted and analyzed with each batch of samples. The results obtained from the method blank analysis are used to evaluate the presence of contaminants originating from the laboratory sample preparation process.

Surrogate spikes consist of known quantities of compounds that are chemically similar to target analytes, which are spiked into all field and QC samples. The results of surrogate spikes are expressed as percent recoveries, and are used to evaluate the efficiency of the sample preparation and analysis procedures.

4.2.2 Soil Lab QA/QC

The soil testing laboratory also adheres to an in-house QA/QC program. The laboratory managers continually monitor testing activities in the lab in order to assure that testing is proceeding in accordance with the appropriate standards. Any discrepancies are reviewed and the test is rerun if appropriate. A laboratory manager reviews all test results before they are released to the client. If test result accuracy is suspect, the entire test is reviewed and rerun if appropriate. All applicable equipment (scales, load cells LVDTs, etc.) is calibrated at least once every year by a senior CTL technician. An independent calibration company with equipment traceable to NBS standards calibrates our calibration equipment annually.

Section 5: References

City of East Palo Alto, 2011. Request for Proposal Gloria Way Well Production Alternatives Analysis and East Palo Alto Water Security Feasibility Study. October 11.

Marshack, J.B. 2011 (16th edition). A Compilation of Water Quality Goals: State Water Resource Control Board, Sacramento, CA, 47 p. with Tables

US EPA. 2011. Guidance on Quality Assurance Project Plans CIO 2106-G-05 . Sacramento, California.

Table 1: QAPP Distribution List

Name	Organization	Title	Email Address	Telephone
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	USEPA	Project Manager		
	USEPA	QA Manager		

Table 2a: Title 22 DPH Drinking Water Quality-Summary of Complete Scan

Analysis**	Methods (EPA/SM)	Recommended Reporting Limits	Minimum Water Quantity/Required Containers**	Preservation	Holding Time (days)
Anion Scan (see Table 2b)	varies	varies	One 500 mL poly	Unpreserved; <6 ^{o}C	varies
Asbestos in DW (Table 2c)	EPA 100.2	0.2 MFL	Two 1.0 L	Unpreserved; <6 ^{o}C	2
DHS Diquat (Table 2c)	EPA 549.2	4.0 µg/L	One 1.0 L brown poly	Dechlorinate***; <6 ^{o}C	2
DHS Endothall (Table 2c)	EPA 548.1	8.0 µg/L	One 250 mL amber	<6 ^{o}C	7
DHS Glyphosate (Table 2c)	EPA 547	6.0 µg/L	Two 125 mL (250 mL)	Dechlorinate; <6 ^{o}C	14
DHS Non-volatile synthetic organic chemicals (see Table d)	EPA 525.2 & 507	varies	Two 1.0 L amber glass	Dechlorinate w. 50 mg/L $Na_2S_2O_3$ HCl to pH <2; <6 ^{o}C	14
DHS Regulatory: Carbamates (Table 2e)	EPA 531.1	varies	Two 125 mL amber glass (250 mL)	3.6 mL monochloroacetic acid before dechlorination ; <6 ^{o}C	28
DHS Regulatory: Chlorinated Acids (Table 2f)	EPA 515.1	varies	Two 1.0 L amber glass;	Unpreserved, but dechlorinate; <6 ^{o}C	14
DHS Regulatory: Chlorinated Pesticides and PCBs (Table 2g)	EPA 508	varies	Two 1.0 L amber glass;	Unpreserved, but dechlorinate*; <6 ^{o}C	7
DHS Regulatory: Volatile Organic Compounds (see Table 2h)	EPA 524.2	varies	Four 40 mL VOA (160 mL)	HCl to pH<2;<4 ^{o}C; no headspace	14
Dioxin 2378 TCDD in DW (Table 2i)	EPA 1613A	0.005 µg/L	Two 1.0 L amber glass	Unpreserved; <6 ^{o}C	365
EDB)/DCP (Table 2i)	EPA 504.1	0.01 µg/L	Three 40 mL VOA (120 mL)	$Na_2S_2O_3$; <6 ^{o}C	14
General Physical Parameters: color, odor, turbidity (see Table 2j)	varies	varies	Two 250 mL or one 500 mL	Various: see Table	–
General Mineral Scan (see Table 2j)	varies	varies	One 2.0 L	Various: see Table	–
Gross Alpha and Beta (Table 2i)	EPA 900.0	3.0 pCi/L	One 1.0 L poly	HNO_3 to pH <2; <6 ^{o}C	180
Inorganics Scan (see Tables 2k)	EPA and SM	varies	1.0 L	Various: see Table	–
Perchlorate (Table 2l)	EPA 314.0	4.0 µg/L	500 mL poly	Unpreserved; <6 ^{o}C	28
Radium 226 & 228 (Table 2l)	EPA 903/904	1.0 pCi/L	1.0 L poly	HNO_3 to pH <2; <6 ^{o}C	180
Strontium 90 (Table 2l)	EPA 905	1.0 pCi/L	One 1.0 L poly	HNO_3 to pH <2; <6 ^{o}C	180
Tritium (Table 2l)	EPA 906	1,000 pCi/L	One 500 mL poly	<6 ^{o}C	21
Chromium(VI) (Cr6) (Table 2m)	SM 3500-Cr B	0.010 mg/L	One 125 mL poly	Unpreserved; <6 ^{o}C	2
Uranium (U) (Table 2m)	EPA 200.8	1.0 µg/L	One 125 mL amber glass	Unpreserved; <6 ^{o}C	180

Notes:

* Some analytes repeat with scan packages.
** Dechlorinate <u>only</u> if chlorinated water sample is collected
*** Some samples may be combined depending on lab

DW = Drinking water
EPA = U.S. Environmental protection Agency Method
SM = Standard Method

VOA = volatile organic analysis vials
mg/L = milligram per liter or parts per million
mL = milliliter
µg/L = microgram per liter or parts per billion

Table 2b: Anion Scan

Analysis	EPA Methods	Recommended Reporting Limits	Holding Time (days)	Standards (mg/L)		
				CA Primary MCL	PHG	CA Secondary MCL
Bromide(Br^-)*	300.1	5 µg/L	28	–	–	–
Chloride (Cl^-)	300.0	0.50 mg/L	28	–	–	250
Fluoride (F^-)	300.0	0.10 mg/L	28	2	–	–
Iodide (I^-)*	200.7	5 µg/L	28	–	–	–
Nitrate (NO_3^-)	300.0	2.0 mg/L	2	45	45	–
Nitrite (NO_2^-)	300.0	0.40 mg/L	2	1	1	–
Sulfate (SO_4^-)	300.0	0.50 mg/L	28	–	–	250

Notes:
* In addition to standard anions

Table 2c: Asbestos, Diquat, Endothall and Glyphosate

Analysis	Standards (mg/L)		
	CA Primary MCL	PHG	CA Secondary MCL
Asbestos in DW	7 MFL	7MFL	–
Diquat	0.02	0.015	0.02
Endothall	0.100	0.580	0.100
Glyphosate	0.700	0.900	0.700

Note:
MFL = million fibers per liter
MCL = Maximum Contaminant Level for drinking water
PHG = Public Health Goal for drinking water

Table 2d: Non Volatile Synthetic Organic Chemicals (EPA 525.2)

Analysis	Standards (mg/L)			Analysis	Standards (mg/L)		
	CA Primary MCL	PHG	CA Secondary MCL		CA Primary MCL	PHG	CA Secondary MCL
Acenaphthene	–	–	–	Dimethylphthalate	–	–	–
Acenaphthylene	–	–	–	Di-n-butyl phthalate	–	–	–
Acetochlor	–	–	–	Di-n-octylphthalate	–	–	–
Alachlor	0.002	0.004	–	Diphenamid	–	–	–
Anthracene	–	–	–	Disulfoton	–	–	–
Atracine	0.001	0.00015	–	EPTC	–	–	–
Benzo(a)anthracene	0.001	0.00015	–	Ethion	–	–	–
Benzo(a)pyrene	0.0002	0.00004	–	Fluorathene	–	–	–
Benzon(b)fluoranthene	–	–	–	Fluorene	–	–	–
Benzo(g,h,i)perylene	–	–	–	Indeno(1,2,3-cd)pyrene	–	–	–
Benzo(k)fluoranthene	–	–	–	Metolachlor	–	–	–
Bis(2-ethylhexyl)adipate	–	–	–	Metribuzin	–	–	–
Bis(2-ethylhexyl)phthalate	–	–	–	Molinate	0.020	0.001	–
Bromacil	–	–	–	Naphthalene	–	–	–
Butachlor	–	–	–	PCNB	–	–	–
Butyl benzyl phthalate	–	–	–	Phenanthrene	–	–	–
Captan	–	–	–	Prometon	–	–	–
Chloropropham	–	–	–	Prometryn	–	–	–
Chrysene	–	–	–	Pyrene	–	–	–
Cyanazine	–	–	–	Simazine	0.004	0.004	0.004
Diazinon	–	–	–	Terbacil	–	–	–
Dibenzo(a,h)anthracene	–	–	–	Thiobencarb	0.070	0.070	0.001
Diethylphthalate	–	–	–	Trithion	–	–	–
Dimethoate	–	–	–				

Table 2e: Carbamates

Analysis	Standards (mg/L)		
	CA Primary MCL	PHG	CA Secondary MCL
Carbofuran	0.018	0.0017	–
Oxamyl	0.050	0.050	–

Table 2f: Chlorinated Acids

Analysis	EPA Method	Recommended Reporting Limits	Holding Time (days)	Standards (mg/L)		
				CA Primary MCL	PHG	CA Secondary MCL
Bentazon	515.1	2.0 µg/L	14	0.018	0.200	–
2,4-D	515.1	10 µg/L	14	0.070	0.070	–
Dalapon	515.1	10 µg/L	14	0.200	0.790	–
Dinoseb	515.1	2.0 µg/L	14	0.007	0.014	–
Petrachlorophenol	515.1	0.2 µg/L	14	0.001	0.0004	–
Picloram	515.1	1.0 µg/L	14	0.500	0.005	–
2,4,5-TP (Silvex)	515.1	1.0 µg/L	14	–	–	–

Table 2g: Chlorinated Pesticides and PCBs

Analysis	EPA Method	Recommended Reporting Limits	Holding Time (days)	Standards (mg/L)		
				CA Primary MCL	PHG	CA Secondary MCL
Endrin	508	0.10 µg/L	7	0.002	0.0018	–
HCH-gamma (Lindane)	508	0.20 µg/L	7	–	–	–
Heptachlor	508	0.010 µg/L	7	0.00001	0.000008	–
Heptachlor epoxide	508	0.010 µg/L	7	0.00001	0.000008	–
Hexachlorocyclopentadiene	508	1.0 µg/L	7	0.050	0.050	–
Hexachlorobenzene	508	0.50 µg/L	7	0.001	0.050	–
Methoxychlor	508	10 µg/L	7	0.030	0.030	–
PBB-1016	508	0.50 µg/L	7	–	–	–
PCB-1232	508	0.50 µg/L	7	–	–	–
PCB-1232	508	0.50 µg/L	7	–	–	–
PCB-1248	508	0.50 µg/L	7	–	–	–
PCB-1254	508	0.50 µg/L	7	–	–	–
PCB-1260	508	0.50 µg/L	7	–	–	–
Total PCBs	508	0.50 µg/L	7	–	–	–
Toxaphene	508	1.0 µg/L	7	0.003	0.00003	–
Chlordane (tech)	508	0.10 µg/L	7	0.0001	0.00003	–

Table 2h: Volatile Organic Compounds (VOCs)

Analysis	EPA Method	Recommended Reporting Limits	Holding Time (days)	Standards (mg/L)		
				CA Primary MCL	PHG	CA Secondary MCL
Benzene	524.2	0.50 µg/L	14	0.001	0.00015	–
Carbon tetrachloride	524.2	0.50 µg/L	14	0.0005	0.00001	–
Chlorobenzene	524.2	0.50 µg/L	14	0.070	0.200	–
1,2-Dichlorobenzene	524.2	0.50 µg/L	14	0.600	0.600	–
1,4-Dichlorobenzene	524.2	0.50 µg/L	14	0.005	0.600	–
1,1-Dichloroethane	524.2	0.50 µg/L	14	0.005	0.003	–
1,2-Dichloroethane	524.2	0.50 µg/L	14	0.0005	0.0004	–
1,1-Dichloroethane	524.2	0.50 µg/L	14	0.005	0.003	–
cis-1,2-Dichloroethane	524.2	0.50 µg/L	14	–	–	–
trans-1,2-Dichloroethane	524.2	0.50 µg/L	14	–	–	–
1,2-Dichloropropane	524.2	0.50 µg/L	14	0.005	0.0005	–
1,2-Dichloropropene (total)	524.2	0.50 µg/L	14			–
Ethylbenzene	524.2	0.50 µg/L	14			–
Methyl Tert-butyl ether	524.2	3.0 µg/L	14	0.013	0.013	0.005
Methylene chloride	524.2	0.50 µg/L	14	–	–	–
Styrene	524.2	0.50 µg/L	14	0.100	0.0005	–
1,1,2,2-Tetrachloroethane	524.2	0.50 µg/L	14	–	–	–
Tetrachloroethane	524.2	0.50 µg/L	14	–	–	–
Toluene	524.2	0.50 µg/L	14	0.150	0.150	–
1,2,4-Trichlorobenzene	524.2	0.50 µg/L	14	0.005	0.005	–
1,1,1-Trichloroethane	524.2	0.50 µg/L	14	0.200	1.000	–
1,1,2-Trichloroethane	524.2	0.50 µg/L	14	0.005	0.0003	–
Trichloroethene	524.2	0.50 µg/L	14	0.005	0.0008	–
Trichlorofluoromethane	524.2	5.0 µg/L	14	0.150	0.700	–
Vinyl chloride	524.2	0.50 µg/L	14	0.0005	0.00005	–
Xylenes (total)	524.2	0.50 µg/L	14	1.750	1.800	–

Table 2i: Dioxin 2378 TCDD, EDB, and DCP

Analysis	Standards (mg/L)		
	CA Primary MCL	PHG	CA Secondary MCL
Dioxin (2,3,7,8 tetrachlorodibenzo-p-dioxin)	0.00000003	–	0.000000001
Ethylene dibromide (EDB) (1,2 dibromoethane)	0.00005	0.00001	–
Dibromochloropropane (DCP) (1,2-dibromo3-chloropropane)	0.0002	0.0000017	–

Table 2j: General Physical and General Mineral (Conventional Chemistry)

Analysis	Method (EPA/SM)	Recommended Reporting Limits	Holding Time (days)	Preservation	Standards (mg/L)		
					CA Primary MCL	PHG	CA Secondary MCL
Color (CU)	SM2120B	3 CU	2.0	<6 °C	–	–	5
Odor (TON)	EPA 140.1	1 TON	1.0	<6 °C	–	–	3
Turbidity (NTU)	EPA 180.1	0.05 NTU	2.0	<6 °C	1.0	–	5
Aggressive Index	AWWA	calculated	–	–	–	–	–
Alkalinity (total as $CaCO_3$)	EPA 2320B	2 mg/L	14	<6 °C	–	–	–
Bicarbonate (HCO_3^-)	SM 2320B	5.0 mg/L	14	<6 °C	–	–	–
Calcium (Ca^{2+})	EPA 200.7	1.0 mg/L	180	Add HNO_3 to pH <2	–	–	—
Carbonate (CO_3^{2-})	SM 2320B	5.0 mg/L	14	<6 °C	–	–	–
Chloride (Cl^-)	EPA 300.0	0.50 mg/L	28	<6 °C	–	250	–
Conductivity (Electrical or Specific Conductance-EC)	SM	20 µSiemans/cm	28	<6 °C	–	400	–
Copper (Cu)	EPA 200.8	50 µg/L	180	Add HNO_3 to pH <2	1.300	0.300	1.000
Cyanide (CN)	10-204-00-1X	3 µg/L	14	Cool, NaOH to pH >12; ascorbic acid if chlorinated	0.150	0.150	–
Iron (Fe) (total)	EPA 200.8	100 µg/L	180	Add HNO_3 to pH <2	–	–	0.300
Hardness (total as $CaCO_3$)	SM2340B	5.0 mg/L	180	Add HNO_3 to pH <2	–	–	–
Hydroxide (OH^-)	SM 2320B	1.0 mg/L	14	<6 °C	–	–	–
Potassium (K^+)	EPA 200.7	1.0 mg/L	180	Add HNO_3 to pH <2	–	–	
MBAS (Methylene Blue Active Substances)	SM 5540C	0.050 mg/L	2	<6 °C	–	0.500	–
Magnesium (Mg^{2+})	EPA 200.7	1.0 mg/L	180	Add HNO_3 to pH <2	–	–	–
Manganese (Mn^{2+})	EPA 200.8	20 µg/L	180	Add HNO_3 to pH <2	–	0.050	–
Sodium (Na^+)	EPA 200.7	1.0 mg/L	180	Add HNO_3 to pH <2	–	–	–
pH (units)	SM 4500	1.0 pH units	0.01	<6 °C	–	6.5-8.5	–
Total Dissolved Solids (TDS)	SM 2540C	10 mg/L	7	<6 °C	–	500	–
Sulfate (SO_4^{2-})	EPA 300	0.50 mg/L	28	<6 °C	–	250	–
Zinc (Zn^{2+})	EPA 200.8	50 µg/L	180	Add HNO_3 to pH <2	–	5.0	–

Notes:
CU = Color Units
TON = Threshold Odor Number
NTU = Nephalometric Turbidity Units

Table 2k: Inorganics Scan

Analysis	EPA Method	Recommended Reporting Limits	Holding Time (days)	Preservation	Standards (mg/L)		
					CA Primary MCL	PHG	CA Secondary MCL
Aluminum (Al)	200.8	50.0 µg/L	180	Add HNO_3 to pH <2	1.000	0.600	0.200
Antimony (Sb)	200.8	6.0 µg/L	180	Add HNO_3 to pH <2	0.006	0.02	–
Arsenic (As)	200.8	2.0 µg/L	180	Add HNO_3 to pH <2	0.010	0.000004	–
Barium (Ba)	200.8	100 µg/L	180	Add HNO_3 to pH <2	1.000	2.000	–
Beryllium (Be)	200.8	1.0 µg/L	180	Add HNO_3 to pH <2	0.004	0.001	–
Cadmium (Cd)	200.8	1.0 µg/L	180	Add HNO_3 to pH <2	0.0005	0.00004	–
Chromium (Cr) total	200.8	10 µg/L	180	Add HNO_3 to pH <2	–	–	–
Copper (Cu)	200.8	50 µg/L	180	Add HNO_3 to pH <2	1.300	0.300	1.000
Iron (Fe)	200.8	100 µg/L	180	Add HNO_3 to pH <2	–	–	0.300
Lead (Pb)	200.8	5.0 µg/L	180	Add HNO_3 to pH <2	0.015	0.0002	–
Mercury (Hg)	245.1	1.0 µg/L	28	Add HNO_3 to pH <2	0.002	0.0012	–
Nickel (Ni)	200.8	10 µg/L	180	Add HNO_3 to pH <2	0.100	0.012	–
Selenium (Se)	200.8	5.0 µg/L	180	Add HNO_3 to pH <2	0.050	–	–
Silver (Ag)	200.8	10.0 µg/L	180	Add HNO_3 to pH <2	–	–	0.100
Thallium (Tl)	200.8	1.0 µg/L	180	Add HNO_3 to pH <2	0.002	0.0001	–
Zinc (Zn)	200.8	5 µg/L	180	Add HNO_3 to pH <2	–	5.000	–
Fluoride (F)	300.0	0.1 mg/L	28	<6 ^{o}C	2.000	1.000	–
Nitrate (NO_3)	300.0	2.0 mg/L	2	<6 ^{o}C	10	10	–
Nitrite (NO_2)	300.0	0.4 mg/L	2	<6 ^{o}C	1.000	1.000	–
Nitrite (NO_2)+ Nitrate (NO_3) as N (calc)	300.0	0.40 mg/L	28	<6 ^{o}C	–	–	–

Table 2l: Perchlorate, Groass Alpha and Beta Radium, Strontium-90, and Tritium

Analysis	Standards		
	CA Primary MCL	PHG	CA Secondary MCL
Perchlorate (mg/L)	0.006	0.006	–
Gross Alpha (pCi/L)	15	–	–
Gross Beta(mrem/yr)	4	–	–
Radium 226 & 228 (pCi/L)	5.0	0.05	–
Strontium 90 (pCi/L)	8.0	0.35	–
Tritium (pCi/L)	20,000	400	–

Notes:
pCi/L = picoCuries per liter
mrem/yr = millirems per year

Table 2m: Additional Analytes

Analysis	Standards		
	CA Primary MCL	PHG	CA Secondary MCL
Chromium(VI) (mg/L)	–	0.00002	–
Uranium (pCi/L)	20	0.5	–

Table 3: Soil Sample Physical Properties and Analytical Methods

Soil Property	Suggested Test Method
Porosity	ASTM 425M
Hydraulic conductivity	ASTM D5084
Vertical and horizontal permeability	API RP40/ EPA 9100

Appendix B

Well Construction Summary Table

Selected Wells

Appendix B. Summary of Well Construction and Hydraulic Performance Information

T (S)	R (W)	Sec	Let	Owner Well Name	Elevation (ft-amsl)	Location Notes	City	Date Drilled	Owner	Use	Static Depth to Water (ft-bgs)	Well Depth (ft)	Well Diameter (in)	Screen Interval (ft)	Screen Length (ft)	Pumping Rate (gpm)	Drawdown (ft)	Test Duration (hours)	Specific Capacity (gpm/ft)	Aquifer Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Depth to Bedrock (ft)	Notes
5	2	18				Ravenswood 250' N of 41-040	EPA	6/15/1905	Spring Valley Water Co.			230		198-230	32	20							All were artesian when drilled and affected by the tide
5	2	18				Ravenswood	EPA	1/1/1904	Spring Valley Water Co.							20							Reportedly 10 wells produced 201 gpm ~20 gpm
5	2	18				Ravenswood	EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	18				Ravenswood	EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	18				Ravenswood	EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	18				Ravenswood	EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	18				Ravenswood 500' N or 41-029	EPA	10/17/1904	Spring Valley Water Co.			239		201-218	17	20							
5	2	18					EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	18				Ravenswood 250' N of 41-030	EPA	1/23/1905	Spring Valley Water Co.			223		195-198 203-215	15	20							
5	2	18					EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	18				Ravenswood 500' N or 41-031	EPA	10/26/1904	Spring Valley Water Co.			225		194-215	21	20							
5	2	18					EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	18				Ravenswood 230' N of 41-032	EPA	2/18/1905	Spring Valley Water Co.			241		207-209 210-216	9	20							No flow
5	2	18					EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	18				Ravenswood 500' N of 41-030	EPA	11/14/1904	Spring Valley Water Co.			234		210-220	10	20							
5	2	18					EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	18					EPA	11/23/2004	Spring Valley Water Co.							20							
5	2	19	C1				EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	19	N80			Dunbarton Pt.	EPA	1/1/1904	Spring Valley Water Co.							20							
5	2	19	C2			Ravenswood	EPA	4/12/1905	Spring Valley Water Co.			210		203-210	7	20							
5	2	19	C3			Ravenswood	EPA	6/2/1906	Spring Valley Water Co.			232		199-214 216-232	31	20							
5	2	19	F1			Ravenswood	EPA	6/25/1905	Spring Valley Water Co.			217		203-217	14	20							
5	2	19	F2			Ravenswood 500' S of 41-062	EPA	6/16/1905	Spring Valley Water Co.			223		210-223	13	20							
5	2	19	L1			Ravenswood 500' S of 41-063	EPA	1/4/1906	Spring Valley Water Co.			224		217-224	7	20							
5	2	19	L2			Ravenswood	EPA	7/14/1905	Spring Valley Water Co.			216		202-216	14	20							
5	2	19	L3			Ravenswood 500' S 41-065	EPA	12/18/1905	Spring Valley Water Co.			212		206-212	6	20							

Appendix B. Summary of Well Construction and Hydraulic Performance Information

T (S)	R (W)	Sec	Let	Owner Well Name	Elevation (ft-amsl)	Location Notes	City	Date Drilled	Owner	Use	Static Depth to Water (ft-bgs)	Well Depth (ft)	Well Diameter (in)	Screen Interval (ft)	Screen Length (ft)	Pumping Rate (gpm)	Drawdown (ft)	Test Duration (hours)	Specific Capacity (gpm/ft)	Aquifer Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Depth to Bedrock (ft)	Notes
5	2	19	P1			Ravenswood 1000' S of 41-066	EPA	8/2/1905	Spring Valley Water Co.			208		198-208	10	20							
5	2	19	P2			Ravenswood 500' S of 41-067	EPA	12/12/1905	Spring Valley Water Co.			214		192-196 200-214	14	20							
5	2	19	P			Ravenswood 1000' S of 41-068	EPA	8/28/1905	Spring Valley Water Co.			214		200-214	14	20							
5	2	19	30			2081 Bay Road	EPA		Romic Environmental Technologies Corp	Monitoring	8.5	215		~165-180	15								
5	2	30				2519 Pulgas Ave.	EPA	3/23/1977	Saturo Iwasaki	Irrigation		280	12	232-280	48								
5	3	15	A			Adjacent to Menlo Park Sanitary District Treatment Plan	MP	1/20/1958	Robert Martin	Industrial	144	240	12	145-157 186-187 196-202	19								
5	3	21	G			2015 Bayshore Hwy Redwood City	RC	2/5/1962	Harbor Village Trailer Park	Domestic/Irrigation	14	380	10.75	183-193 230-242 295-308 333-342 362-367	49	200	9	16.5	22.2	44444	907.0		
5	3	22	L			160 Scott Dr Menlo Park	MP	11/14/1988	Bohannon Dev. Co.	Irrigation	18	230	12	120-200	80	60	2	8	30.0	60000	750.0		
5	3	22				1 m N of Bayshore & SP RR	MP	10/15/1957	Menlo Park Sanitary District	Municipal	145	280		146-154 274-280	14	50							
5	3	25	F1	Gloria Way	19	Bay & Gloria East Palo Alto	EPA	12/29/1979	Co. of San Mateo	Municipal		350	24	258-280 318-323	27	300	130	24	2.3	4615	170.9		
5	3	25	F			2379 Palo Verde East Palo Alto	EPA	2/27/1989	Atancacio Ochoa	Domestic		118	10	40-115	75								
5	3	25	F			2393 Palo Verde East Palo Alto	EPA	5/8/1989	Ekula Lelit Sag	Domestic		100	10	20-100	80	15.5		3					
5	3	25	G1		15		EPA					54		31-48	17								
5	3	25	M	#1?	15	2188 Addison Ave East Palo Alto	EPA	4/28/1905	Palo Alto Park Mutual Water Co	Municipal		300	10			150							
5	3	25	M1	#2	15	2188 Addison Ave East Palo Alto	EPA	1915	Palo Alto Park Mutual Water Co	Municipal	22	67	12	60-67	7	150							
5	3	25	M2	#3	15	2188 Addison Ave East Palo Alto	EPA	1936	Palo Alto Park Mutual Water Co	Municipal	31	325	14	194-195 219-235 249-257 269-285	41	450							
5	3	25	M4	#5	15	2188 Addison Ave East Palo Alto	EPA	9/12/1950	Palo Alto Park Mutual Water Co	Municipal	46	306	10	219-279	67	300							
5	3	25	M5	#6	15	2189 Addison Ave East Palo Alto	EPA	1/1/1953	Palo Alto Park Mutual Water Co	Municipal		260	10	247-251	4								
5	3	25	M6	#7	15	2190 Addison Ave East Palo Alto	EPA	Jun-87	Palo Alto Park Mutual Water Co	Municipal	49	460	8	248-260 290-300 340-366 378-388 424-440	74	350	96	8.5	3.6	7292	98.5		
5	3	26	J			2200 Menalto St East Palo Alto	EPA	4/13/1989	Richard M Jacobeen	Domestic	16	72	10	20-72	52	15	3	3	5.0	10000	192.3		
5	3	26				960 Menlo Pam Dr. Menlo Park	MP	10/8/1977	Harry Hoffman	Irrigation	24	50	9	20-50	30								
5	3	26	M			698 Menlo Oaks Dr Menlo Park	MP	12/2/1976	Mars Garcia	Domestic		102	10	60-102	42								
5	3	26				885 Menlo Oaks Menlo Park	MP	12/12/1977	Robt L Gantenbelen	Irrigation		60		21-60	39								
5	3	26	F			660 Berkeley Ave Menlo Park	MP	11/13/1957	Stanley Rozynski	Domestic	33	69	8	53-58	5								
5	3	26	L1	No. 3	37.5	Willow and Bay Rd	MP	10/31/1928	Veterans Hospital	Industrial		575											
5	3	26	L2			Willow and Bay Rd	MP	5/1/1961	Veterans Hospital	Industrial		620											
5	3	26	L3			Willow and Bay Rd	MP	2/1/1929	Veterans Hospital	Industrial		572											
5	3	26	L4	No. 1	39.8	Willow	MP		Veterans Hospital	Industrial		600		85-100 175-180 308-315 410-414									

Appendix B. Summary of Well Construction and Hydraulic Performance Information

T (S)	R (W)	Sec	Let	Owner Well Name	Elevation (ft-amsl)	Location Notes	City	Date Drilled	Owner	Use	Static Depth to Water (ft-bgs)	Well Depth (ft)	Well Diameter (in)	Screen Interval (ft)	Screen Length (ft)	Pumping Rate (gpm)	Drawdown (ft)	Test Duration (hours)	Specific Capacity (gpm/ft)	Aquifer Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Depth to Bedrock (ft)	Notes
5	3	27				189 Hawthorn, Atherton	A	11/19/2003	Bill Frimel	Irrigation		200	5	40-200	160	15							
5	3	27				198 Toyon Rd., Atherton	A	9/17/2001	Rick Skierka	Irrigation	52	300	5	60-300	240	23+							
5	3	27				96 Irving Ave., Atherton	A	1/23/2007	James Witt	Irrigation	12	140	5	40-80 100-140	80	60	15	4	4.0	8000	100.0		
5	3	27				75 Catalpa Dr Atherton	A	5/18/2011	Andrew Kessler	Irrigation	60	250	5	190-250	60	31	67	24	0.5	925	15.4		
5	3	27				102 Catalpa Dr Atherton	A	10/13/1977	Conrad Welling	Irrigation		102	10	42-102	60	9.5		3					
5	3	27				98 Madrone Rd Atherton	A	5/23/1988	Mike & Judy Gaulke	Domestic		100	12	20-100	80	32.5		6					
5	3	27				70 Edge Rd Atherton	A	9/30/1985	Norman Howard	Irrigation	20	105	9	30-100	70	15	18	2	0.8	1667	23.8		
5	3	27				232 Oak Grove Ave Atherton	A	7/9/1988	Eugene Rauen	Domestic	40	200	6	050-070 080-110 155-180	75	30		5					
5	3	27				85 Encino Rd Atherton	A	6/26/1977	James Moreing	Domestic	32	118	15	20-118	98								
5	3	27				48 Encino Rd Atherton	A	7/3/1977	RA Schmitt	Domestic	20	120	15	20-118	98								
5	3	27	G			2 Rosewood Dr. Atherton	A	9/6/1977	Joe Livingston	Irrigation	25	121	15	20-121	101	50	10	6	5.0	10000	99.0		
5	3	27	B			301 Green oaks dr Atherton	A	8/19/1977	Carl Doerflinger	Domestic	56	121	8	020-121	101								
5	3	27	B			2 Lupine Atherton	A	11/27/1990	Mr. Zapattin	Irrigation	15	110	9	020-110	90								
5	3	27	C			197 Greenoaks Dr Atherton	A	9/11/1988	Linda Davis Spiker	Irrigation		50	10	012-50	38								
5	3	27	E			92 Flood Circle Atherton	A	9/28/1950	Geo F. Koth	Domestic	53	105	8	082-088 090-105	21								
5	3	27	F			88 La Burhum Rd Atherton	A	9/29/1988	Dave Anderson	Irrigation	25	85	9	020-040 060-080	40	60	2	4	30.0	60000	1500.0		
5	3	27	G4			28 Mananita Rd Atherton	A	7/20/1990	Linda Haynie	Irrigation		140	9	060-080 100-120	40	40	39	4	1.0	2051	51.3		
5	3	27	G1		35	294 Oak Grove Ave.	A	9/14/1988	John Rosso	Irrigation		58	5	38-58	20								
5	3	27	H			86 Fredrick Ave Atherton	A	8/25/1990	Mary Lee Shepard	Irrigation		115	5	060-100	40	50	35	4	1.4	2857	71.4		
5	3	27	J			3 Altree ct Atherton	A	5/5/1977	Jack Cosgrove	Domestic	28	105	8	030-035 075-095	25	14							
5	3	27	K2M		45	120 Toyon Rd.	A	4/5/1991	Curt Shultze	Irrigation	48	290	6	145-165 210-230 240-280	60	30							
5	3	27	L			90 Limdem Ave Atherton	A	3/13/1991	Steve Shepard	Irrigation		180	10	060-100 160-180	60	40	8	4	5.0	10000	166.7		
5	3	27	L			28 Flood Circle Atherton	A	5/29/1991	Louis Allen	Irrigation		140	10	060-080 100-120	40	60	15	6	4.0	8000	200.0		
5	3	27	L6M			69 Debell St.	A	10/5/1992	Robert Ger	Irrigation	40	180	5	50-90 130-150 170-180	70	50	55	4	0.9	1818	26.0		
5	3	27	M			139 James Ave Atherton	A	7/15/1988	Robert R Strickland Jr	Irrigation	14	80	9	60-80	20	60	10	4	6.0	12000	600.0		
5	3	27	N			135 Laurel St Atherton	A	9/15/1988	Thomas Gamboa	Irrigation		50	10	030-050	20								
5	3	27	N			166 Encinal Ave Atherton	A	7/27/1989	Charles Pratt	Domestic		300	12	070-090 160-240 260-280	120								
5	3	27	N			172 Encinal Ave Atherton	A	3/5/1953	B. Banducci		55	90	8	55-57 80-83	5								
5	3	27	P			408 Middlefield Rd.	A	8/25/1953	John Perata	Irrigation	45	391	10	milld 60- 387		30	83						
5	3	27	P2			2 Limdem Ave., Atherton	A	6/8/1963	Robert Proctor	Domestic	40	90	8	25-37 42-57 78-90	24	20	8	4	2.5	5000	208.3		
5	3	27	Q			230 Oakgrove Ave Atherton	A	7/15/1988	Eugene & Gloria Berry	Domestic	40	220	12	065-110 160-200	85	25							
5	3	27	R3		46		A					160		28-140									
5	3	27	S			Hawthorne Ave, Atherton	A	4/20/1950	LA Parsons	Domestic	59	65	8	59-65	6								
5	3	28				#2 Placitas, Atherton	A	8/3/1977	Robert Thrasher	Irrigation		105	10	030-105	75	14		2					

Appendix B. Summary of Well Construction and Hydraulic Performance Information

T (S)	R (W)	Sec	Let	Owner Well Name	Elevation (ft-amsl)	Location Notes	City	Date Drilled	Owner	Use	Static Depth to Water (ft-bgs)	Well Depth (ft)	Well Diameter (in)	Screen Interval (ft)	Screen Length (ft)	Pumping Rate (gpm)	Drawdown (ft)	Test Duration (hours)	Specific Capacity (gpm/ft)	Aquifer Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Depth to Bedrock (ft)	Notes
5	3	28	G			98 San Benito Atherton	A	5/7/1977	WL Talbot	Irrigation	30	60	8	035-040 050-060	15	14	0	2					
5	3	28	F			78 Jennings Atherton	A	5/2/1977	W Batton	Domestic		95	5	038-042 070-075	9								
5	3	34	C			238 Oak Grove Ave, Atherton	A	1/31/1997	Suzanne Smith	Irrigation	101	120	5	20-120	100	60	17	6	3.5	7059	70.6		
5	3	34	C			171 Glenwood Ave, Atherton	A	9/20/1988	Gary Lencioni	Irrigation		60	5	40-60	20								
5	3	34				Harvard & El Camino, Atherton	A	8/8/1978	Pacific Gas & Electric	Industrial		120											
5	3	34	H1	Leland Well	53	345 Middlefield	MP	10/18/1977	USGS	Domestic	49	310	8	180-200 250-270	50	200	0.5		400.0	800000	16000.0	667.00	elog water levels chemistry
5	3	34	H4				MP															720.00	
5	3	34	R1				PA		Stanford U			292	10										
5	3	35		South		80 Willow Rd. Middlefield & Willow, Menlo Park	MP	7/13/1977	Lane Publishing	Irrigation	56	215	8	100-110 160-165 185-195	25	75	4	2	18.8	37500	1500.0		
5	3	35		West		80 Willow Rd. Middlefield & Willow, Menlo Park	MP	6/5/1905	Lane Publishing	Irrigation	56	213	8	100-120 150-190	60	310							
5	3	35	D2			Middlefield, Menlo Park	MP	9/21/1965	St. Patrick's Seminary	Irrigation and Domestic		450	12	160-180 220-240 250-290 320-440	200	840	50	82	16.8	33600	168.0		
5	3	35	D3		50	320 Middlefield Rd, Menlo Park	MP	10/24/1986	St Patricks Seminary	Domestic		425	12	160-180 190-220 230-240 350-360 380-420	110	600	11	5	54.5	109091	991.7		
5	3	35	G1	Old Hale	40	hale street	PA	1/1/1923	City of Palo Alto	Municipal		280	14	143-168 170-180 196-280	119	500			4.7	9400	79.0		
5	3	35	G10M	New Hale	44	hale street	PA	12/28/1955	City of Palo Alto	Municipal	190	840	14	108-828	330	1425			22.0	44000	133.3	927.0	
5	3	35	G11			970 Palo Alto Ave, Palo Alto	PA	7/26/1994	John Dowson	Irrigation	41	270	5	170-190 200-260	80	25	5	4	5.0	10000	125.0		
5	3	36	D1	No. 1		1985 University Ave, Menlo Park	MP	7/6/1966	O'Connor Tract Coop Water Co.	Domestic		550	12	181-372 396-489 508-532	108	1200	25	38	48.0	96000	888.9		Q= 466 in 2003
5	3	36	D2	No. 2	38	381 Oak Court Menlo Park	MP	2/21/1963	O'Connor Tract Coop Water Co.	Municipal	35	305	12	072-090 172-178 184-200 217-223 233-237 242-245 252-265 282-291	75	300	60	48	5.0	10000	133.3		Q= 192 in 2003
5	3	36	F2		36	39 Cresent Drive	PA	11/11/1992	Bill Keller	Irrigation	60	260	5	150-260	110	80	5	24	16.0	32000	290.9		

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5	3	36	K				PA	2/8/1997	City of Palo Alto	Municipal		338	14	099-111 165-185 193-208 236-244 259-275 294-306 318-338	93								
5	3	36	L			1302 Forest Ave, Palo Alto	PA	11/3/1977	Russel F Scott Jr	Landscaping	15	21	4	18-21	3	8	0	1					
5	3	36	L10				PA					65		20-65	45								
5	3	36	R			185 Lois Lane, Palo Alto	PA	2/28/1977	James A Jensen	Irrigation	10	25	2			15							
5	3	36	R			179 Walter Hays Drive, Palo Alto	PA	4/23/1977	Albert J Miller	Irrigation	7.5	15	2	011-015	4	.							
5	3	36	R			180Walter Hays Drive, Palo Alto	PA	6/25/1977	KS Krishnan	Irrigation	8	19	6	010-015	5								
5	3	36	R			175 Heather Ln, Palo Alto	PA	5/12/1977	Ora Matthews	Irrigation	9	25		17-25	8	10	0	1					
5	3	36	R			1724 Channing Ave, Palo Alto	PA	7/15/1977	AW Austin	Irrigation	9	15	6	008-015	7								
5	3	36	P			1133 Channing Ave, Palo Alto	PA	7/25/1977	Virgil F Baxter	Irrigation	16.5					8	5.5	1	1.5	2909			
5	3	36	P2	Eleanor1		Eleanor Park	PA	2/26/2003	SCVWD	Monitoring		930	2	830-850	20							932.0	elog, multiple completion monitoring well, flowing artesian
5	3	36	P3	Eleanor2		Eleanor Park	PA	2/26/2003	SCVWD	Monitoring		740	2	720-740	20							932.0	elog, multiple completion monitoring well, flowing artesian
5	3	36	P4	Eleanor3		Eleanor Park	PA	2/26/2003	SCVWD	Monitoring		560	2	540-560	20							932.0	elog, multiple completion monitoring well, flowing artesian
5	3	36	P5	Eleanor4		Eleanor Park	PA	2/26/2003	SCVWD	Monitoring		200	2	180-200	20							932.0	elog, multiple completion monitoring well, flowing artesian
5	3	36	N				PA	1/1/1977	Walter	Irrigation	22	30	6										
5	3	36	F			39 Crescent Ave, Palo Alto	PA	11/11/1992	Bill Keller	Irrigation	60	260		150-260	110	80	5	24	16.0	32000	290.9		
6	2	2				Jordan Ct & Panchita Wy, Los Altos	LA	7/10/1954	N. Los Altos Water Co.			317	12	172-177 196-210 299-306 307-317	36								
6	2	6	E			873 Oregon Ave, Palo Alto	PA	9/24/1977	Storne Ogasaward	Irrigation	10	15	2	010-15	5	8	0	2					
6	2	6	D			150 Iris Way, Palo Alto	PA	9/21/1977	Wai May Chan	Irrigation	10	20.5		13-20.5	7.5	12							
6	2	6	P			733 San Carlos Ct., Palo Alto	PA		WE Marshall	Irrigation	10	22	4			8.5							
6	2	6	D			34 Morton St, Palo Alto	PA	4/28/1977	Ralph J Monroe	Irrigation	10												
6	2	6	D			969 Ebarcadero Rd., Palo Alto	PA	5/22/1977	Howard H Hoyt Jr	Irrigation	9	25	2	16-25	9	10							
6	2	6	D			945 N California Ave, Palo Alto	PA	5/27/1977	Leon S Goltzer	Irrigation	6	9	2	004-9	5								
6	2	6				714 Rosewood Dr, Palo Alto	PA	1/1/1956	Ray Stetler		8	28		26-28	2								
6	2	6				1870 Bayshore Hwy, Palo Alto	PA	7/30/1953	Harold L May	Domestic		72	8	56-65	9								
6	2	7	G			607 St Claire Dr., Palo Alto	PA	3/4/1997	Graciano Echaide	Irrigation	14	18	4	14-18	4								
6	2	7	C			3138 Flowers Ln., Palo Alto	PA	7/14/1978	Sturdevant	Irrigation	8	20.5	2	10.5-20.5	10								
6	2	7	F			540 Loma Verde Ave, Palo Alto	PA	7/1/1978	William E Pickthorn	Irrigation	8	29	6	15-29	14	7	2	1	3.5	7000	500.0		
6	2	7	A			843 Ross Ct, Palo Alto	PA	6/22/1977	Philip J Hart	Irrigation	8.5	22	2	14-22	8	11	0	1					
6	2	7	C			3121 Flowers Lane, Palo Alto	PA	8/29/1977	Shig Ogasawara	Irrigation	15	18	2	13-18	5	18	0	2					
6	2	7				Mundel Ct, Palo Alto	PA	4/1/1959	N. Los Altos Water Co.	Municipal	70	464	12	110-127 164-176 270-292	51	26	122	42	0.2	426	8.4		
6	2	8				3401 Ross Rd, Palo Alto	PA	8/1/1954	HW Hartwick	Domestic	9	30	8	20-29	9								
6	2	8	D			3505 Evergreen Rd, Palo Alto	PA	10/17/1977	Jack Hoover	Irrigation	7	10	4	007-10	3								

T (S)	R (W)	Sec	Let	Owner Well Name	Elevation (ft-amsl)	Location Notes	City	Date Drilled	Owner	Use	Static Depth to Water (ft-bgs)	Well Depth (ft)	Well Diameter (in)	Screen Interval (ft)	Screen Length (ft)	Pumping Rate (gpm)	Drawdown (ft)	Test Duration (hours)	Specific Capacity (gpm/ft)	Aquifer Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Depth to Bedrock (ft)	Notes
6	2	8				Bayshore & San Antonio, Palo Alto	PA	9/7/1956	City of Los Altos	Municipal	10	300	10	167-175	8	118	93.5	77	1.3	2524	315.5		
6	2	8	B			Bayshore & San Antonio, Palo Alto	PA	9/7/1956	City of Los Altos	Municipal		175	10	167-175	8								
6	2	8	J			Palo Alto	PA	10/26/1992	Jim Arnold	Domestic	65	260	5	100-160 200-260	120	10		0.5					
6	2	8				El Camino Real at E. Meadow Dr., Palo Alto	PA	3/1/1928	W.H. Cheli														
6	2	8	R			Palo Alto	PA	1/24/1956	Chas Hovey		3	60	12										
6	2	8	M			3726 Grove St, Palo Alto	PA	12/20/1956	Joe Sakuma		9	54	8	025-027 028-031 038-042	9								
6	2	8	A			966 San Antonio Rd, Palo Alto	PA	1/21/1957	Casey's Palo Alto Ready Mix	Municipal		376	8	319-322 330-333 549-352 361-363	11								
6	2	8	A			967 San Antonio Rd, Palo Alto	PA	11/26/1956	Casey's Palo Alto Ready Mix	Industrial	52	220	10	164-169 173-175 196-199	10								
6	2	8				3890 Duncan Place, Palo Alto	PA	11/9/1956	City of Palo Alto	Municipal		912	14	144-912	768	695	153	60	4.5	9085	11.8		
6	2	17				Middlefield Road, Mt. View	MV		Chas Swinimer			555	10	160-548	388								
6	2	17	H			2397 Rock St, Mt. View	MV	3/1/1961	Edward Higa			80	10	46-47 52-55	4								
6	2	17	L			Alma St,	MV	3/21/1997	Parodi Brothers			465	6	158-165 250-257 311-313 327-329 351-355 368-371 444-452 456-460	37								
6	2	17	M			Mt. View	MV	6/1/1931	Y Antoku			376	10	207-211 266-271 319-324 342-345	17								
6	2	17	N			Mt. View	MV	4/1/1931	K Watanabe			289											
6	2	17				Kind & San Antonio Rds, San Jose	MV		AA Azvedo			275	10	65-275	210								
6	2	17				120 Ortega Ave, Mt View	MV	1/23/1961	Yoshio Ozawa	Domestic and Irrigation	27	300	10	095-105 115-124 154-170 176-196 222-230	63								
6	2	17					PA					878	12	505-560 705-765 775-800	140								
6	2	17	B			699 San Antonio, Palo Alto	PA	10/1/1993	ARCO	Monitoring		18.5	10	006-012 015-17.5	8.5								
6	2	18				Los Altos	LA	2/14/1957	N. Los Altos Water Co.	Municipal	60	520	12	375-382 386-399 495-508	33	140	239	54	0.6	1172	35.5		
6	2	18	J			Los Altos	LA	3/31/1997	N. Los Altos Water Co.	Municipal	60	464	12	118-135 194-201 280-306 366-372	56	75	165	30.5	0.5	909	16.2		

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6	2	18				Los Altos	LA	4/3/1997	N. Los Altos Water Co.			520	12	375-382 386-399 495-508	33								
6	2	18	C			Mt. View	MV	12/1/1925	F Hart			400	10	170-398	228								
6	2	18	F			4130 El Camino Real, Palo Alto	PA	1/27/1978	Grant and Bridges	Irrigation		105	5	55-105	50								
6	2	18	V			385 Arastradero Rd, Palo Alto	PA	9/1/1945	R. Marchetti			509		036-054 065-071 256-258 276-278 338-339 347-349 382-384 392-399 496-509	55								
6	2	18	Q			4258 Suzanne St, Barron Park	PA	10/25/1956	City of Palo Alto	Municipal		1056	14	144-1056	912	605	152	85	4.0	7961	8.7		Pumping Test
6	2	18	J			351 Monroe Dr, Palo Alto	PA	10/25/1956	HF Hampel		20	54		041-044 046-047 052-053	5								
6	2	18	K			El Camino Real, Palo Alto	PA	11/19/1956	Renault and Hanelley		29	198	10	053-055 071-074 142-146 179-181 185-189 193-198	20								
6	2	18				649 Maybelle Ave, Palo Alto	PA	1/23/1954	Floyd Schiesh		52	135	10										
6	2	18				Maybelle Ave, Palo Alto	PA	8/14/1930	Danny			411	8	100-160	60								
6	2	18				720 La Pera, Palo Alto	PA	5/5/1953	Chester Slinger		25	72	8	028-030 037-043 051-052 060-66	14								
6	3	1	B1				PA	1/1/1926	City of Palo Alto	Municipal	446												
6	3	1	R			2350 Bryon St, Palo Alto	PA	6/26/1977	Dan & Lois Mathewson	Irrigation	12	25	2	16-25	9	35	9	1	3.9	7778	864.2		
6	3	1	B2	Rinconda	21.17	Hopkins St, Palo Alto	PA	5/20/1954	City of Palo Alto	Municipal		900	14	156-900	342	1250			33.0	66000	193.0	>1082	Carollo report says elog available
6	3	1	A17				PA	7/25/1977		Irrigation	10	25	2	16-24	9	10	0	1					
6	3	1	A16				PA	8/2/1977		Irrigation	9	20	2	13-20	7	10	0	1					
6	3	1	A15				PA	8/20/1977		Irrigation	10	22	2	14-22	7	10	0	1					
6	3	1	A			101 Primrose Wy, Palo Alto	PA	5/8/1977	Louis Simon	Irrigation	12	25	8	16-25	9	10	0	1					
6	3	1	A			872 Seale Ave, Palo Alto	PA	8/31/1977	Keith A Wilkinson	Irrigation	9	20	2	13-20	7	10	1	1	10.0	20000	2857.1		
6	3	1	R2				PA	8/31/1977		Irrigation	12	23	2	15-23	8	7.5	7	1	1.1	2143	267.9		
6	3	1	A			31 Primrose Way, Palo Alto	PA	9/1/1977	Bruce Minners	Irrigation	9	13.5	4	009-14	5								
6	3	1	E			544 Coleridge, Palo Alto	PA	9/8/1977	Geo Ishiyama	Irrigation	35	93	5	50-92	42	14	0	1					
6	3	1	G1		19		PA					72		53-64	9								
6	3	1	A			160 Iris Way	PA	11/17/1977	Henry J Lane	Irrigation	9	20	2	13-20	7	10	1	1	10.0	20000	2857.1		
6	3	1	L			445 Lowell Ave, Palo Alto	PA	9/12/1977	SW Jarvis	Irrigation		90	5	50-90	40	15	5	1	3.0	6000	150.0		
6	3	1	A			38 Morton St, Palo Alto	PA	12/20/1977	Mary Hobson	Irrigation	10	20	2	13-20	7	8	4	1	2.0	4000	571.4		
6	3	1	F			1545 Escobita Ave	PA	9/24/1992	Sally Hewlet	Domestic and Irrigation	65	260	6	155-255	100	80	15	10	5.3	10667	106.7		
6	3	1	M1	Seale	40		PA	4/11/1905	City of Palo Alto	Municipal		430	14	173-420		400			4.5				
6	3	1	C1			Hopkins Ave, PA	PA	4/14/1905	City of Palo Alto	Municipal	250												
6	3	1	A13				PA	6/1/1977		Irrigation	8	25	2	16-25	9	10	2	1	5.0	10000	1111.1		
6	3	1	B4			Hopkins Ave at Pine, PA	PA	5/7/1905	City of Palo Alto	Municipal		1082										909.0	

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6	3	1	D1	Middlefield No. 2	40	Middlefield Rd, PA	PA		City of Palo Alto	Municipal		750	14	165-172 226-242 252-272 362-376 425-433 442-456 570-592		1700			10.0				
6	3	1	D1			Middlefield Rd, PA	PA	4/15/1905	City of Palo Alto	Municipal		750											
6	3	1	9			2100 Bryant St, Palo Alto	PA	8/11/1993	Frank J Siri	Irrigation	16	104	5	058-078 090-100	30	40	9	4	4.4	8889	296.3		
6	3	1				2077 Newell, AP	PA	6/10/1949	HC Hastorf			60											
6	3	2	D1			Tower Well	PA	3/5/1925	City of Palo Alto	Municipal		367											
6	3	2	D1			Forest and Ramona, PA	PA	2/1/1929	Stanford U	Municipal		30	10										
6	3	2	C			Hamilton Ave., PA	PA		City of Palo Alto	Municipal		401											
6	3	2	H10		40		PA					85		20-85									
6	3	2				Old Trancos Rd	PA	1/1/1947	G. Forrester			132											
6	3	3	E			1305 Laurel Bay Dr.	MP	3/31/1978	William Watson	Irrigation	50	90	5	40-90	50	15	5	4	3.0	6000	120.0		
6	3	3				292 Valparaiso Ave.	A	4/1/1991	Joe Montana	Irrigation	70	238	6	80-100 120-238	38	50	62	2	0.8	1613	42.4		
6	3	3				1131 Westfield Dr.	MP	5/10/1991	Neil Thompson	Irrigation	84	330	4.5	80-320	240	20	20	2	1.0	2000	8.3		
6	3	3	B			384 Castro St, Mt View	MV	12/10/1957	Investment Lands, Inc.	Irrigation		390	12	238-390	152	150	140	84.5	1.1	2143	14.1		
6	3	3	E			1285 Bay Laurel Drive	MP	9/11/1990	Ann Gregory	Irrigation	50	120	5	40-100	60	50	40	4	1.3	2500	41.7		
6	3	3	E			1325 Bay Laurel Dr.	MP	4/5/1988	Bob Ekedahl	Irrigation	49	100	5	20-80	60	60	1	5.5	60.0	120000	2000.0		
6	3	3	L1			Govenors Well	PA	1/1/1934	Stanford U	Municipal		746											
6	3	3	J			Arboretum	PA	1/1/1907	Stanford U	Municipal		430											
6	3	3	N				PA		K&H			355											
6	3	3	P1			Shearer Well	PA		Stanford U	Municipal		320											
6	3	3	P1			Sand Hill & Pasteur Dr.	PA	12/18/2003	Stanford U	Irrigation	74	355	16	150-350	150	1500	46	8	32.6	65217	434.8		Well no. 3, Detailed log
6	3	3	R80				PA		K&H			443											
6	3	3	J2			Arboretum	PA	1/1/1918	Stanford U	Municipal		472				330							
6	3	3	M2		87	1325 Bay Laurel Dr.	MP			Irrigation	49	100		20-80	60	60	1	8	60.0	120000	2000.0		
6	3	3	M10		93		PA			Irrigation		301		142-301	159								
6	3	9	A2			Krug #1	PA		Stanford U	Municipal		698	12										
6	3	10	D1			Krug #2	PA	5/1/1905	Stanford U	Municipal		705		139-256 299-371 388-444 431-501									
6	3	10	D1			Sand Hill and Stock Farm Rd.	PA	9/13/2003	Stanford U	Irrigation	86	310	18	150-215 245-305	125	500	56	8	8.9	17857	142.9		Well no.4, Detailed log and elog
6	3	11	A1				PA	4/1/1931	Stanford U	Municipal		410											
6	3	11	B10		51	Stanford U.	PA	2/25/1957	Stanford U	Other		626	14	144-624	482	1350	44	64	30.7	61364	127.3		
6	3	11	R2			Bowdoin St	PA	3/28/2001	Rasmussen	Heat Exchanger		220											
6	3	11	R5			Bowdoin St	PA	3/28/2001	Rasmussen	Heat Exchanger		220											
6	3	11	R3			Bowdoin St	PA	3/28/2001	Rasmussen	Heat Exchanger		220											
6	3	11	R4			Bowdoin St	PA	3/28/2001	Rasmussen	Heat Exchanger		220											
6	3	11	A			Stanford U	PA	11/18/1956	Stanford U	Municipal		624	14	144-624	480	1350	44	68	30.7	61364	127.8		
6	3	11	R			2265 Bowdoin St, Palo Alto	PA	11/22/1989	JM Platt	Irrigation		120	5	60-100	40	10	30	6	0.3	667	16.7		
6	3	11	C				PA		Stanford U	Municipal		347	12										
6	3	11	A				PA	1/1/1918	Stanford U	Municipal		410											

Appendix B. Summary of Well Construction and Hydraulic Performance Information

T (S)	R (W)	Sec	Let	Owner Well Name	Elevation (ft-amsl)	Location Notes	City	Date Drilled	Owner	Use	Static Depth to Water (ft-bgs)	Well Depth (ft)	Well Diameter (in)	Screen Interval (ft)	Screen Length (ft)	Pumping Rate (gpm)	Drawdown (ft)	Test Duration (hours)	Specific Capacity (gpm/ft)	Aquifer Transmissivity (gpd/ft)	Hydraulic Conductivity (gpd/ft^2)	Depth to Bedrock (ft)	Notes
6	3	12	R			Fernando & Ash, Palo Alto	PA	10/11/1954	City of Palo Alto	Municipal		1020	14			700	232	202	3.0	6034			
6	3	12	A10	Fernando	30.79	Fernando Station	PA	5/8/1905	City of Palo Alto	Municipal		1020				325			3.0	6000			
6	3	12?	D1	Peers Park	33.06	Peers Park, Palo Alto	PA	3/14/1958	City of Palo Alto	Municipal	142	850	14	150-850	700	900			7.3	14600	20.9		
6	3	12					PA	1/1/1935	Sutter Packing Co			790	14										
6	3	12	G1			Alma and Oregon	PA		City of Palo Alto			512	14										
6	3	12	G2			395 Page Mill Rd	PA	12/24/1953	Hewlett-Packard		24	339	12										
6	3	12						6/1/1935	Military Academy	Municipal		292											
6	3	12	R1					3/1/1923															
6	3	12	G1					1/1/1930	Alma Oregon														
6	3	12	P					1/1/1932				436											
6	3	12						1/1/1934	Matadero			473											
6	3	12	C1			Park Blvd.		1/1/1935															
6	3	12		No. 2				1/1/1937	Sutter Packing Co			793											
6	3	13	A3	Matadero	40.38	Materdero & Jasina Avenues	PA	10/3/1956	City of Palo Alto	Municipal	37	1186	14	142-1066	924	400			3.5	7000	7.6		
6	3	13	A			620 W Matadero, Palo Alto	PA	10/8/1956	City of Palo Alto	Municipal		1066	14	142-1066	924	190	105	92	1.8	3619	3.9		
6	3	13				Matadero	PA	1/1/1930				512											
6	3	13	P1			3333 Hillview	PA	1/27/1978	Watkins-Johnson	Irrigation		847	10	300-600	300								
6	3	13					PA	1/1/1934				379											
6	3	13	F			922 Matadero Ave, Palo Alto	PA	12/21/1977	Kenneth A Artunian		30	100	5	45-100	55	15	43	6	0.3	698	12.7		
6	3	13	H			777 La Para, Palo Alto	PA	3/4/1955	Robert A Garcia	Irrigation	41	62	8	030-033 036-039 042-048 051-054	15								
6	3	13					PA					540											
6	3	13				Carruthers	PA	1/1/1917	Stanford U	Municipal		308											

T/R/sec/let - township/range/section/grid letter
ft-amsl - feet above mean sea level
ft-bgs - feet below ground surface
ft - feet
in - inches
gpm - gallons per minute

Q - pumping rate
gpm - gallons per minute
DD - drawdown
t - time
Q/DD - specific capacity
T - transmissivity

gpd/ft - gallons per day per foot
K - hydraulic conductivity
gpd/ft^2 - gallons per day per foot squared

Appendix C

Water Quality Data

Appendix C. Groundwater Quality Data

Owner Well Name	Location Notes	City	Date Sampled	Owner	Screen Interval (ft-bgs)	TDS (mg/L)	Fe (ug/L)	Mn (ug/L)	NO3 (mg/L)	Cl (mg/L)	As (ug/L)	Bo (ug/L)	F (mg/L)	Hardness CaCO3 (mg/L)	EC (uS/cm)	WQ Source
					Water Quality Standard:	**500/1000**	**300**	**50**	**10**	**250**	**10**	**1000**	**2**			
Gloria Way	Bay & Gloria East Palo Alto	EPA		City of East Palo Alto	258-323											
			5/29/1981			520					<10				850	Geomatrix and Papaodopulos, 1989
			8/21/1981			958				146						HDR 2004
			11/3/1981				60	**150**								HDR 2004
			12/2/1983			760					<10				1200	Geomatrix and Papaodopulos, 1989
			12/18/1986			**1040**	**1000**		<1	450	<10		0.1	190	1500	HDR 2004
			6/1/1989			800	100		0.2	**264**	<2		0.9	192	1040	HDR 2004
			5/2/1997			802	47	**160**	<0.05	**350**		230	0.1	220	1550	USGS, 2002
			12/15/2003			840	140	**190**	ND	**280**	1.4	260	0.33	250	1500	HDR 2004
Weeks Street	Weeks St. East of Pulgas Ave.	EPA	7/26/2001	City of East Palo Alto	177-194	860	**20000**		<0.05	**290**	**19**	290	0.02	380	1400	SMHSA, 2011
#2	2188 Addison Ave East Palo Alto	EPA		Palo Alto Park Mutual Water Co	60-67											
			1/16/1981			630					<10				940	Geomatrix and Papaodopulos, 1989
			2/22/1985								<10					Geomatrix and Papaodopulos, 1989
			12/20/1999						**12.5**							Kennedy-Jenks, 2012
			2/8/2001			594	<10	**62.4**	8.43	57.4	<2	249	0.37	298	906	Kennedy-Jenks, 2012
			10/19/2001			540	<100	**57**	6.6	55	<2	240	<0.1	380	850	Kennedy-Jenks, 2012
			6/19/2003			560	<100	**63**		53				420	910	Kennedy-Jenks, 2012
			11/30/2004						4.8							Kennedy-Jenks, 2012
			9/27/2005				ND				<1					Kennedy-Jenks, 2012
			11/10/2006					**59**	4.7							Kennedy-Jenks, 2012
			7/3/2007			570	ND	**62**	4.8	52				380	940	Kennedy-Jenks, 2012
			5/6/2008				ND	**55**								Kennedy-Jenks, 2012
			7/1/2008				ND	**55**	4.9	56	ND		0.26	390	1300	Kennedy-Jenks, 2012
			8/26/2008				ND	**62**								Kennedy-Jenks, 2012
			4/21/2009				ND	**67**	5.3							Kennedy-Jenks, 2012
			7/21/2009				ND	**57**								Kennedy-Jenks, 2012
			10/20/2009				ND	**53**								Kennedy-Jenks, 2012
			9/28/2009						4.4							Kennedy-Jenks, 2012
			5/18/2010				57									Kennedy-Jenks, 2012
			7/20/2010				63									Kennedy-Jenks, 2012
			8/17/2010			541			3.5	54					842	Kennedy-Jenks, 2012
			4/18/2011				61	**100**								Kennedy-Jenks, 2012
			5/17/2011				ND	**85**	3.3	52	ND		0.21	380	864	Kennedy-Jenks, 2012
			6/21/2011				ND	**68**								Kennedy-Jenks, 2012
			7/19/2011				ND	**24**								Kennedy-Jenks, 2012
			8/16/2011				ND	**65**								Kennedy-Jenks, 2012
			9/20/2011				ND	**65**								Kennedy-Jenks, 2012
			10/18/2011				ND	**66**							808	Kennedy-Jenks, 2012
			11/15/2011				ND	**71**								Kennedy-Jenks, 2012
			12/20/2011					ND								Kennedy-Jenks, 2012

Appendix C. Groundwater Quality Data

Owner Well Name	Location Notes	City	Date Sampled	Owner	Screen Interval (ft-bgs)	TDS (mg/L)	Fe (ug/L)	Mn (ug/L)	NO3 (mg/L)	Cl (mg/L)	As (ug/L)	Bo (ug/L)	F (mg/L)	Hardness CaCO3 (mg/L)	EC (uS/cm)	WQ Source
#3	2188 Addison Ave East Palo Alto	EPA		Palo Alto Park Mutual Water Co	194-285											
			3/7/1980								<1					Geomatrix and Papaodopulos, 1989
			1/29/1988			546					<10				880	Geomatrix and Papaodopulos, 1989
			6/19/2003			490	<100	<10	0.85	110	1.1	180	0.28	190	830	Kennedy-Jenks, 2012
			11/10/2006				ND	15								Kennedy-Jenks, 2012
			6/28/2007				ND	17	0.56	100				170	810	Kennedy-Jenks, 2012
			5/27/2008			590	ND	16	0.86						850	Kennedy-Jenks, 2012
			4/28/2009						ND							Kennedy-Jenks, 2012
			9/25/2009						ND		1.5		0.13			Kennedy-Jenks, 2012
			8/17/2010						0.49		1.2					Kennedy-Jenks, 2012
			1/12/2011						2							Kennedy-Jenks, 2012
			5/17/2011						0.64	96			0.1	170	791	Kennedy-Jenks, 2012
			10/17/2011												736	Kennedy-Jenks, 2012
#5	2188 Addison Ave East Palo Alto	EPA		Palo Alto Park Mutual Water Co	219-279											
			1/15/1982			440					<10			770		Geomatrix and Papaodopulos, 1989
			1/28/1982			490										Geomatrix and Papaodopulos, 1989
			2/7/1986								<10					Geomatrix and Papaodopulos, 1989
			12/28/1995			450	**610**	<30	6.3	99	<2		<0.1	250	750	Kennedy-Jenks, 2012
			2/8/2001			448	**1170**	28.3	5.31	75.2	<1	193	0.405	200	730	Kennedy-Jenks, 2012
			11/24/2004			470	**150**	<10	6	95	<1	220	0.28	220	600	Kennedy-Jenks, 2012
			12/14/2005				**7500**									Kennedy-Jenks, 2012
			11/10/2006				ND	20								Kennedy-Jenks, 2012
			7/3/2007			450	ND	ND	5.9							Kennedy-Jenks, 2012
			5/6/2008				ND	ND								Kennedy-Jenks, 2012
			7/1/2008						6.8							Kennedy-Jenks, 2012
			4/28/2009						6.1							Kennedy-Jenks, 2012
			9/28/2009						6.6							Kennedy-Jenks, 2012
			5/18/2010				ND									Kennedy-Jenks, 2012
			7/20/2010				ND									Kennedy-Jenks, 2012
			9/21/2010			415	ND	ND	5.9	80	0.8		0.22	210	684	Kennedy-Jenks, 2012
			10/28/2010						6.4							Kennedy-Jenks, 2012
			1/4/2011						6.4							Kennedy-Jenks, 2012
			5/17/2011						6.3							Kennedy-Jenks, 2012
#6	2189 Addison Ave East Palo Alto	EPA		Palo Alto Park Mutual Water Co	247-251											
			1/18/1979													
			1/14/1983			440					<10				830	
			12/23/1997			480	<100	<30	9.1	86	<2	250	<.1	180	880	Kennedy-Jenks, 2012
			2/8/2001			484	<10	14.4	7.06	85.3	<1	190	0.385	230	790	Kennedy-Jenks, 2012

Appendix C. Groundwater Quality Data

Owner Well Name	Location Notes	City	Date Sampled	Owner	Screen Interval (ft-bgs)	TDS (mg/L)	Fe (ug/L)	Mn (ug/L)	NO3 (mg/L)	Cl (mg/L)	As (ug/L)	Bo (ug/L)	F (mg/L)	Hardness CaCO3 (mg/L)	EC (uS/cm)	WQ Source
			10/19/2001			440	<100	<20	5.9	86	<2	190	<0.1	210	750	Kennedy-Jenks, 2012
			9/27/2005				ND	10		90				210		Kennedy-Jenks, 2012
			11/10/2006				ND	11								Kennedy-Jenks, 2012
			7/10/2007			540	ND	11	5.6	85				210	850	Kennedy-Jenks, 2012
			7/15/2008						4.7							Kennedy-Jenks, 2012
			4/28/2009				ND	11	5.1	ND	ND					Kennedy-Jenks, 2012
			9/25/2009						4.4							Kennedy-Jenks, 2012
			8/9/2010			467	ND	ND	5.3	90					779	Kennedy-Jenks, 2012
			5/17/2011				ND	ND	4.6	80			0.21		784	Kennedy-Jenks, 2012
			10/17/2011												736	Kennedy-Jenks, 2012
#7	2190 Addison Ave East Palo Alto	EPA		Palo Alto Park Mutual Water Co	248-440											
			12/6/1990			280	**450**	<10	1.7	40	<5		<0.1	900	670	Kennedy-Jenks, 2012
			12/22/1999			336	150	**47**	5.4	50.1	<3	192	0.244	108	580	Kennedy-Jenks, 2012
			9/17/2002			460	110	**39**	0.95	4.5	3.2	200	0.37	87	660	Kennedy-Jenks, 2012
			11/30/2005				ND	**66**		44				76		Kennedy-Jenks, 2012
			11/10/2006				570	**68**								Kennedy-Jenks, 2012
			6/28/2007				2.5	**190**	0.52	47	2.3		ND	99	700	Kennedy-Jenks, 2012
			7/3/2007			420	**4800**	**290**								Kennedy-Jenks, 2012
			5/6/2008				**590**	**79**								Kennedy-Jenks, 2012
			8/26/2008				**530**	**84**								Kennedy-Jenks, 2012
			4/21/2009				**330**	**56**	2							Kennedy-Jenks, 2012
			5/19/2009				**2100**	**92**								Kennedy-Jenks, 2012
			6/22/2009				**1400**	**73**								Kennedy-Jenks, 2012
			7/21/2009				200	**49**								Kennedy-Jenks, 2012
			8/18/2009				420	**60**								Kennedy-Jenks, 2012
			9/25/2009				100	**54**	2.6							Kennedy-Jenks, 2012
			10/20/2009				100	45								Kennedy-Jenks, 2012
W-143	1990 Bay Road	EPA	8/8/2007	1990 Bay Road Site and Vicinity Contamination Site						509						GeoTracker
	2519 Pulgas Ave.	EPA	6/18/1988	Saturo Iwasaki	230-280										1400	Geomatrix and Papaodopulos, 1989
			7/26/2001				**4500**				4.5	250				SMHSA, 2011
	Willow and Bay Rd	MP	1/3/1990	Veterans Hospital		470	160	<10	0.06	43.7	<1		0.24	104	728	Lab Sheet, 1989
	294 Oak Grove Ave. T5S.R3W-27G1	A	4/29/1997	John Rosso	35-58	976	<3	2	4.4	160					1740	USGS, 2002
			10/18/1993			987				130		500	0.3	670	1630	USGS, 1995
	28 Mananita Rd Atherton T5S/R3W-27G4	A	10/19/1993	Linda Haynie	60-120	551				68		250	0.1	360	910	USGS, 1995
	120 Toyon Rd. T5S/R3W-24K2	A	5/2/1997	Curt Shultze	145-280	613	18	**82**	<0.05	230					1170	USGS, 2002
			10/18/1993			623				160		200	0.3	300	1120	USGS, 1995
	T5S/R3W-27R3	A	5/2/1997		28-140	492	9	**500**	1.6	53					886	USGS, 2002
Leland Well	345 Middlefield	MP	6/15/1981	USGS	180-270	436-446	29-65	**71**	0.9	70		150			785	Oliver , 1990
			5/2/1997			442	<3	**56**	0.9	93		170	0.2	160	785	USGS, 2002

Appendix C. Groundwater Quality Data

Owner Well Name	Location Notes	City	Date Sampled	Owner	Screen Interval (ft-bgs)	TDS (mg/L)	Fe (ug/L)	Mn (ug/L)	NO3 (mg/L)	Cl (mg/L)	As (ug/L)	Bo (ug/L)	F (mg/L)	Hardness CaCO3 (mg/L)	EC (uS/cm)	WQ Source
West	80 Willow Rd. Middlefield & Willow, Menlo Park	MP	6/15/1983	Lane PublishingSunset	100-195	314	ND	**78**	8	39				145		
			6/15/1988			455				46				150		
South	80 Willow Rd. Middlefield & Willow, Menlo Park	MP	6/15/1983	Lane PublishingSunset	100-190	485	47	47	5.5	40				307		
			6/15/1988			514	50	**50**		45						
	320 Middlefield Rd, Menlo Park	MP	5/2/1997	St Patricks Seminary	160-420	469	<3	46	1.7	95		190	0.2	200	845	USGS, 2002
			1983,1988			480	140	**60**	3.6	110				220		Oliver, 1990
New Hale	hale street	PA	3/1/1961	City of Palo Alto	108-828	582	30	40	2	162				224	1000	Carollo, 1999
			4/1/1974				**2450**	**60**	2.39	66				219		Carollo, 1999
			8/1/1984			600	190	**110**	3.26	**260**	8			200	1020	Carollo, 1999
			3/23/1987			680	140	**200**	3.3	180	**10**			160	1100	Carollo, 1999
			3/11/1991			820	**520**	40	1.4	**290**	5			290	1200	Carollo, 1999
			2/22/1994				10	20								Carollo, 1999
			4/7/1994			910	**450**	20	1.1	**370**	5			300		Carollo, 1999
			10/10/1996				**580**								1600	Carollo, 1999
			5/2/1997			615	42	**110**	0.67	200		300	0.2	210	1130	USGS, 2002
			11/13/1997				**460**	**170**								
			8/8/2001												1400	USGS, 2004
No. 1	1985 University Ave, Menlo Park	MP	6/15/1987	O'Connor Tract Coop Water Co.	181-532	420	60	40	4	86				180		Oliver, 1990
			6/15/2003	O'Connor Tract Coop Water Co.		460		**52**	4	66		200				Sweeny, 2003
			6/15/1991	O'Connor Tract Coop Water Co.		440	<300	**56**	3.4	61	<50		0.23	280		Annual Water Quality Report
No. 2	381 Oak Court Menlo Park	MP	6/15/1987	O'Connor Tract Coop Water Co.	72-291	440	40	**80**	2.8	88				220		Oliver, 1990
			6/15/2003	O'Connor Tract Coop Water Co.		470		**160**	2.8	40		230				Sweeny, 2003
			6/15/1991	O'Connor Tract Coop Water Co.		460	130	**140**	<45	50	<50		0.21	300		Annual Water Quality Report
	39 Cresent Drive, T5S/R3W-36F2	PA	5/2/1997	Bill Keller	150-260	373	<300	44	0.32	39		200			678	USGS, 2002
	T5S/R3W-36L10	PA	5/2/1997		20-65	588	<300	<100	5.8	54		270			1050	USGS, 2002
Eleanor4	Eleanor Park	PA	4/15/2003	SCVWD	180-200	440	**470**	<20	<2	66	<2	215	0.23	160	737	USGS, 2004
			10/29/2003			590	150	117	<2	64	4	232	0.19	177	822	
			8/17/2004			425	193	99	<2	63	<2	242	0.26	168	782	
			9/8/2005			447	73	94	<2	64	<2	217	0.33	162	785	
			9/13/2007			468	<20	94	4	75	3	242	0.22	192	816	
Eleanor3	Eleanor Park	PA	4/15/2003	SCVWD	540-560	770	120	**155**	<2	**360**	<2	205	<0.1	160	1420	USGS, 2004
			10/29/2003			850	140	**322**	<2	**344**	2	240	<0.1	182	1540	

Appendix C. Groundwater Quality Data

Owner Well Name	Location Notes	City	Date Sampled	Owner	Screen Interval (ft-bgs)	TDS (mg/L)	Fe (ug/L)	Mn (ug/L)	NO3 (mg/L)	Cl (mg/L)	As (ug/L)	Bo (ug/L)	F (mg/L)	Hardness CaCO3 (mg/L)	EC (uS/cm)	WQ Source
			8/17/2004			758	**374**	**318**	<2	**372**	<2	275	<0.1	187	1540	
			11/2/2006			766	100	**288**	<2	**315**	<2	209	<0.1	169	1470	
Eleanor2	Eleanor Park	PA	4/15/2003	SCVWD	720-740	**2700**	**1300**	**517**	<2	**1360**	<2	**1360**	<0.1	641	4540	USGS, 2004
			8/17/2004			**2670**	**<100**	**425**	6	**1640**	<2	**1490**	<0.1	753	5520	
			11/2/2006			**2650**	**17**	**465**	<2	**1320**	<2	**1460**	<0.1	605	4500	
Eleanor1	Eleanor Park	PA	4/15/2003	SCVWD	830-850	**1500**	150	**134**	<2	**750**	6	**1690**	<0.1	260	2570	USGS, 2004
			8/17/2004			**1530**	153	**129**	<2	**736**	<2	**1720**	<0.1	306	3020	
			11/2/2006			**1420**	29	**112**	<2	**683**	<2	**1690**	<0.1	256	2510	
Rinconda	Hopkins St, Palo Alto	PA	3/1/1961	City of Palo Alto	156-900	680	50	**190**	4.9	204				253	1170	Carollo, 1999
			4/1/1974				**2460**	**350**	1.32	91				365		Carollo, 1999
			8/1/1984				**700**	40	0.66		4					Carollo, 1999
			3/23/1987			470	170	ND	1	130	**10**			130	940	Carollo, 1999
			3/11/1991			910	**580**	**170**	0.87	**380**	5			250	1400	Carollo, 1999
			2/22/1994				**520**	**230**	1		5					Carollo, 1999
			4/7/1994			910	**520**	**220**		**440**				260	1700	Carollo, 1999
			10/10/1996						1.4							Carollo, 1999
			5/2/1997			581	59	**120**	<0.05	180		390		130	1030	USGS, 2002
			11/13/1997				**500**	**170**								Carollo, 1999
	R6S/T3W-G1	PA	5/2/1997			555	8	19	2.87	54		260			1000	USGS, 2002
Middlefield No. 2	Middlefield Rd, PA	PA		City of Palo Alto	165-592	380	**1200**	80	1						710	Carollo, 1999
	T6S/R3W-H10	PA	5/2/1997		20-85	462	77	**200**	<0.05	44		180			808	USGS, 2002
	1325 Bay Laurel Dr. T6SR3W-3M2	MP	5/2/1997		20-80	536	<300	<100	1.7	58		210			858	USGS, 2002
	T6S/R3W-M10	PA	5/2/1997		142-301	563	<300	<100	2.7	72		210			924	USGS, 2002
	Stanford U. T6S/R3W-11B1	PA	5/2/1997	Stanford U	144-624	502	6	**120**	1.6	120		170			934	USGS, 2002
Fernando	Fernando Station	PA	3/1/1961	City of Palo Alto	?-1020	454	220	**260**	ND	64				235	751	Carollo, 1999
			4/1/1974				**2400**	**60**	0.1	53	**10**			238	580	Carollo, 1999
			8/1/1984			410	90	ND	1.8	47	8			220	770	Carollo, 1999
			12/3/1987			420	**1100**	**210**	0.1	82	5			170	710	Carollo, 1999
			3/11/1991			490	**2500**	**290**	1	95	5			190	780	Carollo, 1999
Peers Park	Peers Park, Palo Alto	PA	3/1/1961	City of Palo Alto	150-850	424	**520**	**180**	1.8	51				194	687	Carollo, 1999
			4/1/1974				**2680**	**60**	0.1	44				213	560	Carollo, 1999
			8/1/1984				**2900**	**130**	1.6		8					Carollo, 1999
			12/3/1987			400	**820**	**190**	1.2	57	5			170	700	Carollo, 1999
			3/11/1991			480	**670**	**300**	1	100	5			170	700	Carollo, 1999
			2/22/1994				**260**	**320**	1		5					Carollo, 1999
			4/7/1994			450	**440**	**300**		**460**				170	790	Carollo, 1999
			10/10/1996						1.4							Carollo, 1999
			5/2/1997													Carollo, 1999
			11/13/1997				**540**	**180**								Carollo, 1999
Matadero	Materdero & Jasina Avenues	PA	3/1/1961	City of Palo Alto	142-1066	520	20	**130**	0.9						870	Carollo, 1999

Appendix C. Groundwater Quality Data

Owner Well Name	Location Notes	City	Date Sampled	Owner	Screen Interval (ft-bgs)	TDS (mg/L)	Fe (ug/L)	Mn (ug/L)	NO3 (mg/L)	Cl (mg/L)	As (ug/L)	Bo (ug/L)	F (mg/L)	Hardness CaCO3 (mg/L)	EC (uS/cm)	WQ Source
			4/1/1974			416	**2000**	50	7.3	71				126	681	Carollo, 1999
			8/1/1984				**2700**	**570**	0.4	66	6			290	700	Carollo, 1999
			12/3/1987					**460**	0.09		5					Carollo, 1999
			3/11/1991			520	**990**	**370**	1	26	5			150	870	Carollo, 1999
			2/22/1994			550	**530**	**270**	1	120	5			140	740	Carollo, 1999
			4/7/1994				**800**	**300**								Carollo, 1999
			10/10/1996			490			1.4	130				130	850	Carollo, 1999
			11/13/1997				ND	**310**								Carollo, 1999

ft-bgs - beet below ground surface
mg/L - milligrams per liter
ug/L - micrograms per liter
TDS - total dissolved solids
Fe - iron
Mn - manganese
WQ - water quality

NO3 - nitrate as nitrate
Cl - chloride
As - arsenic
B - boron
F - fluoride
CaCO3 - calcium carbonate
EC - electrical conductivity
uS/cm - microseimens per centimeter

1100 - Bold values indicates concentrations above maximum contaminant level

Appendix D

Environmental Contamination Sites

Appendix D. Summary of Environmental Contamination Sites

TODD ID NO.	GEOTRACKER ID NO.	GLOBAL ID NO.	BUSINESS_NAME	STREET NUMBER	STREET NAME	CITY	STATE	ZIP	CASE TYPE	STATUS	STATUS DATE	LEAD AGENCY	LOCAL AGENCY	RB CSE NO.	LOC CASE NO.	POTENTIAL CONTAMINANT OF CONCERN	POTENTIAL MEDIA AFFECTED
1	23436	T0608100562	DALE WAY PROPERTY	78	LOGAN	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	4/26/1993	SMCLOP	SMCLOP	41-0588	980001		Soil
2	52913	T0608100198	ERLER PROPERTY	95	ATHERTON	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	7/7/1992	SMCLOP	SMCLOP	41-0208	980005	Gasoline	Soil
3	17695	T0608100213	FAXON RD ASSO	99	FAXON	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	7/7/1992	SMCLOP	SMCLOP	41-0224	980003		Soil
4	26868	T0608100325	MENLO ATHERTON HIGH SCHOOL	555	MIDDLEFIELD	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	1/3/1994	SMCLOP	SMCLOP	41-0340	980004	Gasoline	Soil
5	9299	T0608101113	PRIVATE RESIDENCE		PRIVATE RESIDENCE	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	1/27/2000	SMCLOP	SMCLOP	41-1219	988007	Diesel	Soil
6	12872	T0608131067	PRIVATE RESIDENCE		PRIVATE RESIDENCE	ATHERTON	CA	940276417	LUST Cleanup Site	Completed - Case Closed	5/6/2008	SMCLOP	SMCLOP		988010	Heating Oil / Fuel Oil	Soil
7	55871	T0608101250	PRIVATE RESIDENCE		PRIVATE RESIDENCE	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	5/21/1996	SMCLOP	SMCLOP	41-0941	989001		Soil
8	34690	T0608105592	PRIVATE RESIDENCE		PRIVATE RESIDENCE	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	7/7/1992	SMCLOP	SMCLOP	41-0535	980002	Gasoline	Other Groundwater (uses other than drinking water)
9	38765	T0608100901	PRIVATE RESIDENCE		PRIVATE RESIDENCE	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	9/17/1996	SMCLOP	SMCLOP	41-0986	988006	Diesel	Soil
10	40468	T0608191182	PRIVATE RESIDENCE		PRIVATE RESIDENCE	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	5/12/2003	SMCLOP	SMCLOP	41-1288	988008	Diesel	Soil
11	54257	T0608124054	PRIVATE RESIDENCE		PRIVATE RESIDENCE	ATHERTON	CA	94027	LUST Cleanup Site	Completed - Case Closed	9/6/2005	SMCLOP	SMCLOP		988009	Diesel	Under Investigation
12	36041	T10000001950	1039 Garden Street	1039	Garden Street	East Palo Alto	CA	94303	Cleanup Program Site	Completed - Case Closed	10/2/2010	SF RWQCB		01S0185		DDD / DDE / DDT, Other Insecticides / Pesticides / Fumigants / Herbicides	Soil
13	55858	SL0002020092	1060 WEEKS STREET	1060	WEEKS STREET	EAST PALO ALTO	CA	94303	Cleanup Program Site	Completed - Case Closed	1/1/2000	SF RWQCB		41S0147		* Insecticides/Fumigants	
14	48800	SL0608186716	2555 PULGAS EPA LLC	2555/2565	PULGAS AVE	EAST PALO ALTO	CA	94303	Cleanup Program Site	Completed - Case Closed	1/1/2008	SF RWQCB		41S0302		Waste Oil / Motor / Hydraulic / Lubricating	Soil
15	45201	SL1825C1166	CLARUM HOMES	1200	BEECH ST	EAST PALO ALTO	CA		Cleanup Program Site	Completed - Case Closed	1/1/2000	SF RWQCB		41S0152		* Pesticides/Herbicides	
16	46466	SL0608117332	EASTSIDE COLLEGE PREP SCHOOL		PULGAS AVENUE	EAST PALO ALTO	CA	94303	Cleanup Program Site	Completed - Case Closed	2/1/2003	SF RWQCB	SMCLOP	41S0159		* Pesticides/Herbicides	Soil
17	48758	SL0608171026	FORMER UPRR RAIL SPUR	N/A	EAST OF ILLINOIS STREET	EAST PALO ALTO	CA	94303	Cleanup Program Site	Completed - Case Closed	6/11/2009	SF RWQCB		41S0153		Arsenic	Soil
18	37507	SL0608185050	GLOBAL STEEL	255	DEMETER STREET	EAST PALO ALTO	CA	94303	Cleanup Program Site	Completed - Case Closed	1/19/2007	SF RWQCB		41S0302		* Chlorinated Hydrocarbons	Other Groundwater (uses other than drinking water)
19	49744	SL0608107863	KITTY CLEANERS	910	NEWBRIDGE	EAST PALO ALTO	CA	943031023	Cleanup Program Site	Completed - Case Closed	10/30/2009	SF RWQCB	SMCLOP	41S0177		Tetrachloroethylene (PCE)	Other Groundwater (uses other than drinking water)
20	61119	T0608157762	MILES PROPERTY	872	RUNNYMEDE	EAST PALO ALTO	CA	94025	Cleanup Program Site	Completed - Case Closed	5/11/2004	SMCLOP	SMCLOP		899021	Polychlorinated biphenyls (PCBs)	Under Investigation
21	28552	T10000000035	Ravenswood Family Health Center	1802-1804	Bay Road	East Palo Alto	CA	94303	Cleanup Program Site	Completed - Case Closed	5/13/2009	SF RWQCB		41S0302		Diesel, Fuel Oxygenates, Gasoline, Other Petroleum, Waste Oil / Motor / Hydraulic / Lubricating	
22	32977	T0608101657	SIRI BROS PARTNERSHIP	2012	CLARK	EAST PALO ALTO	CA	94303	Cleanup Program Site	Completed - Case Closed	10/19/1999	SMCLOP	SMCLOP		899014		Soil

Appendix D. Summary of Environmental Contamination Sites

TODD ID NO.	GEOTRACKER ID NO.	GLOBAL ID NO.	BUSINESS_NAME	STREET NUMBER	STREET NAME	CITY	STATE	ZIP	CASE TYPE	STATUS	STATUS DATE	LEAD AGENCY	LOCAL AGENCY	RB CSE NO.	LOC CASE NO.	POTENTIAL CONTAMINANT OF CONCERN	POTENTIAL MEDIA AFFECTED
23	33421	SL18214594	IDEA	2081	BAY RD	EAST PALO ALTO	CA		Cleanup Program Site	Open - Inactive	6/2/2009	SF RWQCB		SL18214594		* Chlorinated Solvents - PCE, * Chlorinated Solvents - TCE, * Metals/Heavy Metals - Chromium 6, * Other Spill, * Pesticides/Herbicides, * Petroleum - Automotive gasolines, * Petroleum - Diesel fuels, * Petroleum - Waste oil, * Volatile Organic Compounds (	
24	23985	SL0608191196	2519 PULGAS	2519	PULGAS	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Remediation	3/9/2009	SF RWQCB		41S0302			Other Groundwater (uses other than drinking water), Soil
25	34987	T10000001713	Cooley Landing, Ravenswood Industrial Ar	2100	Bay Road	East Palo Alto	CA	94303	Cleanup Program Site	Open - Remediation	11/1/2011	SF RWQCB		41S0302			Soil
26	9521	T0608106461	KUNG PROPERTY	1010	RUNNYMEDE STREET	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Remediation	4/13/2004	DTSC	SMCLOP		899019	Chlordane, DDD / DDE / DDT, Other Insecticides / Pesticides / Fumigants / Herbicides	Soil
27	7170	T0608149545	PICK & SAVE AUTO WRECKERS	1985	BAY	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Remediation	12/1/1994	SF RWQCB	SMCLOP	RWQCB	899013	Waste Oil / Motor / Hydraulic / Lubricating	Other Groundwater (uses other than drinking water)
28	10067	SL0608188488	PRIVATE RESIDENCE		PRIVATE RESIDENCE	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Remediation	12/22/2010	SF RWQCB		41S0187		Chlordane, DDD / DDE / DDT, Other Insecticides / Pesticides / Fumigants / Herbicides, Toxaphene	Soil
29	26099	SL0608165362	PULGAS AND BAY	Various	PULGAS AVE AND BAY ROAD	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Remediation	5/5/2009	SF RWQCB		41S0302		Trichloroethylene (TCE), Arsenic, Diesel, Gasoline, Other Petroleum	
30	7094	SL0608102323	ROMIC ENVIRONMENTAL TECHNOLOGI	2081	BAY ROAD	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Remediation	12/31/2007	USEPA		41S0151		* Solvents	Other Groundwater (uses other than drinking water)
31	56078	SL0608169978	TWC TARA LLC	151	TARA ROAD	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Remediation	5/29/2009	SF RWQCB		41S0302	899025	Lead, Diesel, Gasoline, Other Petroleum	
32	49595	SL0608152426	OLSON COMPANY	965	WEEKS STREET	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Site Assessment	1/1/2007	SF RWQCB	SMCLOP	41S0302		DDD / DDE / DDT, Other Insecticides / Pesticides / Fumigants / Herbicides	Soil
33	44392	SL0608107431	PETERSON PROPERTY	1950	BAY	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Site Assessment	10/5/2005	SF RWQCB	SMCLOP		899026	Arsenic, Lead, Diesel, Gasoline, Waste Oil / Motor / Hydraulic / Lubricating	Soil
34	33008	SL0608148082	RHONE-POULENC	1990	BAY ROAD	EAST PALO ALTO	CA	94303	Cleanup Program Site	Open - Verification Monitoring	1/1/2005	SF RWQCB		41S0075		Arsenic	Other Groundwater (uses other than drinking water), Sediments, Soil, Surface water

Appendix D. Summary of Environmental Contamination Sites

TODD ID NO.	GEOTRACKE R ID NO.	GLOBAL ID NO.	BUSINESS_NAME	STREET NUMBER	STREET NAME	CITY	STATE	ZIP	CASE TYPE	STATUS	STATUS DATE	LEAD AGENCY	LOCAL AGENCY	RB CSE NO.	LOC CASE NO.	POTENTIAL CONTAMINANT OF CONCERN	POTENTIAL MEDIA AFFECTED
35	26942	T0608100031	ARCO #0749	1998	UNIVERSITY AVENUE	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	9/25/2000	SMCLOP	SMCLOP	41-0032	890003	Gasoline	Other Groundwater (uses other than drinking water)
36	11406	T0608101034	BAY AREA AUTO WRECKERS	2017	BAY RD	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	4/29/1998	SF RWQCB	SMCLOP	41-1125	899003	Gasoline	Under Investigation
37	35632	T0608101036	ELECTRITE COMPANY INC	1805	BAY RD	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	4/13/2009	SF RWQCB	SMCLOP	41-1127	899002	Gasoline	Under Investigation
38	25952	T0608156921	GOODWILL PROPERTY	1475	EAST BAYSHORE ROAD	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	2/26/2004	SMCLOP	SMCLOP		890023	Diesel	Other Groundwater (uses other than drinking water)
39	31146	T0608100633	IBRAHIM PROPERTY	2395	UNIVERSITY	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	6/27/2001	SMCLOP	SMCLOP	41-0666	890009	Gasoline	Other Groundwater (uses other than drinking water)
40	55197	T0608100141	IWASAKI NURSERY	2519	PULGAS AVE	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	5/8/1997	SF RWQCB	SMCLOP	41-0149	890010	Gasoline	Other Groundwater (uses other than drinking water)
41	24325	T0608111865	J & J RENTALS AND SALES	1800	WEST BAYSHORE ROAD	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	6/6/2011	SMCLOP	SMCLOP		890027	Gasoline, Waste Oil / Motor / Hydraulic / Lubricating	Other Groundwater (uses other than drinking water)
42	51004	T0608152821	JONES MORTUARY	660	DONOHOE	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	9/13/2003	SMCLOP	SMCLOP		890020	Gasoline	Other Groundwater (uses other than drinking water)
43	14574	T0608100679	MIZUFUNE NURSERY	756	RUNNYMEDE	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	12/11/1995	SMCLOP	SMCLOP	41-0715	890011	Gasoline	Other Groundwater (uses other than drinking water)
44	2615	T0608161049	NARITA PROPERTY	806	RUNNYMEDE	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	8/10/2004	SMCLOP	SMCLOP		899018	Polychlorinated biphenyls (PCBs)	Soil
45	5831	T0608100386	PECK & HILLER	2479	PULGAS AVE	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	3/20/1997	SF RWQCB	SMCLOP	41-0405	890008	Gasoline	Other Groundwater (uses other than drinking water)
46	45136	T0608192693	PENINSULA CHARTER LINES	160	DEMETER	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	8/30/2004	SMCLOP	SMCLOP	41-1258	890017	Gasoline	Other Groundwater (uses other than drinking water)
47	4223	T0608100387	PENINSULA CHARTER LINES INC	160	DEMETER ST	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	11/26/1996	SF RWQCB	SMCLOP	41-0406	890001	Diesel	Other Groundwater (uses other than drinking water)
48	33821	T0608100763	PITCHER DRILLING	2447	PULGAS	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	9/13/2002	SMCLOP	SMCLOP	41-0809	890012	Gasoline	Other Groundwater (uses other than drinking water)
49	14678	T0608100412	RE BORRMANN'S	2540	PULGAS AVE	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	5/8/1997	SF RWQCB	SMCLOP	41-0433	890006	Gasoline	Other Groundwater (uses other than drinking water)
50	16792	T0608182543	SHELL STATION	2194	UNIVERSITY	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	12/10/2004	SMCLOP	SMCLOP		890022	Gasoline	Other Groundwater (uses other than drinking water)
51	36997	T0608100499	SIRI BROS NURSERY INC	940	O'CONNOR	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	3/1/1991	SMCLOP	SMCLOP	41-0523	890004	Gasoline	Soil
52	55595	T0608100546	TOUCHATT TRUCKING	2535	EAST PULGAS	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	1/18/1996	SMCLOP	SMCLOP	41-0572	890007	Gasoline	Other Groundwater (uses other than drinking water)
53	12635	T0608100576	UNOCAL #2862	1901	UNIVERSITY	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	8/31/1993	SMCLOP	SMCLOP	41-0604	890005	Gasoline	Other Groundwater (uses other than drinking water)

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TODD ID NO.	GEOTRACKER ID NO.	GLOBAL ID NO.	BUSINESS_NAME	STREET NUMBER	STREET NAME	CITY	STATE	ZIP	CASE TYPE	STATUS	STATUS DATE	LEAD AGENCY	LOCAL AGENCY	RB CSE NO.	LOC CASE NO.	POTENTIAL CONTAMINANT OF CONCERN	POTENTIAL MEDIA AFFECTED
54	54309	T0608100615	WAREHOUSE/COLOMBO BAKERY	1401	WILLOW	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	8/16/1994	SMCLOP	SMCLOP	41-0644	890002	Gasoline	Other Groundwater (uses other than drinking water)
55	41557	T0608100985	YAMANE NURSERY	1979	PULGAS	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	10/19/1999	SMCLOP	SMCLOP	41-1074	890015	Gasoline	Other Groundwater (uses other than drinking water)
56	20951	T0608140462	RAINER SERVICE STATION	1905	EAST BAYSHORE ROAD	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Open - Site Assessment	5/5/1999	SMCLOP	SMCLOP	41-4053	890016	Gasoline	Other Groundwater (uses other than drinking water)
57	19095	T0608100926	CHEVRON 9-1081	2101	UNIVERSITY	EAST PALO ALTO	CA	94303	LUST Cleanup Site	Open - Verification Monitoring	3/1/2006	SMCLOP	SMCLOP	41-1012	890013	Gasoline	Other Groundwater (uses other than drinking water)
58	25051	SL0608139819	ALANIZ/TIM HILLEARY CONSTRUCTION	519	HAMILTON AVENUE	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	10/27/2004	SMCLOP	SMCLOP		449073	* Chlorinated Hydrocarbons	Other Groundwater (uses other than drinking water)
59	17463	SL0608132881	AMOROSO PROPERTY	135	COMMONWEALTH DRIVE	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	12/8/2009	SMCLOP	SMCLOP		449083	Benzene	Under Investigation
60	25381	SL0608102249	BELTRAMO PROPERTY	1452	EL CAMINO REAL	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	2/17/2011	SMCLOP	SMCLOP		449082	Tetrachloroethylene (PCE), Diesel	Other Groundwater (uses other than drinking water)
61	45727	SL0608120935	CT INTERNATIONAL SALES	3645	HAVEN	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	4/7/2005	SMCLOP	SMCLOP		449077	Gasoline	Other Groundwater (uses other than drinking water)
62	46642	SL0608127363	HAVEN AVENUE INDUSTRIAL CONDOMI	3633	HAVEN	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	4/10/2007	SMCLOP	SMCLOP		449080	Polychlorinated biphenyls (PCBs)	Other Groundwater (uses other than drinking water)
63	47999	SLT2O098104	JA MOREING COMPANY	120	CONSTITUTION DR	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	1/1/1970	SF RWQCB		SLT2O098104		* Volatile Organic Compounds (VOC)	
64	23038	T0608196771	LINCOLN WILLOW PARCEL F-2	990	HAMILTON	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	9/3/1996	SMCLOP	SMCLOP		449049		Soil
65	17027	T0608104269	MELCHER'S IRON WORKS, FORMER	1520	WILLOW	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	9/9/1996	SMCLOP	SMCLOP		449005		Other Groundwater (uses other than drinking water)
66	25368	SL0608198685	MENLO TECH	188	CONSTITUTION	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	1/25/2005	SMCLOP	SMCLOP		449078	Copper	Soil
67	1669	T0608132255	NORTHWOOD	1394	WILLOW	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	11/17/1994	SMCLOP	SMCLOP		449002		Other Groundwater (uses other than drinking water)
68	10445	T0608144763	RAYMOND HANDLING SYSTEMS	1215	O'BRIEN	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	12/31/1992	SMCLOP	SMCLOP	41-0438	449004	Diesel	Other Groundwater (uses other than drinking water)
69	56671	SL0608164334	ROOFING CONTRACTOR	551/555	HAMILTON	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	10/27/2004	SMCLOP	SMCLOP		449075	Gasoline	Soil
70	38703	SL0608119551	SEGALE BROTHERS WOOD PRODUCTS	535	HAMILTON	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	1/25/2005	SMCLOP	SMCLOP		449079	Lead	Soil
71	32130	T10000003057	SLAC Group 1 Removal Action Sites	2575	Sand Hill Rd.	Menlo Park	CA	94025	Cleanup Program Site	Completed - Case Closed	8/30/2011	SF RWQCB		SL0608125065		Trichloroethylene (TCE), Polychlorinated biphenyls (PCBs), Lead, Heating Oil / Fuel Oil	Contaminated Surface / Structure, Indoor Air, Other Groundwater (uses other than drinking water), Sediments, Soil, Soil Vapor, Surface water
72	46807	SL0608109540	SUNSET HEATING AND AIR CONDITION	511	HAMILTON	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	10/27/2004	SMCLOP	SMCLOP		449072	* Chlorinated Hydrocarbons	Soil

Appendix D. Summary of Environmental Contamination Sites

TODD ID NO.	GEOTRACKER ID NO.	GLOBAL ID NO.	BUSINESS_NAME	STREET NUMBER	STREET NAME	CITY	STATE	ZIP	CASE TYPE	STATUS	STATUS DATE	LEAD AGENCY	LOCAL AGENCY	RB CSE NO.	LOC CASE NO.	POTENTIAL CONTAMINANT OF CONCERN	POTENTIAL MEDIA AFFECTED
73	39745	T0608138278	TERMINAL AVE HOUSING DEVELOP.	297	TERMINAL AVENUE	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	12/8/2009	SMCLOP	SMCLOP		449068	Diesel	Other Groundwater (uses other than drinking water)
74	34162	SL0608151735	UPRR EASEMENT, FORMER	1470	CHILCO	MENLO PARK	CA	94025	Cleanup Program Site	Completed - Case Closed	10/27/2004	SMCLOP	SMCLOP		449076	Other Petroleum	Soil
75	39597	T10000003054	SLAC - Former Substation 406	2575	Sand Hill Road	Menlo Park	CA	94025	Cleanup Program Site	Open - Assessment & Interim Remedial Action	6/14/2011	SF RWQCB		SL0608125065		Polychlorinated biphenyls (PCBs), Heating Oil / Fuel Oil, Polynuclear aromatic hydrocarbons (PAHs)	Contaminated Surface / Structure, Other Groundwater (uses other than drinking water), Soil Vapor, Surface water
76	48813	SLT2O100106	115 INDEPENDENCE DRIVE	115	INDEPENDENCE DR	MENLO PARK	CA		Cleanup Program Site	Open - Inactive	3/8/2002	SF RWQCB		SLT2O100106			
77	36800	SLT2O097103	149 COMMONWEALTH DR	149	COMMONWEALTH DR	MENLO PARK	CA		Cleanup Program Site	Open - Inactive	3/8/2002	SF RWQCB		SLT2O097103			
78	4229	T0608100940	KREBS ENGINEERS	1205	CHRYSLER DR	MENLO PARK	CA	94025	Cleanup Program Site	Open - Inactive	6/2/2009	SF RWQCB		41S0157	449051	Stoddard Solvent / Mineral Spirits / Distillates	
79	23200	SLT2O096102	PHARM CHEM LABS INC	3925	BOHANNON DR	MENLO PARK	CA		Cleanup Program Site	Open - Inactive	5/11/2009	SF RWQCB		SLT2O096102			
80	2944	T0608192675	RAVENSWOOD SUBSTATION	UNKNOWN	WILLOW RD	MENLO PARK	CA	94025	Cleanup Program Site	Open - Inactive	6/3/2009	SF RWQCB	SMCLOP	41-1257	449059	Stoddard Solvent / Mineral Spirits / Distillates	Under Investigation
81	30821	SLT2O101107	SUN MICROSYSTEMS INC	UNKNOWN	WILLOW RD	MENLO PARK	CA		Cleanup Program Site	Open - Inactive	5/11/2009	SF RWQCB		SLT2O101107			
82	40113	SL0608116342	PENINSULA SPORTSMEN'S CLUB		South of the Dumbarton Bridge, East of University Avenue	Menlo Park	CA		Cleanup Program Site	Open - Remediation	10/15/2009	SF RWQCB		2179.718		Lead, Polynuclear aromatic hydrocarbons (PAHs)	Soil
83	27902	SL0608151381	PORTOLA VALLEY TRAINING CENTER	100	ANSEL LANE	MENLO PARK	CA		Cleanup Program Site	Open - Remediation	4/8/2010	SF RWQCB	SMCLOP	41S0174		Polychlorinated biphenyls (PCBs)	Soil
84	30470	SL0608125065	SLAC NATIONAL ACCELERATOR LABOR	2575	SAND HILL ROAD	MENLO PARK	CA	94025	Cleanup Program Site	Open - Remediation	11/19/2009	SF RWQCB	PALO ALTO	2179.7052		Polychlorinated biphenyls (PCBs), Diesel, * Solvents	Soil
85	24996	T0608126742	WEST VALLEY PROP (WVP III)	4040	CAMPBELL AVENUE	MENLO PARK	CA	94025	Cleanup Program Site	Open - Remediation	5/2/1997	SF RWQCB	SMCLOP	41-1014		Trichloroethylene (TCE)	Other Groundwater (uses other than drinking water)
86	10843	T0608132242	WO SING CLEANERS	570	DERRY	MENLO PARK	CA	94025	Cleanup Program Site	Open - Remediation	9/11/2003	DTSC	SMCLOP		dtsc	Tetrachloroethylene (PCE)	Other Groundwater (uses other than drinking water)
87	35919	T10000003488	Fitness 101 and Former Critchfield Mechan	4085	Campbell Avenue & 40 Scott Drive	Menlo Park	CA	94025	Cleanup Program Site	Open - Site Assessment	1/13/2012	SF RWQCB		41S0192		Tetrachloroethylene (PCE)	Other Groundwater (uses other than drinking water), Soil
88	34825	SL0608144772	NORGE/ ATHERTON CLEANERS, FORME	1438	EL CAMINO REAL	MENLO PARK	CA	94025	Cleanup Program Site	Open - Site Assessment	4/22/2008	DTSC	SMCLOP			Tetrachloroethylene (PCE)	Other Groundwater (uses other than drinking water)
89	44170	SLT2O099105	RAYCHEM CORPORATION	300	CONSTITUTION DR	MENLO PARK	CA		Cleanup Program Site	Open - Site Assessment	3/8/2001	DTSC					
90	372	SL0608148913	SHARON HEIGHTS CLEANERS	325	SHARON PARK DRIVE	MENLO PARK	CA	94025	Cleanup Program Site	Open - Site Assessment	1/24/2006	SMCLOP	SMCLOP		449081	Tetrachloroethylene (PCE)	Soil, Soil Vapor
91	11046	SL18322742	SILTEC	3705-3723	HAVEN AVENUE	MENLO PARK	CA		Cleanup Program Site	Open - Verification Monitoring	1/1/2000	SF RWQCB		41S0105		Other Chlorinated Hydrocarbons, Trichloroethylene (TCE), Vinyl chloride, * Volatile Organic Compounds (VOC)	Other Groundwater (uses other than drinking water), Soil
92	33966	L10008021218	MARSH ROAD LANDFILL		FT OF MARSH RD	MENLO PARK	CA	94025	Land Disposal Site	Open	1/1/2001	SF RWQCB		2 417045001			

Appendix D. Summary of Environmental Contamination Sites

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93	3620	T0608100013	ALLEN EQUIPMENT COMPANY	755	HAMILTON AVENUE	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	3/12/1996	SMCLOP	SMCLOP	41-0013	440007	Diesel	Other Groundwater (uses other than drinking water)
94	39218	T0608100888	AUTOMATIC RAIN CO.	4060	CAMPBELL AVENUE	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	8/12/1999	SMCLOP	SMCLOP	41-0969	440047	Gasoline	Other Groundwater (uses other than drinking water)
95	44787	T0608100347	B P OIL (INDEPENDENT)	1200	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	8/21/2000	SMCLOP	SMCLOP	41-0365	440008	Gasoline	Other Groundwater (uses other than drinking water)
96	20895	T0608100059	BAY ASSOCIATES	1150	CHRYSLER DRIVE	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	4/10/1999	SMCLOP	SMCLOP	41-0063	440005	Gasoline	Other Groundwater (uses other than drinking water)
97	50858	T0608100063	BEACON	595	WILLOW ROAD	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	5/19/1998	SMCLOP	SMCLOP	41-0068	440026	Gasoline	Aquifer used for drinking water supply
98	6899	T0608100075	BOHANNON PARK	990	MARSH ROAD	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	2/10/1994	SMCLOP	SMCLOP	41-0080	440034	Waste Oil / Motor / Hydraulic / Lubricating	Soil
99	29909	T0608100334	BP #11207	1110	MARSH	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	2/24/2010	SMCLOP	SMCLOP	41-0351	440018	Diesel	Other Groundwater (uses other than drinking water)
100	10496	T0608100104	CARL OLSON & SONS/ZACCOR	3750	HAVEN	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	8/10/1995	SMCLOP	SMCLOP	41-0110	440017	Gasoline	Other Groundwater (uses other than drinking water)
101	59800	T0608100997	CHEVRON 9-0754	3805	BOHANNON	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/15/2004	SMCLOP	SMCLOP	41-1086	440052	Gasoline	Other Groundwater (uses other than drinking water)
102	13622	T0608100111	CHEVRON 9-3982	104	LA MESA	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/8/1995	SMCLOP	SMCLOP	41-0118	440003	Diesel	Other Groundwater (uses other than drinking water)
103	33466	T0608100117	CHEVRON 9-6375	1377	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/27/2002	SMCLOP	SMCLOP	41-0124	440024	Gasoline	Other Groundwater (uses other than drinking water)
104	53325	T0608100134	CHEVRON 9-7085	3500	ALAMEDA DE LAS PULGA	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/15/2000	SMCLOP	SMCLOP	41-0141	440004	Gasoline	Other Groundwater (uses other than drinking water)
105	33455	T0608192683	CLARK PROPERTY	1283	WILLOW	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/14/2000	SMCLOP	SMCLOP	41-1246	440061	Gasoline	Other Groundwater (uses other than drinking water)
106	36423	T0608100166	COLLEGE PARK CONVALESCENT	1275	CRANE	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	1/14/1991	SMCLOP	SMCLOP	41-0174	440028	Gasoline	Soil
107	3498	T0608100209	EXXON 7-0225	389	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	5/12/2006	SMCLOP	SMCLOP	41-0219	440041	Gasoline	Other Groundwater (uses other than drinking water)
108	34228	T0608100203	EXXON 7-3910	145	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	11/7/2003	SMCLOP	SMCLOP	41-0213	440030	Gasoline	Other Groundwater (uses other than drinking water)
109	59464	T0608100212	FAIR OAKS PARTNERS	701	MARSH	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	4/16/2001	SMCLOP	SMCLOP	41-0223	440025	Gasoline	Other Groundwater (uses other than drinking water)
110	37359	T0608100221	FLOOD PARK (SMCo)	215	BAY	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	9/10/1997	SMCLOP	SMCLOP	41-0232	440029	Gasoline	Other Groundwater (uses other than drinking water)

Appendix D. Summary of Environmental Contamination Sites

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111	18930	T0608175554	GUY'S ROOFING	831	HAMILTON	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	1/30/1997	SMCLOP	SMCLOP	41-1164	449050	Waste Oil / Motor / Hydraulic / Lubricating	Soil
112	4087	T0608100258	HEUBLEIN, INC.	151	COMMONWEALTH	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/16/1998	SMCLOP	SMCLOP	41-0271	440006	Gasoline	Other Groundwater (uses other than drinking water)
113	5601	T0608100629	HUETTIG & SCHROMM	3700	HAVEN	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	9/16/1994	SMCLOP	SMCLOP	41-0661	440033	Gasoline	Other Groundwater (uses other than drinking water)
114	10207	T0608162345	INFORMIX	3905	BOHANNON	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	11/30/2004	SMCLOP	SMCLOP		449060	Diesel	Other Groundwater (uses other than drinking water)
115	11827	T0608100804	JUPITER ENGINEERING	1105	O'BRIEN	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	12/6/1994	SMCLOP	SMCLOP	41-0858	440044	Gasoline	Other Groundwater (uses other than drinking water)
116	18638	T0608100287	K F FOODS INC	600	WILLOW	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/1/1992	SMCLOP	SMCLOP	41-0301	440021	Gasoline	Other Groundwater (uses other than drinking water)
117	53551	T0608100295	KNAPPKINS	4055	BOHANNON	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/30/1998	SMCLOP	SMCLOP	41-0310	440032	Gasoline	Other Groundwater (uses other than drinking water)
118	11604	T0608100299	KULAKOFF DEVELOPMENT	1190	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	7/3/1991	SMCLOP	SMCLOP	41-0314	440014	Diesel	Other Groundwater (uses other than drinking water)
119	25932	T0608100314	LUTZ FORD	350	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	2/11/2004	SMCLOP	SMCLOP	41-0329	440009	Gasoline	Other Groundwater (uses other than drinking water)
120	18653	T0608101126	MAGNUSSEN BUICK-GMC	550	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	3/10/2006	SMCLOP	SMCLOP	41-1238	440055	Gasoline	Other Groundwater (uses other than drinking water)
121	50109	T0608100932	MARSH ROAD DELI	763	MARSH	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	4/21/2000	SMCLOP	SMCLOP	41-1019	440048	Gasoline	Other Groundwater (uses other than drinking water)
122	1082	T0608100064	MARSH ROAD TEXACO	743	MARSH	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	1/19/2007	SMCLOP	SMCLOP	41-0069	440002	Gasoline	Other Groundwater (uses other than drinking water)
123	7591	T0608100643	MENLO IND. PARK LIFT STATION	1990	HAMILTON	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	2/9/1995	SMCLOP	SMCLOP	41-0676	440036	Gasoline	Other Groundwater (uses other than drinking water)
124	34936	T0608191127	MENLO PARK FIRE DEPT. H.Q.	300	MIDDLEFIELD	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	4/9/2002	SMCLOP	SMCLOP	41-1286	440064	Waste Oil / Motor / Hydraulic / Lubricating	Other Groundwater (uses other than drinking water)
125	33011	T0608100156	MENLO PARK, CITY OF	701	LAUREL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	12/10/1999	SMCLOP	SMCLOP	41-0164	440022	Diesel	Other Groundwater (uses other than drinking water)
126	7843	T0608100330	MIDLAND PACIFIC CORP	3536	HAVEN	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	10/24/1995	SMCLOP	SMCLOP	41-0345	440031	Gasoline	Other Groundwater (uses other than drinking water)
127	23101	T0608100690	MOREING COMPANY	120	CONSTITUTION DR	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	4/8/1998	SF RWQCB	SMCLOP	41-0729	440042	Gasoline	Under Investigation
128	529	T0608100991	OASIS	329	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	2/10/1998	SMCLOP	SMCLOP	41-1080	440051	Gasoline	Soil

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129	3052	T0608188983	RAYBERG LUMBER	1460	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	7/26/2002	SMCLOP	SMCLOP	41-4026	440063	Gasoline	Soil
130	21162	T0608100417	RAYMOND HANDLING SYSTEM	1215	O'BRIEN	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	4/17/1990	SMCLOP	SMCLOP	41-1195	440015		Other Groundwater (uses other than drinking water)
131	30060	T0608100854	RICHARD ANN BEACON	275	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	7/31/1997	SMCLOP	SMCLOP	41-0928	440046	Gasoline	Other Groundwater (uses other than drinking water)
132	40491	T0608100459	SHARON HEIGHTS COUNTRY CLUB	2900	SAND HILL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	7/19/1991	SMCLOP	SMCLOP	41-0483	440027	Gasoline	Soil
133	1091	T0608100475	SHELL	3201	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	12/22/2006	SMCLOP	SMCLOP	41-0499	440013	Gasoline	Other Groundwater (uses other than drinking water)
134	1968	T0608100472	SHELL	201	LA CUESTA	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	4/20/1990	SMCLOP	SMCLOP	41-0496	440020	Waste Oil / Motor / Hydraulic / Lubricating	Soil
135	5255	T0608100462	SHELL	125	SHARON PARK	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	2/24/2000	SMCLOP	SMCLOP	41-0486	440040	Gasoline	Soil
136	7542	T0608119374	SHELL	1400	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	12/2/2005	SMCLOP	SMCLOP		440070	Gasoline	Other Groundwater (uses other than drinking water)
137	12214	T0608100481	SHELL	495	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/1/2001	SMCLOP	SMCLOP	41-0505	440010	Waste Oil / Motor / Hydraulic / Lubricating	Other Groundwater (uses other than drinking water)
138	34410	T0608100476	SHELL	3536	ALAMEDA DE LAS PULGAS	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	9/22/1992	SMCLOP	SMCLOP	41-0500	440012	Waste Oil / Motor / Hydraulic / Lubricating	Soil
139	37358	T0608100467	SHELL	1400	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	7/3/1991	SMCLOP	SMCLOP	41-0491	440023	Waste Oil / Motor / Hydraulic / Lubricating	Soil
140	40498	T0608198726	SHELL	125	SHARON PARK	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	5/21/2009	SMCLOP	SMCLOP		440069	Gasoline	Other Groundwater (uses other than drinking water)
141	37661	T0608192410	SHELL, FORMER	1000	WILLOW	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	2/19/2002	SMCLOP	SMCLOP	41-4027	440066	Gasoline	Other Groundwater (uses other than drinking water)
142	60282	T0608105455	SHOOTER LANDSCAPING	3605	HAVEN	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	3/6/2002	SMCLOP	SMCLOP	41-4024	440058	Gasoline	Other Groundwater (uses other than drinking water)
143	10408	T0608100513	SRI	333	RAVENSWOOD	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	2/22/1995	SMCLOP	SMCLOP	41-0537	440001	Gasoline	Soil
144	3441	T0608101110	SRI INTERNATIONAL	333	RAVENSWOOD	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	6/11/1999	SMCLOP	SMCLOP	41-1214	440054	Diesel	Under Investigation
145	4079	T0608155571	ST PATRICK'S SEMINARY	320	MIDDLEFIELD	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	1/10/1997	SMCLOP	SMCLOP		449006		Soil
146	23006	T0608100747	STANFORD CADILLAC	1300	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	8/18/1994	SMCLOP	SMCLOP	41-0791	440043	Gasoline	Soil
147	39264	T0608179055	SUNSET HEATING AND AIR CONDITION	507	HAMILTON	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	10/27/2004	SMCLOP	SMCLOP		440071	Gasoline	Other Groundwater (uses other than drinking water)
148	3442	T0608100906	THYSEN MANAGEMENT COMPANY	3705	HAVEN AVE	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	7/30/1999	SF RWQCB	SMCLOP	41-0991	449048	* Solvents	Under Investigation
149	10914	T0608143678	TOLLNER PAINTING	525	HAMILTON	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	10/27/2004	SMCLOP	SMCLOP		440074	Gasoline	Other Groundwater (uses other than drinking water)

Appendix D. Summary of Environmental Contamination Sites

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150	49964	T0608101104	TOSCO #3652	1380	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	9/11/2002	SMCLOP	SMCLOP	41-1208	440053		Other Groundwater (uses other than drinking water)
151	58101	T0608100589	TOSCO #4354 (FORMER UNOCAL)	710	WILLOW	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	1/13/2009	SMCLOP	SMCLOP	41-0617	440035	Waste Oil / Motor / Hydraulic / Lubricating	Soil
152	18233	T0608100327	U.S. POSTAL SERVICE	3875	BOHANNON	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	10/15/1999	SMCLOP	SMCLOP	41-0342	440039	Gasoline	Other Groundwater (uses other than drinking water)
153	54555	T0608100609	VETERANS ADMINISTRATION	795	WILLOW	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	9/5/2006	SMCLOP	SMCLOP	41-0637	440016	Gasoline	Other Groundwater (uses other than drinking water)
154	41928	T0608192691	WESTBAY STEEL	1	CASEY	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	9/20/2001	SMCLOP	SMCLOP	41-1251	440056	Gasoline	Soil
155	61342	T0608100819	WIGGINS TRUST	111	POPE	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	11/28/1995	SMCLOP	SMCLOP	41-0879	448045	Gasoline	Soil
156	49368	T0608117998	WILLOW SERVICE STATION	500	WILLOW	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	4/14/2004	SMCLOP	SMCLOP	41-4025	440062	Diesel	Aquifer used for drinking water supply
157	28046	T0608152727	ZOHRAB'S GARAGE	3233	MIDDLEFIELD	MENLO PARK	CA	94025	LUST Cleanup Site	Completed - Case Closed	12/1/2005	SMCLOP	SMCLOP	41-4023	440057	Gasoline	Other Groundwater (uses other than drinking water)
158	35907	T0608100964	RED CARPET CAR WASH	1436	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Open - Remediation	1/15/2004	SMCLOP	SMCLOP	41-1051	440050	Gasoline	Other Groundwater (uses other than drinking water)
159	37964	T0608100036	ARCO #0313	3600	ALAMEDA DE LAS PULGAS	MENLO PARK	CA	94025	LUST Cleanup Site	Open - Site Assessment	4/25/2003	SMCLOP	SMCLOP	41-0037	440019	Benzene, Toluene, Xylene, Fuel Oxygenates, Gasoline	Other Groundwater (uses other than drinking water)
160	11889	T10000000880	Shell	495	El Camino Real	Menlo Park	CA	94025	LUST Cleanup Site	Open - Site Assessment	3/2/2009	SMCLOP	SMCLOP		440087	Fuel Oxygenates, Gasoline	Aquifer used for drinking water supply, Soil
161	46105	T0608126581	STANFORD LINCOLN MERCURY, FORMI	444	EL CAMINO REAL	MENLO PARK	CA	94025	LUST Cleanup Site	Open - Site Assessment	7/21/2008	SMCLOP	SMCLOP		440086	Gasoline	Other Groundwater (uses other than drinking water)
162	11004	SL1825E1228	ALZA BUILDING D	2575	HANOVER ST	PALO ALTO	CA	94304	Cleanup Program Site	Completed - Case Closed	8/19/2002	SF RWQCB	SANTA CLA	43S0960		Other Chlorinated Hydrocarbons	Under Investigation
163	3656	SL18296717	ALZA CORP	1454	PAGE MILL RD	PALO ALTO	CA		Cleanup Program Site	Completed - Case Closed	5/5/1998	SF RWQCB		SL18296717			
164	32117	SL0608573298	BAY CENTERLESS GRINDING	939	INDUSTRIAL AVENUE	PALO ALTO	CA	94303	Cleanup Program Site	Completed - Case Closed	4/13/2012	SF RWQCB		43S1094		Tetrachloroethylene (PCE), Waste Oil / Motor / Hydraulic / Lubricating	Under Investigation
165	37572	SL0608587795	BECKMAN INSTRUMENTS	1050	PAGE MILL RD	PALO ALTO	CA	94304	Cleanup Program Site	Completed - Case Closed	1/31/2002	SF RWQCB	SANTA CLA	43S0196		1,1,1-Trichloroethane (TCA)	Soil
166	54803	T10000002007	Birch Plaza	2640 & 2650	Birch Street	Palo Alto	CA	94304	Cleanup Program Site	Completed - Case Closed	5/6/2010	SF RWQCB		43S1132		Trichloroethylene (TCE)	Other Groundwater (uses other than drinking water)
167	50271	SL0608589297	FORMER PALO ALTO MEDICAL FOUNDATION		HOMER AVENUE	PALO ALTO	CA	94307	Cleanup Program Site	Completed - Case Closed	12/1/2005	SF RWQCB		43S0544		* Solvents	Aquifer used for drinking water supply
168	19898	SL0608580975	FORMER SYMTRON FACILITY	4019	TRANSPORT STREET	PALO ALTO	CA		Cleanup Program Site	Completed - Case Closed	7/1/2009	SF RWQCB		43S0913			
169	13692	T0608570350	HEWLETT-PACKARD COMPANY	130	LYTTON AVENUE	PALO ALTO	CA	94301	Cleanup Program Site	Completed - Case Closed	1/1/1989	SF RWQCB		43S0524		* Solvents	
170	57485	SL0608524762	LOCKHEED MARTIN SPACE SYSTEMS	3170	PORTER DRIVE	PALO ALTO	CA	94304	Cleanup Program Site	Completed - Case Closed	9/1/2006	SF RWQCB		43S1059			
171	1076	SL0608568096	MERCER PROCESSING	230	PORTAGE AVE	PALO ALTO	CA	94306-2242	Cleanup Program Site	Completed - Case Closed	4/8/2002	SF RWQCB	SANTA CLA	43S0965		Other Chlorinated Hydrocarbons, Trichloroethylene (TCE)	Soil

Appendix D. Summary of Environmental Contamination Sites

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172	9089	T10000002860	Palo Alto High School, Auto Shop Building	50	Embarcadero Road	Palo Alto	CA	94306	Cleanup Program Site	Completed - Case Closed	7/5/2011	SANTA CLAR	SANTA CLARA CO. LOP		06S3W02	Waste Oil / Motor / Hydraulic / Lubricating	Soil
173	12137	T10000001638	Premier Properties - 385-399 Sherman Ave	385-399	Sherman Avenue	Palo Alto	CA	94301	Cleanup Program Site	Open - Assessment & Interim Remedial Action	11/3/2009	SF RWQCB		43S1133		Trichloroethylene (TCE)	Other Groundwater (uses other than drinking water)
174	39828	SL0608563745	3400 HILLVIEW AVENUE SITE [NPDES]	3400	HILLVIEW AVE.	PALO ALTO	CA		Cleanup Program Site	Open - Inactive	1/1/1990	SF RWQCB		43S1037		* Solvents	Other Groundwater (uses other than drinking water)
175	44655	T0608591602	AYDIN CORP	3180	HANOVER ST	PALO ALTO	CA	94304	Cleanup Program Site	Open - Inactive	4/17/2009	SF RWQCB		43S0011		* Solvents	Other Groundwater (uses other than drinking water)
176	50424	T0608591604	DURA BOND	3201	ASH ST	PALO ALTO	CA	94306	Cleanup Program Site	Open - Inactive	4/17/2009	SANTA CLARA CO. LOP				* Solvents	Other Groundwater (uses other than drinking water)
177	4267	SL18361781	DURA-BOND BEARING	370	PORTAGE AVENUE	PALO ALTO	CA		Cleanup Program Site	Open - Inactive	8/1/1997	SANTA CLAR	SANTA CLARA CO. LOP				
178	43687	T0608591791	EASTMAN KODAK COMPANY	925	PAGE MILL RD	PALO ALTO	CA	94304	Cleanup Program Site	Open - Inactive	6/2/2009	SF RWQCB		43-1969		* Solvents	Under Investigation
179	46738	SL0608552838	FORMER COHERENT INC. FACILITY	3210	PORTER DRIVE	PALO ALTO	CA		Cleanup Program Site	Open - Inactive	1/1/2011	SF RWQCB		43S1057		* Solvents	Other Groundwater (uses other than drinking water)
180	51415	SL0608567552	HEWLETT-PACKARD COMPANY BUILDIN	3215	PORTER DRIVE	PALO ALTO	CA	94304	Cleanup Program Site	Open - Inactive	4/27/2005	SF RWQCB		43s1026			
181	30754	SL0608548639	HILLVIEW PORTER REGIONAL PROGRA	3215	PORTER DRIVE	PALO ALTO	CA	94304	Cleanup Program Site	Open - Inactive	4/27/2005	SF RWQCB		43s1027		* Solvents	Other Groundwater (uses other than drinking water)
182	21496	T0608591652	HYATT RICKEYS	4201 4219	EL CAMINO REAL	PALO ALTO	CA	94306	Cleanup Program Site	Open - Inactive	4/17/2009	SF RWQCB		43S0514		* Solvents	Soil
183	33500	SLT2O198301	LAWSON BROTHERS CLEANERS	853	ALMA ST	PALO ALTO	CA	94304	Cleanup Program Site	Open - Inactive	3/9/2001	SF RWQCB		43S0811			
184	18155	T10000000481	Palo Alto 76	835	San Antonio Road	PALO ALTO	CA	94303	Cleanup Program Site	Open - Inactive	6/3/2009	SF RWQCB		43S1127		Diesel, Fuel Oxygenates, Other Petroleum	Indoor Air, Other Groundwater (uses other than drinking water), Soil, Soil Vapor, Under Investigation
185	52874	SL608592734	Palo Alto Medical Foundation		URBAN LANE	Palo Alto	CA		Cleanup Program Site	Open - Inactive	5/5/2009	SF RWQCB				* Petroleum - Automotive gasolines, * Petroleum - Diesel fuels, * Volatile Organic Compounds (VOC)	
186	35563	T0608591756	STANFORD CLEANERS	2875	EL CAMINO REAL	PALO ALTO	CA	94306	Cleanup Program Site	Open - Inactive	6/2/2009	SF RWQCB		43-1928		* Solvents	Under Investigation
187	10074	SL0608518462	TELEDYNE-SINGER SITE [NPDES]	3176	PORTER DRIVE	PALO ALTO	CA		Cleanup Program Site	Open - Inactive	1/1/1990	SF RWQCB		43S1053		* Solvents	Other Groundwater (uses other than drinking water)
188	46030	T0608591678	VANCE BROWN AND SONS	2747	PARK BLVD	PALO ALTO	CA	94306	Cleanup Program Site	Open - Inactive	4/17/2009	SF RWQCB		43S0736		Gasoline	Under Investigation
189	40440	T0608591625	WATKINS JOHNSON COMPANY	3333	HILLVIEW AVE	PALO ALTO	CA	94304	Cleanup Program Site	Open - Inactive	4/17/2009	SF RWQCB		43S0251		* Solvents	Other Groundwater (uses other than drinking water)

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190	6739	SL1823B659	Advalloy - East Charleston, Inc.	844	EAST CHARLESTON ROAD	PALO ALTO	CA	94303	Cleanup Program Site	Open - Remediation	1/1/2002	SF RWQCB		43S0246		* Volatile Organic Compounds (VOC)	Indoor Air, Other Groundwater (uses other than drinking water), Soil, Soil Vapor, Under Investigation
191	3955	T10000001712	Beckman Coulter	1050	Page Mill Road	Palo Alto	CA	94304	Cleanup Program Site	Open - Remediation	2/22/2011	SF RWQCB		43S0196		Diesel, Polynuclear aromatic hydrocarbons (PAHs)	Soil
192	28762	SL18220618	FAIRCHILD SEMICONDUCTOR SITE	4001	MIRANDA AVE	PALO ALTO	CA	94304-1218	Cleanup Program Site	Open - Remediation	5/14/2009	SF RWQCB	SANTA CLA	43S0035		1,1,1-Trichloroethane (TCA), Alcohols, Tetrachloroethylene (PCE), Trichloroethylene (TCE), Xylene	Other Groundwater (uses other than drinking water)
193	30862	SL18288709	FORMER FORD AEROSPACE	3825	FABIAN WY	PALO ALTO	CA	94303-4604	Cleanup Program Site	Open - Remediation	3/22/2005	SF RWQCB		43S0228		* Chlorinated Solvents - PCE, * Volatile Organic Compounds (VOC)	Indoor Air, Other Groundwater (uses other than drinking water), Soil, Soil Vapor
194	39975	SL18321741	HEWLETT PACKARD COMPANY	395	PAGE MILL RD	PALO ALTO	CA	94306-2024	Cleanup Program Site	Open - Remediation	1/1/1989	SF RWQCB	SANTA CLA	43S0053		1,1,1-Trichloroethane (TCA), Other Chlorinated Hydrocarbons, Tetrachloroethylene (PCE), Trichloroethylene (TCE)	Other Groundwater (uses other than drinking water), Soil
195	20556	SL18297718	HEWLETT- PACKARD Company	3500	DEER CREEK RD	PALO ALTO	CA	94304-1317	Cleanup Program Site	Open - Remediation	5/19/2009	SF RWQCB	SANTA CLA	43S0052		1,1,1-Trichloroethane (TCA), Other Chlorinated Hydrocarbons, Benzene, Freon, Toluene, Trichloroethylene (TCE), Vinyl chloride, Xylene	Indoor Air, Other Groundwater (uses other than drinking water), Soil Vapor
196	41850	SL720511210	HEWLETT-PACKARD COMPANY	640	PAGE MILL RD	PALO ALTO	CA	94304-1001	Cleanup Program Site	Open - Remediation	1/1/1987	SF RWQCB	SANTA CLA	43S0051		Trichloroethylene (TCE), 1,1,1-Trichloroethane (TCA), Arsenic, Tetrachloroethylene (PCE)	Other Groundwater (uses other than drinking water), Soil Vapor
197	58601	SL720501209	HEWLETT-PACKARD COMPANY	1501	PAGE MILL RD	PALO ALTO	CA	94304-1126	Cleanup Program Site	Open - Remediation	12/31/1990	SF RWQCB	SANTA CLA	43S0050		1,1,1-Trichloroethane (TCA), Other Chlorinated Hydrocarbons, Acetone, Benzene, Other Solvent or Non-Petroleum Hydrocarbon, * * ETHYLENE DIBROMIDE (EDB), Trichloroethylene (TCE), Xylene	Other Groundwater (uses other than drinking water), Soil
198	18308	SL0608561372	OREGON EXPRESSWAY UNDERPASS		ALMA STREET	PALO ALTO	CA	94301	Cleanup Program Site	Open - Remediation	9/16/1987	SF RWQCB	SANTA CLA	43s0230		Trichloroethylene (TCE)	Other Groundwater (uses other than drinking water)
199	4725	T10000000584	ANDERSON HONDA	1766	EMBARCADERO ROAD	PALO ALTO	CA	94303	Cleanup Program Site	Open - Site Assessment	11/25/2008	SF RWQCB		43S1123		Diesel, Waste Oil / Motor / Hydraulic / Lubricating	Other Groundwater (uses other than drinking water), Soil

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200	3080	SL0608500919	CARDINAL CLEANERS	203	FOREST AVE	PALO ALTO	CA	94301	Cleanup Program Site	Open - Site Assessment	12/1/1999	SF RWQCB		43S0950		Tetrachloroethylene (PCE)	Indoor Air, Other Groundwater (uses other than drinking water), Soil, Soil Vapor
201	4954	SLT2O199302	DYNAMIC VALVES	923	INDUSTRIAL AVENUE	PALO ALTO	CA		Cleanup Program Site	Open - Site Assessment	3/8/2001	SF RWQCB		43S0567		Tetrachloroethylene (PCE)	Other Groundwater (uses other than drinking water)
202	16522	SL0608525943	PARK PLAZA	195	PARK BOULEVARD	PALO ALTO	CA	94303	Cleanup Program Site	Open - Site Assessment	12/4/2007	SF RWQCB		43S1107		* Chlorinated Hydrocarbons, Arsenic, Waste Oil / Motor / Hydraulic / Lubricating	Soil, Soil Vapor, Under Investigation
203	24093	T10000002964	PASCO	2000	Geng Road	Palo Alto	CA	94301	Cleanup Program Site	Open - Site Assessment	4/8/2011	SANTA CLARA	SANTA CLARA CO. LOP		05S2W31	Arsenic, Lead, Waste Oil / Motor / Hydraulic / Lubricating	Other Groundwater (uses other than drinking water), Soil
204	17431	T0608572772	PROPOSED PARK PLAZA APARTMENTS	2785	PARK BOULEVARD	PALO ALTO	CA		Cleanup Program Site	Open - Site Assessment	2/24/1993	SF RWQCB		43S1079		Arsenic, Diesel, Tetrachloroethylene (PCE)	Soil
205	21179	T0608591612	STANFORD CLEANERS	2875	EL CAMINO REAL	PALO ALTO	CA	94306	Cleanup Program Site	Open - Site Assessment	6/3/2009	SF RWQCB		43S0121		Tetrachloroethylene (PCE)	Other Groundwater (uses other than drinking water), Soil
206	34531	T10000001633	West Marine	850	San Antonio Road	Palo Alto	CA	94303	Cleanup Program Site	Open - Site Assessment	11/3/2009	SF RWQCB		43S1135		Tetrachloroethylene (PCE)	Aquifer used for drinking water supply, Indoor Air, Soil Vapor
207	43263	T10000002637	dpiX LLC	3406	Hillview Avenue	Palo Alto	CA	94304	Cleanup Program Site	Open - Verification Monitoring	1/27/2012	SANTA CLARA	SANTA CLA	#011	06S3W24	Other inorganic / salt	Other Groundwater (uses other than drinking water), Soil
208	46116	SL0608572741	Taube Koret Campus - Altaire - Bridge Parc	901	SAN ANTONIO ROAD	PALO ALTO	CA	94303	Cleanup Program Site	Open - Verification Monitoring	7/7/2009	SF RWQCB		43S0977		Other Chlorinated Hydrocarbons, Tetrachloroethylene (PCE), Trichloroethylene (TCE), Freon	Indoor Air, Other Groundwater (uses other than drinking water), Soil, Soil Vapor
209	20533	SL181201123	VARIAN ASSOCIATES	601	S. CALIFORNIA AVE.	PALO ALTO	CA	94304-1101	Cleanup Program Site	Open - Verification Monitoring	6/21/2005	SF RWQCB	SANTA CLA	43S0188		1,1,1-Trichloroethane (TCA), Other Chlorinated Hydrocarbons, Trichloroethylene (TCE)	Other Groundwater (uses other than drinking water), Soil
210	42060	L10008699117	PALO ALTO LANDFILL	2380	Embarcadero Road	PALO ALTO	CA		Land Disposal Site	Open	1/1/2001	SF RWQCB		2 438070260			
211	7372	L10005649085	SOLID WASTE DISPOSAL SITE		SE END OF EMBARCADERO RD	PALO ALTO	CA		Land Disposal Site	Open	1/1/2001	SF RWQCB		2 438070001			
212	30507	T0608591738	Advalloy - East Charleston, Inc.	844	East Charleston Road	PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	1/11/2011	SF RWQCB		43-1908	SBS246	Gasoline	
213	23023	T0608500126	Alta Mesa Memorial Park	695	Arastradero Rd	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	1/15/1998	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
214	57544	T0608500149	Arastra Hostel	1529	Arastradero Rd	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	12/29/1995	SANTA CLARA	SANTA CLARA CO. LOP			Heating Oil / Fuel Oil	Soil
215	22898	T0608500165	Arco #0589	1963	El Camino Real	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	12/22/2003	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
216	53703	T0608500183	Arco #0716	699	San Antonio Rd	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	12/6/2004	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)

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217	27556	T0608500186	ARCO #1326	840	SAN ANTONIO ROAD	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	8/17/2010	SANTA CLARA	SANTA CLA	03-022	06S2W08	Fuel Oxygenates, Gasoline	Other Groundwater (uses other than drinking water)
218	58444	T0608500175	ARCO #4430	2995	MIDDLEFIELD ROAD	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	5/26/2011	SANTA CLARA	SANTA CLA	03-027	06S2W07	Gasoline	Surface water
219	14806	T0608500218	Bay Cities Forklift	1001	E Charleston Rd	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	9/30/1994	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
220	45573	T0608500226	Beacon #3463	4073	El Camino Real	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	11/15/2004	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
221	57174	T0608501468	Beacon (#590)	780	San Antonio Ave	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	10/2/2001	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
222	33632	T0608573149	Bill Young's Automotive	849	High St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/13/2000	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
223	22896	T0608501662	Bill's Auto Glass	744	High St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	5/25/1995	SANTA CLARA	SANTA CLARA CO. LOP				Soil
224	44336	T0608501747	BLEIBLER IRON WORKS	411	PAGE MILL RD	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	5/8/1995	SF RWQCB	SANTA CLA	43-1820		Gasoline	Other Groundwater (uses other than drinking water)
225	47214	T0608502032	Carlsen Motors	1730	Embarcadero Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	1/30/1998	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
226	59693	T0608501661	Carmean Trust	411	Acacia Ave	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	4/22/1996	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
227	38012	T0608500889	Chabad of the Greater S Bay	3070	Louis Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	1/27/2000	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
228	5886	T0608500394	CHEVRON	775	PAGE MILL RD	PALO ALTO	CA	94304	LUST Cleanup Site	Completed - Case Closed	10/4/1996	SF RWQCB	SANTA CLA	43-0338		Gasoline	Other Groundwater (uses other than drinking water)
229	43818	T0608501568	Chevron #9-0136	745	El Camino Real	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	12/8/2004	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
230	59921	T0608500382	CHEVRON #9-3173	3972	EL CAMINO REAL	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	2/17/2006	SANTA CLARA CO. LOP			06S2W18	Gasoline	Other Groundwater (uses other than drinking water)
231	44835	T0608500375	Chevron #9-6791	3401	Alma St	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	5/18/1999	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
232	46130	T0608502046	Chevron #9-9000	480	Quarry Rd	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	7/15/1998	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
233	46746	T0608502110	City of Palo Alto (Sidewalk)	291	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	10/2/2002	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
234	4773	T0608590580	CITY OF PALO ALTO PARKING LOT	528	HIGH	PALO ALTO	CA	94301	LUST Cleanup Site	Completed - Case Closed	11/24/2010	SANTA CLARA	SANTA CLA	147-40	06S3W02	Benzene, Other Solvent or Non-Petroleum Hydrocarbon, Toluene, Xylene, Chromium, Lead, Nickel, Other Metal, Diesel, Gasoline	Other Groundwater (uses other than drinking water), Soil
235	24178	T0608564194	City of Palo Alto, Matedero	1080	Colorado Ave	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	1/21/2000	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil

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236	48453	T0608501691	CITY OF PARIS CLEANERS	248	HOMER AVE	PALO ALTO	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/23/1997	SF RWQCB	SANTA CLA	43-1757		Stoddard Solvent / Mineral Spirits / Distillates	Soil
237	60692	T0608500433	Cloudburst Car Wash	841	El Camino Real	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/25/2000	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
238	3228	T0608500441	Coldwell Banker	291	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	2/1/1996	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
239	58783	T0608500443	COLLAGEN INC	2500	FABER PL	PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	10/1/1997	SF RWQCB	SANTA CLA	43-0392		Waste Oil / Motor / Hydraulic / Lubricating	Soil
240	6287	T0608501649	Comstock Property	595	Tennyson Ave	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	4/12/1995	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
241	55089	T0608500455	Consolidated Freightways	3240	Hillview Ave	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	10/17/1990	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
242	30412	T0608501917	Continental Water Systems	930	Commercial St	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	1/24/1996	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
243	54	T0608500434	CO-OPT SERVICE STATION	3897	EL CAMINO REAL	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	9/12/2007	SANTA CLARA	SANTA CLARA CO. LOP		06S2W18	Gasoline	Other Groundwater (uses other than drinking water)
244	40001	T0608569681	Crist Property	865	Hamilton Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	8/11/1994	SANTA CLARA	SANTA CLARA CO. LOP				Soil
245	4641	T0608501889	D & M Auto Repair	190	Channing Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/9/1995	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
246	28457	T0608500485	D&B Automotive	841	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/22/1998	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
247	20211	T0608502347	Dow Jones	1701	Page Mill Rd	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	1/6/1998	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
248	4619	T0608500528	Dow Jones	1701	Page Mill Rd	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	8/15/1989	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
249	23142	T0608501751	Dura Bond Bearing Co.	3201	Ash St	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	1/19/1999	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
250	28456	T0608500534	Dyna Bell	151	Laura Ln	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	8/16/1991	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
251	18235	T0608500546	El Camino Manufacturing	989	Commercial St	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	8/11/1995	SANTA CLARA	SANTA CLARA CO. LOP			Kerosene	Soil
252	5634	T0608531648	Ellenberger Property	1240	Dana St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/26/1996	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
253	16911	T0608535106	Emporium Capwell	180	El Camino Real	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	5/24/1993	SANTA CLARA	SANTA CLARA CO. LOP				Soil
254	3652	T0608500588	EXXON #7-0113	705	SAN ANTONIO ROAD	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	12/18/2008	SANTA CLARA	SANTA CLARA CO. LOP		06S2W17	Gasoline	Other Groundwater (uses other than drinking water)
255	44513	T0608502010	Facciola Industrial	911	Industrial Ave	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	9/8/1997	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
256	45165	T0608502338	Facciola Meat	961	E Charleston Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	9/26/1996	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
257	59847	T0608500596	Facciola Meat Company	961	E Charleston Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	1/7/1997	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)

Appendix D. Summary of Environmental Contamination Sites

TODD ID NO.	GEOTRACKER ID NO.	GLOBAL ID NO.	BUSINESS_NAME	STREET NUMBER	STREET NAME	CITY	STATE	ZIP	CASE TYPE	STATUS	STATUS DATE	LEAD AGENCY	LOCAL AGENCY	RB CSE NO.	LOC CASE NO.	POTENTIAL CONTAMINANT OF CONCERN	POTENTIAL MEDIA AFFECTED
258	5622	T0608500615	FILL'EM FAST	1795	EL CAMINO REAL	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	5/17/2010	SANTA CLARA	SANTA CLA	08-034	06S3W11	Gasoline	Other Groundwater (uses other than drinking water)
259	52476	T0608500366	FLETCHER PROPERTY	2020	WAVERLY ST	PALO ALTO	CA	94301	LUST Cleanup Site	Completed - Case Closed	9/26/1995	SF RWQCB	SANTA CLA	43-0309		Gasoline	Soil
260	32819	T0608500635	Foothill Park	3300	Page Mill Rd	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	10/2/1995	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
261	42052	T0608500637	FORD AEROSPACE	3939	FABIAN WY	PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	1/15/1996	SF RWQCB	SANTA CLA	43-0601		Waste Oil / Motor / Hydraulic / Lubricating	Soil
262	3526	T0608598061	FORMER HARMONY BAKERY	2750	MIDDLEFIELD ROAD	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	9/7/2005	SANTA CLARA CO. LOP			06S2W06	Gasoline	Other Groundwater (uses other than drinking water)
263	45121	T0608502063	Galvez Gas Station	900	El Camino Real	Palo Alto	CA	94305	LUST Cleanup Site	Completed - Case Closed	10/16/1998	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
264	4431	T0608548811	Gavenman Property	3017	El Camino Real	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	8/30/2004	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
265	2033	T0608500683	GOPOWER	1890	EMBARCADERO ROAD	PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	5/7/2008	SANTA CLARA	SANTA CLARA CO. LOP		05S2W32	Gasoline	Other Groundwater (uses other than drinking water)
266	22803	T0608501659	Green World Nursery	2711	El Camino Real	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	10/30/2000	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
267	58271	T0608500706	Hansen Plumbing	50	Homer Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	4/23/2001	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
268	59781	T0608500713	Hengehold Motor Company	762	San Antonio Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	2/21/1996	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
269	44903	T0608568601	Hewlett Packard	3500	Deer Creek Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	4/16/1996	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
270	59345	T0608501755	HEWLETT PACKARD	3500	DEER CREEK RD	PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	4/16/1996	SF RWQCB	SANTA CLA	43-1828		Diesel	Soil
271	34305	T0608502399	Hewlett-Packard	395	Page Mill Rd	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	8/2/1999	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
272	36406	T0608508417	Hoover House	623	Mirada Ave	Palo Alto	CA	94305	LUST Cleanup Site	Completed - Case Closed	2/21/2001	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
273	1897	T0608501005	Hyatt Rickey's	4219	El Camino Real	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	12/3/2004	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
274	43849	T0608587705	Hyatt, Classic Residence	620	Sand Hill Rd	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	7/26/2004	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
275	18015	T0608502061	Independent BMW	799	Alma St	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	8/4/1995	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
276	30699	T0608500743	Independent BMW	400	Emerson St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	3/6/1995	SANTA CLARA	SANTA CLARA CO. LOP				Soil
277	4350	T0608500266	John's Automotive	3508	El Camino Real	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	7/23/1997	SANTA CLARA	SANTA CLARA CO. LOP				Other Groundwater (uses other than drinking water)
278	9655	T0608500788	Jost Heating & Sheet Metal	412	Olive Ave	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	7/9/1992	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
279	6142	T0608501913	Keenan Land Co	753	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	11/2/1995	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
280	35908	T0608500802	Keenan Land Company	975	High St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	12/28/1995	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
281	30450	T0608501702	Kurt's Auto Care	780	High St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	5/21/2003	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)

Appendix D. Summary of Environmental Contamination Sites

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282	24988	T0608500825	Lawson Brothers Cleaners	853	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	12/6/1996	SANTA CLARA	SANTA CLARA CO. LOP			Stoddard Solvent / Mineral Spirits / Distillates	Other Groundwater (uses other than drinking water)
283	58144	T0608501683	Lockheed Missiles	3251	Hanover St	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	12/22/2004	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
284	20366	T0608500934	Mobil	375	Arboretum Rd	Palo Alto	CA	94305	LUST Cleanup Site	Completed - Case Closed	11/9/1994	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
285	32461	T0608500936	Mobil	4201	Middlefield Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	12/2/1998	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
286	6727	T0608500216	MOBIL (BP 11219)	2780	EL CAMINO REAL	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	6/19/2006	SANTA CLARA	SANTA CLARA CO. LOP		06S3W12	Gasoline	Other Groundwater (uses other than drinking water)
287	16054	T0608500960	Morris Auto Parts	999	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/11/2000	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
288	37105	T0608501013	MOZART PROPERTY	1068	MEADOW CIR E	PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	12/2/1994	SF RWQCB	SANTA CLA	43-1018		Diesel	Soil
289	3810	T0608501854	Office Building	529	Bryant	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	3/15/1996	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
290	48882	T0608501658	Old Fire Station	2253	Park Blvd	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	12/29/1995	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
291	7462	T0608500995	OLD PIERS DAIRY	3065	LOUIS RD	PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	10/21/1985	SF RWQCB	SANTA CLA	43-0997		Gasoline	Under Investigation
292	49658	T0608561941	Old Piers Dairy	3065	Louis Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	10/21/1985	SANTA CLARA	SANTA CLARA CO. LOP				Soil
293	35717	T0608500996	Old Post Office Palo Alto	2197	E Bayshore Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	2/29/2000	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
294	39178	T0608501799	Pacific Bell	345	Hamilton Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	12/29/1995	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
295	47144	T0608501021	Paddlesford Oldsmobile	4230	El Camino Real Ave	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	1/13/2004	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
296	60623	T0608501023	Palo Alto Civic Center	250	Hamilton Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/25/1993	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
297	14658	T0608501024	Palo Alto Fire Station #1	301	Alma St	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	8/16/1993	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
298	8320	T0608501025	Palo Alto Firestone	3401	El Camino Real	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	5/28/1996	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
299	37715	T0608502123	Palo Alto Golf Course	1875	Embarcadero Rd	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	12/19/2002	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
300	18563	T0608501029	Palo Alto High School Shop	85	Churchill Ave	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	2/22/2005	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
301	52296	T0608595142	PALO ALTO HILLS COUNTYR CLUB	3000	ALEXIS DRIVE	PALO ALTO	CA	94304	LUST Cleanup Site	Completed - Case Closed	7/1/2005	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
302	26236	T0608546569	Palo Alto Medical Foundation	795	El Camino Real	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/6/1998	SF RWQCB	SANTA CLA	43S0544		Gasoline	Soil
303	49898	T0608555022	Palo Alto Nissan	3001	El Camino Real	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	1/22/1992	SANTA CLARA	SANTA CLARA CO. LOP				Soil
304	13678	T0608587383	PALO ALTO TIRE & BRAKE	306	CAMBRIDGE	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	12/14/2006	SANTA CLARA	SANTA CLARA CO. LOP		06S3W12	Gasoline	Other Groundwater (uses other than drinking water)

Appendix D. Summary of Environmental Contamination Sites

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305	3219	T0608501028	Palo Alto Transmission Service	701	Emerson St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	4/20/2000	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
306	825	T0608502230	Palo Alto Unified School Dist.	85	Churchill Ave	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	10/3/1995	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
307	21536	T0608500494	Paramount Roofing	4030	Transport St	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	4/4/1996	SANTA CLARA	SANTA CLARA CO. LOP			Kerosene	Other Groundwater (uses other than drinking water)
308	6780	T0608564540	PENINSULA CREAMERY	800	HIGH STREET	PALO ALTO	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/29/2005	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
309	24258	T0608501643	Peninsula Creamery	900	High St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/3/1997	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
310	34950	T0608501060	Pinn Brothers Construction Co.	759	Loma Verde Ave	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	5/4/1998	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
311	47784	T0608501068	Premier Properties	250	University Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	5/21/1993	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Other Groundwater (uses other than drinking water)
312	41030	T0608502144	Presidents Hotel	498	University Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	4/30/1999	SANTA CLARA	SANTA CLARA CO. LOP			Heating Oil / Fuel Oil	Soil
313	6123	T0608502132	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	3/29/1999	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Soil
314	9902	T0608500782	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	4/24/1996	SANTA CLARA	SANTA CLARA CO. LOP			Heating Oil / Fuel Oil	Other Groundwater (uses other than drinking water)
315	12165	T0608501819	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/6/1997	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
316	13190	T0608500428	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	12/22/1992	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
317	17417	T0608579955	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/10/2004	SANTA CLARA	SANTA CLARA CO. LOP			Heating Oil / Fuel Oil	Soil
318	20667	T0608545440	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/21/2000	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
319	22437	T0608539996	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	2/28/1992	SANTA CLARA	SANTA CLARA CO. LOP				Soil
320	28410	T0608504754	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	3/30/1995	SANTA CLARA	SANTA CLARA CO. LOP				Soil
321	31496	T0608501959	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/27/1996	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
322	36469	T0608569709	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	5/18/1993	SANTA CLARA	SANTA CLARA CO. LOP				Soil
323	37405	T0608537527	PRIVATE RESIDENCE		PRIVATE RESIDENCE	PALO ALTO	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/30/2005	SF RWQCB	SANTA CLA	43-3133		Heating Oil / Fuel Oil	Soil
324	38785	T0608513197	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/14/1994	SANTA CLARA	SANTA CLARA CO. LOP				Soil
325	43708	T0608548287	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/18/1996	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
326	51595	T0608571490	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	9/18/2000	SANTA CLARA	SANTA CLARA CO. LOP			Heating Oil / Fuel Oil	Other Groundwater (uses other than drinking water)
327	59210	T0608518106	PRIVATE RESIDENCE		PRIVATE RESIDENCE	PALO ALTO	CA	94301	LUST Cleanup Site	Completed - Case Closed	6/30/2005	SF RWQCB	SANTA CLA	43-3132		Heating Oil / Fuel Oil	Soil

Appendix D. Summary of Environmental Contamination Sites

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328	60920	T0608577375	PRIVATE RESIDENCE		PRIVATE RESIDENCE	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	8/22/2002	SANTA CLARA	SANTA CLARA CO. LOP			Heating Oil / Fuel Oil	Soil
329	2801	T0608501107	Riley Vacuum Service	950	Commercial St	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	7/9/1996	SANTA CLARA	SANTA CLARA CO. LOP			Kerosene	Other Groundwater (uses other than drinking water)
330	7092	T0608501144	Royal Glass & Mirror	450	Cambridge Ave	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	12/21/1995	SANTA CLARA	SANTA CLARA CO. LOP				Soil
331	22418	T0608501995	Shearer Family Trust	530	Webster St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	10/29/1997	SANTA CLARA	SANTA CLARA CO. LOP			Heating Oil / Fuel Oil	Soil
332	3426	T0608501289	Shell	3011	Middlefield Rd	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	5/25/1996	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
333	16195	T0608501294	Shell	3900	Middlefield Rd	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	4/6/1999	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
334	22747	T0608501268	Shell	1885	El Camino Real	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	11/12/1996	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
335	29731	T0608501248	Shell	1161	Embarcadero Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	12/21/2004	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
336	46735	T0608501310	Shell	811	E Charleston Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	10/10/1997	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
337	60001	T0608501321	Sherman's Auto	710	San Antonio Rd	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	4/15/1999	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
338	35681	T0608516870	Soltau Property	1111	Hamilton Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	11/28/2001	SANTA CLARA	SANTA CLARA CO. LOP			Heating Oil / Fuel Oil	Other Groundwater (uses other than drinking water)
339	424	T0608501363	Stanford Auto Plaza	1766	Embarcadero Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	7/17/1995	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Other Groundwater (uses other than drinking water)
340	22759	T0608501364	Stanford B.M.W.	275	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	3/26/1996	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
341	19625	T0608502336	Stanford Honda	1766	Embarcadero Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	1/12/1996	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
342	17556	T0608502038	Stanford Shopping Center	551	Willow Rd	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	5/7/1998	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
343	51276	T0608502039	Stanford Shopping Center	527	Willow Rd	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	5/8/1998	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
344	50013	T0608501361	STANFORD UNIVERSITY	UNKNOWN	MECHANICAL ENG BLDG	PALO ALTO	CA	94303	LUST Cleanup Site	Completed - Case Closed	2/20/1997	SF RWQCB	SANTA CLA	43-1386		Stoddard Solvent / Mineral Spirits / Distillates	Soil
345	46976	T0608502064	Stanford University/SteamPlant	340	Galvez St	Palo Alto	CA	94305	LUST Cleanup Site	Completed - Case Closed	4/19/1999	SANTA CLARA	SANTA CLARA CO. LOP			Heating Oil / Fuel Oil	Soil
346	13793	T0608501375	Steve's Foreign Auto Service	809	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	1/8/1992	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Soil
347	6659	T0608550716	Tidy Town Cleaners	163	Everett St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	2/11/1992	SANTA CLARA	SANTA CLARA CO. LOP				Soil
348	44972	T0608500976	Toyota of Palo Alto	690	San Antonio Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	8/31/1999	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)

Appendix D. Summary of Environmental Contamination Sites

TODD ID NO.	GEOTRACKER ID NO.	GLOBAL ID NO.	BUSINESS_NAME	STREET NUMBER	STREET NAME	CITY	STATE	ZIP	CASE TYPE	STATUS	STATUS DATE	LEAD AGENCY	LOCAL AGENCY	RB CSE NO.	LOC CASE NO.	POTENTIAL CONTAMINANT OF CONCERN	POTENTIAL MEDIA AFFECTED
349	30689	T0608547252	UNITED STATES POSTAL SERVICE (USP	2085	EAST BAYSHORE ROAD	PALO ALTO	CA	94301	LUST Cleanup Site	Completed - Case Closed	7/14/2005	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
350	31249	T0608501484	UNKNOWN	1705	EL CAMINO REAL	PALO ALTO	CA	94306	LUST Cleanup Site	Completed - Case Closed	4/9/1992	SF RWQCB	SANTA CLA	43-1517		Gasoline	Under Investigation
351	37772	T0608501669	Unocal #4297	835	San Antonio Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	9/11/1996	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
352	41624	T0608501852	US Post Office	2085	E Bayshore Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	5/29/1996	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
353	5868	T0608501758	V.A. Medical Center	3801	Miranda Ave	Palo Alto	CA	94304	LUST Cleanup Site	Completed - Case Closed	1/7/2002	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
354	15605	T0608501727	Vance Brown & Sons	3101	Park Blvd	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	4/11/1997	SANTA CLARA	SANTA CLARA CO. LOP			Diesel	Other Groundwater (uses other than drinking water)
355	56962	T0608501823	Vance Brown & Sons	2747	Park Blvd	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	2/6/1997	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
356	16351	T0608501967	Varsity Theatre	456	University Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	7/9/1998	SANTA CLARA	SANTA CLARA CO. LOP			Waste Oil / Motor / Hydraulic / Lubricating	Soil
357	26623	T0608591730	VICKERS CONCRETE	4083	TRANSPORT ST	PALO ALTO	CA	94301	LUST Cleanup Site	Completed - Case Closed	4/8/1999	SF RWQCB	SANTA CLA	43-1602		Diesel	Soil
358	15882	T0608501581	Werner Texaco	830	E Charleston Rd	Palo Alto	CA	94303	LUST Cleanup Site	Completed - Case Closed	12/12/2004	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
359	38139	T0608501582	West Bay Cycles	750	San Antonio Rd	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	10/3/2002	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
360	36844	T0608501591	Wheatly Associates	890	San Antonio Rd	Palo Alto	CA	94306	LUST Cleanup Site	Completed - Case Closed	5/20/1999	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
361	47400	T0608502388	Wilbur Property	490	Kingsley Ave	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	12/20/2006	SF RWQCB	SANTA CLA	43-3130		Heating Oil / Fuel Oil	Under Investigation
362	21951	T0608501595	Winston Tire Company	955	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Completed - Case Closed	10/30/1996	SANTA CLARA	SANTA CLARA CO. LOP			Gasoline	Other Groundwater (uses other than drinking water)
363	10212	T0608518410	PRIVATE RESIDENCE		PRIVATE RESIDENCE	PALO ALTO	CA	94303-4900	LUST Cleanup Site	Open - Assessment & Interim Remedial Action	7/8/2009	PALO ALTO, CITY OF		43S0977		Waste Oil / Motor / Hydraulic / Lubricating	Indoor Air, Other Groundwater (uses other than drinking water), Soil Vapor
364	12575	T0608501291	Shell	355	Alma St	Palo Alto	CA	94301	LUST Cleanup Site	Open - Assessment & Interim Remedial Action	3/8/2012	SANTA CLARA	SANTA CLA	19-066	06S3W02	Gasoline	Other Groundwater (uses other than drinking water)
365	8364	T0608501277	SHELL	2200	EL CAMINO REAL	PALO ALTO	CA	94301	LUST Cleanup Site	Open - Remediation	5/12/2002	SANTA CLARA	SANTA CLA	19-048	06S3W12	Gasoline	Other Groundwater (uses other than drinking water), Soil
366	61200	T0608502363	CHEVRON	2799	MIDDLEFIELD ROAD	PALO ALTO	CA	94306	LUST Cleanup Site	Open - Site Assessment	8/29/2005	SANTA CLARA	SANTA CLA	13-033	06S2W06	Gasoline	Other Groundwater (uses other than drinking water)

Appendix D. Summary of Environmental Contamination Sites

TODD ID NO.	GEOTRACKER ID NO.	GLOBAL ID NO.	BUSINESS_NAME	STREET NUMBER	STREET NAME	CITY	STATE	ZIP	CASE TYPE	STATUS	STATUS DATE	LEAD AGENCY	LOCAL AGENCY	RB CSE NO.	LOC CASE NO.	POTENTIAL CONTAMINANT OF CONCERN	POTENTIAL MEDIA AFFECTED
367	1582	T0608500445	COMBES AUTO REPAIR	3585	EL CAMINO REAL	PALO ALTO	CA	94306	LUST Cleanup Site	Open - Site Assessment	7/30/1993	SANTA CLARA	SANTA CLA	12-034	06S3W12	Benzene, Toluene, Xylene, Fuel Oxygenates, Gasoline	Aquifer used for drinking water supply, Other Groundwater (uses other than drinking water), Soil
368	24106	T10000003606	El Camino Center	340	Portage Avenue	Palo Alto	CA	94306	LUST Cleanup Site	Open - Site Assessment	3/13/2012	SANTA CLARA	SANTA CLA	14-825	06S3W12	Trichloroethylene (TCE), Diesel, Gasoline	Other Groundwater (uses other than drinking water)
369	4436	T0608500732	HOHBACH	200	PAGE MILL	PALO ALTO	CA	94306	LUST Cleanup Site	Open - Site Assessment	11/7/1984	SANTA CLARA	SANTA CLA	14-369	06S3W12	Benzene, Toluene, Xylene, Gasoline	Aquifer used for drinking water supply, Soil
370	23549	T0608599114	PALO ALTO AIRPORT	1901	EMBARCADERO RD.	PALO ALTO	CA	94303	LUST Cleanup Site	Open - Site Assessment	6/7/1990	SANTA CLARA	SANTA CLA	08-099	05S2W32	Aviation, Waste Oil / Motor / Hydraulic / Lubricating	Other Groundwater (uses other than drinking water)
371	34200	T0608561135	PALO ALTO FIRE STATION #2	2675	HANOVER St.	PALO ALTO	CA	94301	LUST Cleanup Site	Open - Site Assessment	9/1/2003	SANTA CLARA	SANTA CLARA CO. LOP		06S3W12	Fuel Oxygenates	Aquifer used for drinking water supply
372	11980	T0608501292	SHELL	3601	EL CAMINO REAL	PALO ALTO	CA	94306	LUST Cleanup Site	Open - Site Assessment	12/23/1985	SANTA CLARA	SANTA CLA	19-047	06S3W12	Benzene, Toluene, Xylene, Fuel Oxygenates, Gasoline	Other Groundwater (uses other than drinking water), Soil
373	60708	T0608502062	SHELL	299	S. CALIFORNIA AVENUE	PALO ALTO	CA	94301	LUST Cleanup Site	Open - Site Assessment	1/25/2002	SANTA CLARA	SANTA CLA	19-097	06S3W12	Gasoline	Other Groundwater (uses other than drinking water)
374	9188	T0608501370	STANFORD UNIV. MED. CENTER	211	QUARRY RD.	PALO ALTO	CA	94304	LUST Cleanup Site	Open - Site Assessment	7/29/2010	SANTA CLARA	SANTA CLA	11-079	06S3W03	Diesel	Other Groundwater (uses other than drinking water)

Appendix E

Gloria Way Well Inspection and Testing Report

California American Water
Monterey District

East Palo Alto Area

Gloria Way Well Investigation Summary Report

April 2004

HDR Project No:
086426913.002

HDR

Gloria Way Well Investigation Summary Report

East Palo Alto Area - Gloria Way Well Project

California American Water - Monterey District

April 2004

Prepared under the responsible charge of

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HDR

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Contents

Tables

Appendices

Background

California American Water (Cal-Am) operates the water system in East Palo Alto and is considering building a water treatment facility on the existing Gloria Well site to treat the water and allow its use as an additional domestic water supply source. The well is located at the corner of Bay Road and Gloria Way and is currently operating only as a non-potable supply source.

East Palo Alto obtains water from the San Francisco Public Utility Commission (SFPUC). SFPUC's water supply comes from two major sources: Hetch Hetchy Reservoir in the High Sierra Nevada Mountains, and a local watershed in Alameda County. The purchased SFPUC surface water supply is known for its high quality and for consistently meeting regulatory criteria, with low turbidity, dissolved solids and hardness.

In the summer of 1981, the Gloria Well was put into operation to supplement the East Palo Alto water supply received from SFPUC. However, the Gloria Well water exhibited higher hardness and total dissolved solids (TDS) when compared with the SFPUC water supply. The water from the Gloria Well contained relatively high levels of iron and manganese. Shortly after the well was put into operation, consumers in close proximity to the well reported the water to be objectionable. The use of the well stopped in 1989 and eventually the well was taken out of domestic service in July 1999. The only CDHS approved East Palo Alto source of drinking water supply then became water purchased from the SFPUC. The reasons quoted in the available reports to explain why the well was removed from the system were high iron and manganese concentrations and elimination of a potential cross connection hazard.

Currently, the well is utilized, on a limited part time basis, for non-domestic use. The water from the well serves the City of East Palo's street cleaning, construction dust control and sewer line flushing programs. The well discharge line is physically disconnected (capped) from the domestic water supply line on Bay Road.

Purpose

The proposed re-introduction of the Gloria Well is intended to supplement the existing water supply from SFPUC. Use of the Gloria Well will improve reliability by providing emergency and redundant supply, and potentially reduce the expenses associated with purchased water supply. However it is necessary to consider public and regulatory acceptance when evaluating the feasibility of bringing this well back into potable supply operation. The current physical condition of the well, its hydraulic capacity and the water quality needed to be investigated prior to evaluating the alternatives for re-introducing the well into the water supply system. Only after examination of the well condition and water quality, will Cal-Am be able to adequately assess the potential capital improvements for wellhead treatment approaches and potential blending strategies.

A request for proposals was issued by Cal-Am to perform an evaluation and selection of recommended treatment process, consider integration of the well source with the regional water supply system, provide conceptual and detailed design aspects, and evaluate the project cost effectiveness.

Scope

HDR was retained by Cal-Am in August 2003 to perform the treatment evaluation and design services. The first task required performance of well inspection and evaluation services. These initial services included completing a video survey of well construction and condition, performing pump testing to establish yield data, and completing necessary water quality sampling and analysis. This information was required prior to beginning a conceptual design phase.

Martin B. Feeney, a consulting hydrogeologist was retained to collect and review background data on the existing well, oversee and evaluate the video and the well performance testing and well inspection tasks, and then provide recommendations related to potential well performance and use. Chappel Pump, a local pump and well contractor was employed to remove and inspect the existing pump and column, run the test pumping equipment, and re-install the existing pump. Newman Well Survey was employed to conduct the casing video, and Sequoia Analytical Laboratories was employed to complete the water quality analysis.

The findings of the investigation and preliminary recommendations are presented in this report.

Findings of the Well Investigation Phase

According to the original well driller's log, the well has a total drill depth of 351 feet and a completed well depth of 339 feet. The casing is 12-inch, spiral seam, steel. Also according to the driller's log the first screened perforation is 188 feet from the surface. This depth differs from the information ascertained from the video survey (see summary below). The well log (Water Well Drillers Report) is provided in Appendix A. Pictures taken of the site during visits between September and December of 2003 are provided in Appendix B. The following sub-sections provide summary information on the specific findings of the investigation.

Physical Condition of the Well

Appendix C contains the *East Palo Alto, Gloria Well, Well Assessment Report*, as prepared by Martin B. Feeney. The video surveys performed by Newman Well Survey on January 6, 2004 and subsequently on January 10, 2004 revealed relatively clean unobstructed perforations with limited encrustation, and negligible corrosion at the joints between the stainless steel screen and the mild steel blank. The casing itself was found to be in good shape with minimal encrustation or corrosion and no evidence of holes or deformation. The Video Survey Report can be found in the Appendix D. A full copy of the videotape from the survey was provided to Cal-Am for the well records.

HDR submitted a request to the County of San Mateo (the former operator) for as-built drawings of the Gloria Well; however these records are no longer available. But based on the available data the filter pack, sanitary seal, and pump pedestal appear to be structurally sound, and were constructed in accordance with applicable code (i.e., minimum 50-ft sanitary seal, etc). Additionally, based on the performance test and the video survey, the Gloria Well is in good structural and operating condition. Therefore the current physical condition of the Gloria Well does not limit its potential use as a water supply source.

Hydraulic Performance and Capacity

When originally placed into service, the capacity of the pump was rated at 300 gpm at 471 TDH. During the 72-hour constant pump discharge test performed for this investigation the well was capable of being continuously pumped at a rate of approximately 300 gpm. Discharge was kept constant by manually adjusting the hydrant valve. Flow rate was measured during the pump test with a meter provided by Cal-Am. Water level measurements were also collected as necessary during the extended pumping test period.

The extended pumping test was conducted December 12 through 15, 2003. The pumping flow rate from the well was kept at approximately 300 gpm during the test period. That flow rate was sustained for the full duration of the test, approximately 72 hours. Discharge was routed through the existing hydropneumatic pressure tank to an adjacent fire hydrant on Gloria Way and then conveyed through a 2-1/2 inch hose to the nearby storm drain catch basin. Pictures provided in Appendix B show the test operation. Discharge to the storm drain was permitted through the City of East Palo Alto and the Regional Water Quality Control Board after preliminary water quality testing had been performed for a limited list of constituents of concern. An Encroachment Permit for the three-day test was also filed with a City of East Palo Alto (Appendix G).

Results of the well inspection video determined that the screen perforations were located in the intervals between 259 - 282 feet and 319.5 and 325.5 feet below ground surface. The screen placements are generally consistent with the depth of the probable water bearing strata reported in the original driller's log. However, the upper screen, as reported and as placed, may not align well with available water bearing material. Fine sand is reported in the log at 250-269 feet whereas the screen is set at 259-282 feet. Above and below the sand the driller's log reports that there is clayey material. The lower screen aligns with the 6 feet of sand and gravel reported on the driller's log at a depth of between 319.5 and 325.5 feet. Based on the available data, it is not certain why the upper screen was placed at an interval that appears to be below the water-bearing zone. The original well design information (e-log, etc.) was not available to fully evaluate the as-built construction and determine the reason for the screen/strata offset. Further description of the existing well configuration and a well schematic are in Appendix C.

Due to the orientation of the screens and underlying water-bearing strata, the production capacity of the well is limited to the two zones within the as-built well depth. Based on the pump testing performed for this investigation, the estimated yield from the well is expected to reasonably be between 350 gpm to 450 gpm (see Appendix C). There is a possibility that there may have been a change (increase) in the static water level in the area of the Gloria Well since it was constructed and this may have contributed to an increase in the pumping water level and a potential decrease in drawdown. Therefore this pumping test data should be compared to any available historic water level data for the well, and surrounding wells, to ensure that during the design phase the potential for seasonal level changes are being considered.

Water Quality

The water from the well was sampled on December 15, 2003 and tested in accordance with EPA methods and CCR Title 22 requirements, and for additional criteria as requested by Cal-Am. The water quality of the well was found to be moderately good for a groundwater source, and with appropriate measures the water is expected to be allowed again by CDHS as a permitted drinking water supply source.

As previously mentioned, the Gloria Well water supply must be compared with the SFPUC supply as a quality benchmark. Existing Cal-Am customers are used to the high quality surface water supply they currently receive. In comparison with the current SFPUC water supply, the Gloria Well water exhibits significantly higher conductance, alkalinity, hardness, TDS, and chloride. The manganese concentration is also above the current state SMCL (secondary) standard. The water quality lab results from this investigation help to explain why the water was found to be objectionable in the past to consumers from a taste and odor perspective. The well water, although safe for drinking, has concentrations of minerals typically associated with un-appealing taste and odor based complaints.

Table 1 summarizes the results of some of the historic water quality testing, as well as the water quality testing that was performed on the Gloria Well water during the investigation required for this report. The parameters of concern are further discussed and described below. Parameters and constituents other than those specifically identified below tested below the State MCL's and therefore should not cause a significant concern when compared with the SFPUC water supply.

Table 1. Gloria Way Well Testing Results and Water Quality Comparison.

WATER QUALITY TESTING RESULTS - GLORIA WAY WELL
(FOR SELECTED T-22 GM, GP, INORGANIC AND ORGANIC CONSTITUENTS ONLY)

PARAMETER	REPORTING UNIT	TYPICAL LAB DLR	LAB TEST RESULTS Dec 2003	STATE MCL	E Palo Alto or SFPUC ANNUAL AVERAGE 2001-2002	Historic Results 1986	1989	NOTES/COMMENTS
General Mineral / Physical:								
Bicarbonate Alkalinity	mg/L	5.0	200	(a)	66 (13-120)			Slightly elevated for GW
Calcium	mg/L	0.50	57	(a)	18 (4-31)	40	43	1963 WHO limit was 75 mg/L
Carbonate Alkalinity	mg/L	5.0	8.2	(a)				
Chloride	mg/L	100	280	500 (i)	5 (ND - 7)	450	264	Above reccom'd limit of 250
Color	color units	5.0	10	15 (e)	10	20	8	Possibly assocated with Mn
Corrosivity				Non-Corr.				Not tested
Fluoride	mg/L	0.10	0.33	2 (f)	0.2 (0.1-0.2)	0.1	0.9	Sub-optimal for dental
Hydroxide Alkalinity	mg/L	5.0	ND	(a)				
Lab pH	pH Units	2.0	7.95	6.5 to 8.5	9 (8.6 - 9.4)	8.1	7.9	Below SFPUC source.
Lab Turbidity	NTU	0.10	0.50	5 (e)	0.33 (0.20-0.66)	0.92	0.6	
Magnesium	mg/L	0.10	26	(a)				Mid point of typical range
MBAS	mg/L	0.050	ND	0.5 (e)				
Nitrate as NO3	mg/L	5.0	ND	45 (f)		<1	0.2	
Nitrite as NO2	mg/L	5.0	ND	(a)				
Nitrate + Nitrite (as N)	mg/L	2.0 (m)	ND	10 (f)				Not tested
Nitrite as N	mg/L		ND	1 (f)				Not tested
Odor	TON	1.000	ND	3 (e)				Lowest obtainable odor value
Phosphate (PO4)	mg/L			(a)				Not tested
Potassium	mg/L	2.0	ND	(a)				
Sodium	mg/L	0.50	230	(a)	18 (3-22)	220	240.4	20 ppm 1985 EPA guide value
Specfic Conductance (EC at 25C)	umho/cm	1.0	1500	1600 (h)	214 (13-340)	1500	1040	Above recom'd limit of 900
Sulfate (as SO4)	mg/L	5.0	30	500 (i)	17 (0.7-25)	30	36	Well below SMCL
TDS	mg/L	10	840	1000 (g)	114 (ND-190)	1040	800	Above recom'd limit of 500
Total Alkalinity (as CaCO3)	mg/L	5.0	210	(a)	66 (16-120)	210	250	Evidence of sulfate Ca/Mg
Total Hardness (as CaCO3)	mg/L	1.0	250	(a)	66 (11-120)	190	192	Considered "hard" water
Regulated Inorganics (Primary MCL is shown unless otherwise noted):								
Aluminum	ug/L	5.0	5.4	200 (b)				
Antimony	ug/L	1.0	ND	6				
Arsenic	ug/L	1.0	1.4	10 (c)	ND (j) (ND-180)	<10	<2	Relatively low
Asbestos	MFL		< 0.020	7				Results < analytical sensitivity.
Barium	ug/L	2.0	350	1000		<500	280	Elevated; saline environment?
Beryllium	ug/L	1.0	ND	4				
Boron	mg/L	0.10	0.26	1 (d)	ND (j)			>0.75 is problem for crops
Cadmium	ug/L	1.0	ND	5		<5	<10	
Total Chromium	ug/L	5.0	ND	50		<5	<20	
Cyanide	mg/L	0.0050	ND	0.15				
Copper	mg/L	0.010	ND	1 (e), 1.3 (d	0.059	<0.1	<0.01	
Iron	mg/L	0.10	0.14	0.3 (e)	ND (ND-140)	1.0	<0.1	1/2 the current MCL
Lead	ug/L	5.0	ND	15 (d)	ND	<5	<50	
Manganese	mg/L	0.010	0.19	0.05 (e)	NR (k)			4 times the current MCL
Mercury	ug/L	0.20	ND	2		<50	<1	
Nickel	ug/L	1.0	1.4	100				
Selenium	ug/L	1.0	3.1	50		<10	<50	
Silver	ug/L	1.0	ND	100 (e)		<0.02	<0.005	
Thallium	ug/L	1.0	ND	2				
Zinc	mg/L	0.050	ND	5.0 (e)		0.06	<0.01	
Radiological:								
Combined Radium 226 & 228	pCi/L		0.13 (l)	5				
Gross Alpha	pCi/L			15			0.56	
Tritium	pCi/L			20000				
Strontium-90	pCi/L			8				
Gross Beta	pCi/L			50				
Uranium	pCi/L			20				
Radon	pCi/L							
Bacteriological:								
Total Coliform	P/A	1.0	ND	> 1	0.17			
E-Coli	P/A	1.0	ND	A				
Regulated Organic Chemicals:								
VOC's	*Varies*	*Varies*	ND	*Varies*				Results for all T-22 VOC's
SOC's	*Varies*	*Varies*	ND	*Varies*				Results for all T-22 VOC's
MTBE	mg/L			0.005 (e)				
Thiobencarb	mg/L			0.001 (e)				

NOTES:
(a) Not specifically restricted/regulated
(b) Secondary MCL value is shown The primary MCL is 1,000 ug/L
(c) The Federal MCL is currently 10 ug/L State MCL is not yet established
(d) Current State Action Level
(e) Secondary MCL
(f) Primary MCL
(g) Secondary MCL Upper Limit. Max recom'd is 500 mg/L Short-Term max MCL is 1,500 mg/L
(h) Secondary MCL Upper Limit Max recom'd is 900 mg/L Short-Term max MCL is 2,200 mg/L
(i) Secondary MCL Upper Limit Max recom'd is 250 mg/L Short-Term max MCL is 600 mg/L
(j) ND = not detected
(k) NR = not reported
(l) Feb. 2004 data.
(m) Calculated from Lab Data

Specific Conductance

The results for Specific Conductance averaged 1,600 µmho/cm, above the State MCL secondary recommended upper limit of 900 µmho/cm. Historic records for this well are consistent with the high conductance results with 1,500 and 1,040 µmho/cm for 1986 and 1989 respectively. The average specific conductance detected in the SFPUC supply, as reported in the East Palo Alto 2002 Annual Water Quality Report is 214 µmho/cm.

Total Dissolved Solids (TDS)

The Gloria Well testing result for TDS was 840 mg/L, which is above the State Secondary MCL recommended limit of 500 mg/L. This result confirms the high mineral content of the well water. Samples in 1986 and 1989 measured 1,040 and 800 mg/L respectively. In comparison, SFPUC 2002 samples averaged 114 mg/L and ranged from "non-detect" to 190 mg/L.

Manganese

The testing result for manganese was 0.19 mg/L which when compared with the State Secondary MCL of 0.05 mg/L is found to be approximately 4 times the secondary regulatory limit. DHS historic results for the well are reported as 0.25 and 0.040 for 1986 and 1989 respectively. SFPUC did not report results for Manganese in 2002 but it is likely that the manganese concentration in the SFPUC source is below the MCL.

Iron

The testing result for iron is below the recommended secondary MCL and is discussed here because iron concentrations were reported as concern historically for this well. The iron testing result for this investigation was at 0.14 mg/L which is acceptable for well water, meets the regulatory requirements when compared with the recommended Secondary MCL of 0.3 mg/L. Iron results for 1986 and 1989 are 1 mg/L and <0.1 mg/L, while SFPUC has reported a non-detected result for iron concentration.

Chloride

Ground water in general and specifically in the East Palo Alto region is expected to exhibit higher chloride concentrations when compared with the SFPUC water supply due to the close proximity of the saline coastal environment. The chloride testing result was 280 mg/L, which is higher than the maximum recommended MCL limit of 250 mg/L but is below the Secondary MCL upper limit of 500 mg/L. Chloride results for 1986 and 1989 were 450 and 264 mg/L respectively. SFPUC water is reported at 5 mg/L with a range of "non-detect" to 7 mg/L as reported in the CCR for 2002.

Historic Perspective on Water Quality

Information from the California Department of Health Services (DHS) indicates that in the months that followed the installation of the well in 1981, taste and odor complaints from residents began and ultimately caused the East Palo Alto Waterworks District (operator of the system at the time) to scale back the operation of the well to 5 hours a day on week days (10 a.m. to 3 p.m.). In 1981, water samples taken of the well and of the blended water (downstream) discovered elevated levels of iron (0.06 mg/L) and manganese (0.15 mg/L) in the well water and objectionable odor for the blended water (3-32 odor units). It was suggested at the time that the oxidative reaction between manganese and iron in the well water, and chlorine in the SFPUC water supply produced taste and odor problems in the blended water. Correspondence pertaining to the water quality concerns is provided for reference in Appendix E.

Results for the Gloria Well are also provided for samples taken between 1984 and 1989 courtesy of available CDHS records. The 1984 and 1989 test results for the above problem constituents are summarized in Table 1.

Appendix F provides results for other wells in the Palo Alto area for comparison purposes.

Preliminary Recommendations

From the results of this initial feasibility study, upgrading the Gloria Way Well to a drinking water supply well remains a potential option for the City of East Palo Alto water system and Cal-Am. Alternatives and options for Cal-Am to consider as viable for the potential use of this source for drinking water supply include:

- **Alternative 1.** Wellhead Treatment for Removal of Manganese - Remove Mn and other constituents associated with TDS and taste and odor complaints, then distribute the treated water directly (locally).
  - Treatment Option A. Greensand oxidation/filtration process.
  - Treatment Option B. Membrane process (RO or NF).
- **Alternative 2.** Sequestering of Manganese - Addition of a sequestering agent for manganese, such as polyphosphate. Blend offsite to distribute (requiring a pipeline).
- **Alternative 3.** Offsite Blending with Surface Water - Commingling of only disinfected well water with surface source water from SFPUC (requiring a pipeline but potentially very limited treatment). Blending at SFPUC turnout, or at a storage tank.
- **Alternative 4.** Combined Treatment and Offsite Blending - Similar to Alternative 1, but with offsite blending with surface water (requiring a new pipeline). Blending could be at the SFPUC interconnection location, or at an offsite storage tank location.

It is recommended that the selection of a potential treatment and/or blending project proceed with cohesion, and that the potential aesthetic impact to the customers of the use of this supply be fully considered. Further analysis is necessary to select the most feasible alternative.

Additional consideration must be given to staffing and operator certification class level requirements when treatment facilities are evaluated. The routine sampling and water quality testing requirements associated with the addition of this well as a source of supply will need to be evaluated through CDHS during the design phase. Permitting requirements with CDHS to accept this source and add it back into the system will need resolution. And a Water Supply Permit will need to follow, along with compliance with the California Environmental Quality Act (CEQA). CEQA compliance will likely require a hydrogeologic evaluation of the impact of using this well upon the surrounding aquifer, and this evaluation may include a need to perform some groundwater modeling. Also, to use this well as a source of supply, a Drinking Water Source Assessment (DWSAP) will be required as a support document with the filing of an Amendment to the Drinking Water Supply Permit.

Considerations for Wellhead Treatment Options

Removal of TDS with technologies such as reverse osmosis (RO) or nanofiltration (NF) would improve water quality and taste and odor characteristics by reducing the mineral content in the water, but this alternative should be carefully evaluated against priorities of Cal-Am, the impact on water rates, budget and staffing requirements, and the anticipated yield limitations from the well of 350-450 gpm.

A greensand pressure filtration system is commonly used for manganese removal, and Cal-Am is familiar with this treatment process from its use at other properties. The treatment for manganese would also result in iron removal and a measurable reduction in TDS. The removal of these constituents would improve the esthetic characteristics of the water by reducing the potential for brown and black color in the water. To a lesser degree, it will reduce the potential of taste and odor complaints, but water with high manganese and iron is not necessarily always associated with taste and odor complaints. The use of polyphosphate as a sequestering agent could be an alternative to manganese greensand treatment. Under this approach manganese would stay in solution, but the sequestering agent will mask its presence.

The SFPUC has recently converted from chlorine disinfection to disinfection using chloramine. The chloramine implementation started on February 2, 2004. The conversion to chloramine is aimed at increasing the residence time of the disinfectant in the water, improving protection against pathogens and reducing the formation of harmful disinfection by-products. SFPUC has a target minimum chloramine residual of 1.5 mg/L for its distribution system.

Disinfection at the well site is likely to be required and therefore the well may need to have a chloramine disinfection system. The use of free chlorine at the well site may not be viable because of concerns of breakpoint reaction between the free chlorine in the well water and the chloramine in the SFPUC water. This potential reaction would possibly limit the effectiveness of chloramine in the East Palo Alto water supply. Therefore it may be required that the disinfection system at the well site would require chlorine followed by ammonia injection. For on-site disinfection in this case, storage of aqueous hypochlorite and aqueous ammonia at the well site would be required but the use of these chemicals has some safety concerns associated with it.

To fully analyze the disinfection requirements for use of this well some additional water quality testing, bench testing to evaluate disinfection addition options, and some mass balance calculations may be needed. It may be possible to only add chlorine to a free chlorine concentration of 1 ppm and at this concentration the maximum 4.8:1 ratio of chlorine to ammonia may not be exceeded in a blended application. The SFPUC supply currently has a 4.3:1 ratio of chlorine to ammonia, with excess free ammonia available. Therefore a chlorine-only disinfection system may be feasible using the blending alternative.

It will also be necessary to evaluate and monitor the blending effects on pH. Chloramine is most stable above pH of 8.5. The SFPUC water starts with PH of about 9.0-9.4. Care should be given to maintain a high enough pH in blended water to ensure the beneficial use of chloramines disinfection. The current analysis of the Gloria well water reported a pH of 7.95. In 1986 and 1989 the pH reported for the Gloria well water was 8.1 and 7.9.

The size of the well lot is 50-ft by 80-ft. There is unoccupied space on the north and east portions of the lot for placement of treatment and chemical storage facilities. The well with the new treatment facility would be expected to aesthetically blend reasonably well with the neighborhood. The well site is currently fenced but the perimeter security system may need to be relocated or improved if new facilities are constructed at this site. As an added safety precaution, a new treatment facility with chemical storage could be concealed from the neighborhood by CMU wall or a building structure.

Considerations for Blending Options

A blending strategy could replace some expensive manganese or TDS treatment strategies but use of this alternative must assure that the water quality is not going to degrade for the customers in close proximity to the well. This alternative would require the construction of a new dedicated pipeline to deliver well water closer to the point where water from SFPUC enters the water supply system or at least to a major transmission ("backbone") main. Positive mixing and a greater volumetric ratio of SFPUC water to well water are critical for the success of this alternative. A 4:1 minimum mixing volumetric ratio of SFPUC water to well water is recommended. Assuming the Gloria well produces 400 gpm, the SFPUC flow at the blending location would need to be 1,600 gpm. Mixing the water at a 4:1 or greater volumetric ratio should result in water that is acceptable to the customers. By having no appreciable change in water quality the prior taste and odor complaints would be avoided. A low flow rate interlock signal at the SFPUC transmission line or the blending point would assure that well water is not supplied to the system when the flow rate from the SFPUC is below a pre-set rate.

Gloria Way Well was originally connected to an 8-inch cast iron pipe located in the street in front of the well lot and connected to a main at Bay Rd. The well connection at the street is currently capped off. According to Cal-Am operator's knowledge, the main is approximately 25 years old. The service main that runs into the well site is about 17 years old. The turnout that supplies water from the SFPUC to the East Palo Alto water system is located at the intersection of University Avenue and the Hetch Hetchy Aqueduct; some 2,600 feet from the well. From initial review of the East Palo Alto system maps, it appears that the most convenient location for blending SFPUC water with well water is at the corner of University Avenue and Bay Road. The distance from the well to that intersection is approximately 800 feet. The cost of construction of a 6-inch line, 800 feet long is estimated at approximately $50,000.

Another advantage of blending is the potential of eliminating the need of chloramine application at the well site, as long as the chloramines level in the SFPUC water is at or above 2.5 mg/L at the point of mixing. Currently SFPUC is feeding 2.7 mg/L at the Sunol Valley Chlorination Facility with a reported 0.15 mg/L decay to the East Palo Alto turnout. Therefore, disinfectant residual near the turnout is about 2.5 to 2.6 mg/L. After the mixing (assuming 4:1 mixing ratio) the resulting water would have a 2.0 mg/L chloramine concentration, which is acceptable and safe. SFPUC's disinfectant residual target is 1.5 mg/L and any blending strategy use for the Gloria Well must fully understand the chlorine decay in the system verifying that the level after mixing stays above 1.5 mg/L in the outer reaches of the East Palo Alto distribution system (areas with the longest detention time).

One disadvantage of blending is that the well water supply cannot be used as a reliable alternative or emergency source since its usage is dependent on the flow of the primary source. In case the primary source is significantly reduced or taken out of service, the well water would be turned to as the replacement source, a situation likely to cause taste and odor complaints.

The logistics of this approach must be closely coordinated with SFPUC's chloramine program for East Palo Alto. In the future, SFPUC may lower the disinfectant residual to 2.0-2.5 mg/L and this factor must also be considered in evaluating the alternatives for use of the Gloria Well.

Considerations for Combination of Wellhead Treatment and Blending

A combination of treatment for manganese in conjunction with mixing (blending) of the Gloria Well water with the SFPUC supply is a promising alternative. This alternative would involve installation of the selected treatment (or sequestering) system, and construction of the treated water line from the well site to an offsite transmission main or storage reservoir blending location.

Decision Considerations for the Design Phase

The following is a representative list of key considerations for the design phase:

- Customer acceptance (associated with blending surface water and ground water)

- Permitting considerations (including DWSAP)
- CEQA considerations (including aquifer impact)
- Cost considerations (based on a concise alternatives analysis)
- Treatment process/method selection
- Neighborhood relations
- Operator/Staffing requirements
- DHS approval process and challenges to bring the well online

In addition to the key considerations listed above, it is anticipated that the design phase of the project will also include additional detailed analysis of the following potential alternatives:

Alternative A - Wellhead Treatment and Direct Distribution. This alternative is the supply option originally planned for the Gloria Well as outlined in this summary investigation report. Supply water would receive wellhead treatment and then would be conveyed directly to the adjacent existing distribution pipeline.

Alternative B - Wellhead Treatment and Offsite Blending. This alternative would rely on wellhead treatment however, to address the aesthetics of providing this groundwater supply to customers receiving the existing surface water supply, a new discharge main would be installed from the Gloria Well site to be connected to an existing offsite, large diameter transmission main, or would be connected to the offsite Hetch-Hetchy turnout.

Alternative C - Blending of Untreated Well Water at T-Main. Under this alternative untreated water from the Gloria Well would be conveyed through a new discharge main from the well site to a nearby large transmission main or to a connection at the Hetch-Hetchy turnout.

Alternative D - Blending of Untreated Well Water at Tank. This alternative would involve use of a dedicated discharge main to convey untreated Gloria Well water from the well site to a new tank which would be constructed at an offsite property. Properties under consideration for the new storage tank include a nearby park and a nearby school however, other properties may be available and would be considered during the evaluation for this alternative.

References

East Palo Alto, Gloria Well, Well Assessment Report, Martin B. Feeney, January 2004.

Water System Master Plan, East Palo Alto County Waterworks District, Brown and Caldwell, April 1998.

Appendix A. Water Well Driller's Report (Well Log).

TRIPLICATE
Owner's Copy

F-151-4

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

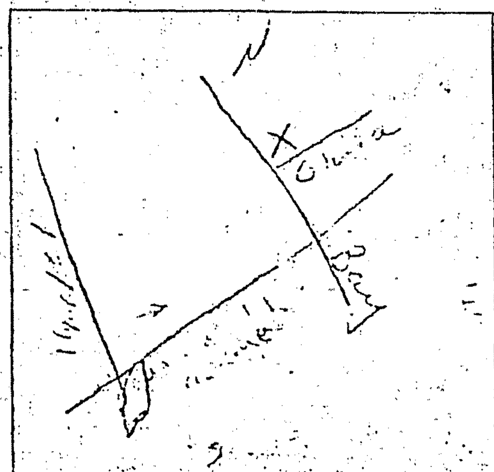
No. 134143

Notice of Intent No. ______
Local Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name County of San Mateo
Address Department of Public Works, County of San Mateo
City Redwood City, Ca. Zip 94063

(2) LOCATION OF WELL (See instructions):
County San Mateo Owner's Well Number ______
Well address if different from above Corner of Bay & Gloria in east Palo Alto
Township ______ Range ______ Section ______
Distance from cities, roads, railroads, fences, etc. ______



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Monterey sand
Diameter of bore 24"
Packed from 100 to 350 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen Johnson screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
+3	253	12 3/4	1/4	255	280	20 slot
280	313	12 3/4	1/4	313	323	100 slot
323	334	12 3/4	1/4			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 100 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 16'-24' ft.
Method of sealing pumped grout

(10) WATER LEVELS:
Depth of first water, if known ______ ft.
Standing level after well completion ______ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom? ______
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ______ ft. At end of test ______ ft.
Discharge ______ gal/min after ______ hours Water temperature ______
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ______
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 351 ft. Depth of completed well 334 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	16	Top Soil
16	24	Gravel and Rock
24	39	Sticky brown clay
39	110	Blue clay
110	142	Joint blue clay
142	158	Sticky blue clay
158	182	Brown sticky clay
182	232	Joint blue clay
232	250	Sticky brown clay
250	269	Fine sand
269	280	Silty brown clay
280	286	Blue clay
286	302	Brown clay
302	311	Blue clay
311	319	Brown clay
319½	325½	Gravel and sand
325½	329	Sticky brown clay
329	351	Brown silt

Work started 11-[illegible] 1979 Completed [illegible] 19[illegible]

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED ______ (Well Driller)
NAME The Water Development Corp.
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 883
City Woodland, Ca. Zip 95695
License No. 283326 Date of this report 1/7/80

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

F-151-

Do not fill in

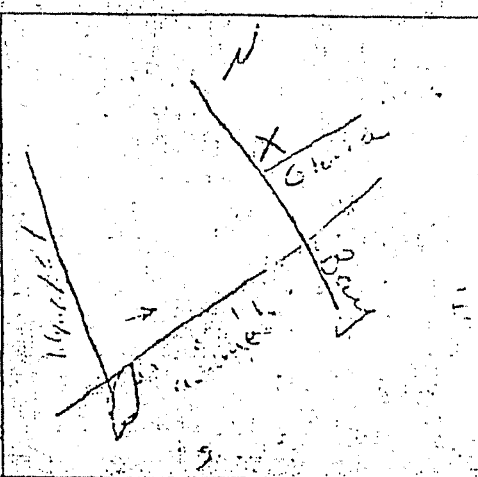
No. 134143

Notice of Intent No. ____
Local Permit No. or Date ____

State Well No. ____
Other Well No. ____

(1) OWNER: Name County of San Mateo
Address Department of Public Works, County of San Mateo
City Redwood City, Ca. Zip 94063

(2) LOCATION OF WELL (See instructions):
County San Mateo Owner's Well Number ____
Well address if different from above Corner of Bay & Gloria in east Palo Alto
Township ____ Range ____ Section ____
Distance from cities, roads, railroads, fences, etc. ____



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size Monterey sand
Diameter of bore 24"
Packed from 100 to 350 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen Johnson screen

From ft.	To ft.	Dia. in.	Cage or Wall	From ft.	To ft.	Slot size
+3	253	12 3/4	¼	253	280	20 slot
280	313	12 3/4	¼	313	323	100 slot
323	334	12 3/4	¼			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 100 ft.
Were strata sealed against pollution? Yes ☒ No ☐ Interval 16-24' ft.
Method of sealing pumped grout

(10) WATER LEVELS:
Depth of first water, if known ____ ft.
Standing level after well completion ____ ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom? ____
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ____ ft. At end of test ____ ft.
Discharge ____ gal/min after ____ hours Water temperature ____
Chemical analysis made? Yes ☐ No ☐ If yes, by whom? ____
Was electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 351 ft. Depth of completed well 334 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
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286	302	Brown clay
302	311	Blue clay
311	319	Brown clay
319½	325½	Gravel and sand
325½	329	Sticky brown clay
329	351	Brown silt

Work started 11-25 1979 Completed 12-7 1979

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED ____ (Well Driller)
NAME The Water Development Corp. (Person, firm, or corporation) (Typed or printed)
Address P.O. Box 383
City Woodland, Ca. Zip 95695
License No. 283326 Date of this report 1/7/80

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES

RECEIVED
SANITARY ENGINEERING
JUN 04 1984

WELL DATA

(1) Place and Owner

(2) Source of Information

Collected by ... Date

(3) Number or Name	05S/03W-25F01M		
Date drilled	1979		
(4) Location: Neighborhood	EAST PALO ALTO		
Size of lot	50'X80'±		
Distance to: Sewer			
Sewage disposal			
Abandoned well			
Nearest property line	16'±		
(5) Housing: Type	NONE		
Condition			
Pit depth *(if any)*			
Floor *(material)*			
Drainage			
(6) Well Depth	351'		
(7) Casing: Depth	339'		
Diameter	12"		
Kind	STAINLESS STEEL		
Height above floor			
Distance to highest perforations	188' FROM SURFACE		
Surface sealed *(yes or no)*	YES		
Gravel pack *(yes or no)*	YES		
Second casing depth	NONE		
Second casing diameter			
Annular seal *(depth)*	100'		
(8) Impervious Strata: Penetrated — Thickness			
Depth to			
(9) Water Levels: Depth to — Surface			
Static	8.5		
When pumping	VARIES		
(10) Pump: Make	BYRON-JACKSON		
Type	8GH 16 STAGE DEEP WELL TURBINE		
Capacity, g.p.m.	300 GPM @ 471 TDH		
Lubrication	SHAFT		
Power	3 PHASE, 60 CYCLE 230/460V		
Auxiliary power	NONE		
Control	PROBES		
Discharge location	BAY ROAD		
Discharge to	WATER MAIN		
(11) Frequency of Use	NOT IN USE		
(12) Flood Hazard	NONE		
(13) Remarks and Defects (Use other side if necessary)			

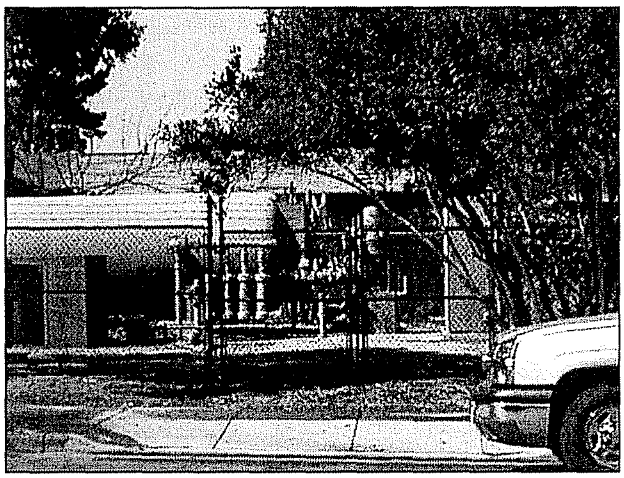
(14) Show well log on other side.

Appendix B. Site Photographs.

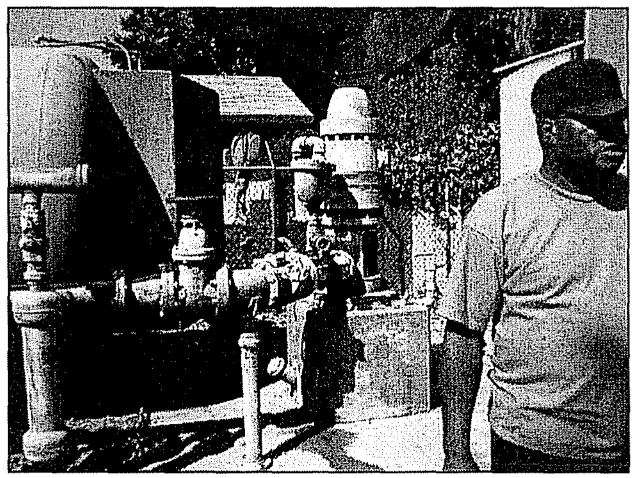
Gloria Well Site View

Gloria Well Hydropneumatic Tank

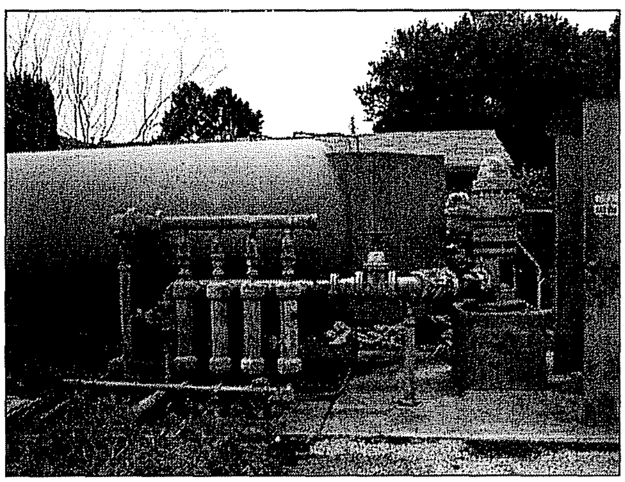
Gloria Well Entrance



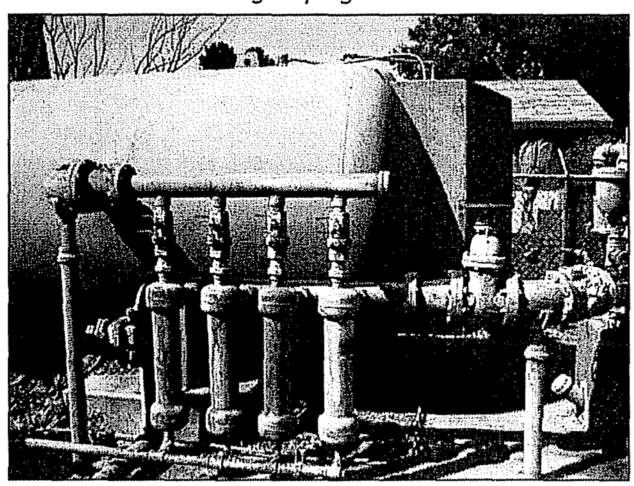
Gloria Well Discharge Piping Photo #1



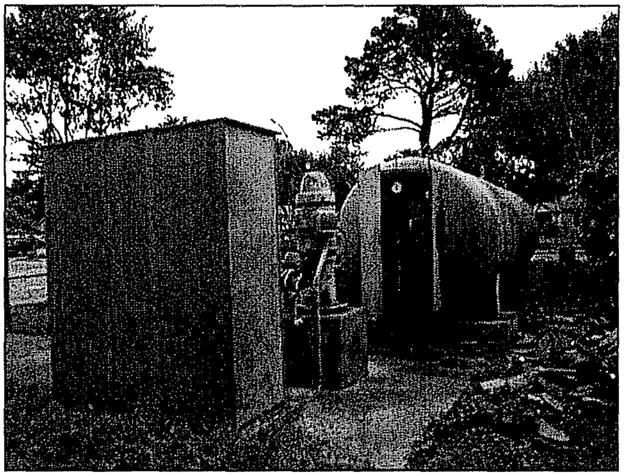
Gloria Well Discharge Piping Photo #2



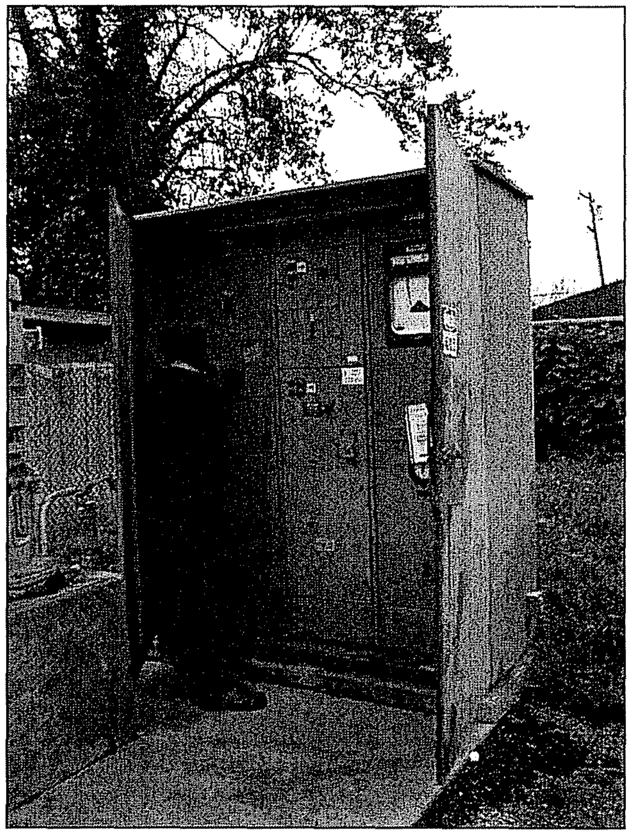
Gloria Well Discharge Piping Photo #3



Gloria Well Discharge Piping Photo #2



Gloria Well Discharge Piping Photo #3



Appendix C. East Palo Alto, Gloria Well, Well Assessment Report.

Martin B. Feeney
Consulting Hydrogeologist

R.G. 4634
C.E.G. 1454
C.Hg 145

January 20, 2004

HDR Engineering, Inc.
2365 Iron Point Road, Suite 300
Folsom, CA 95630

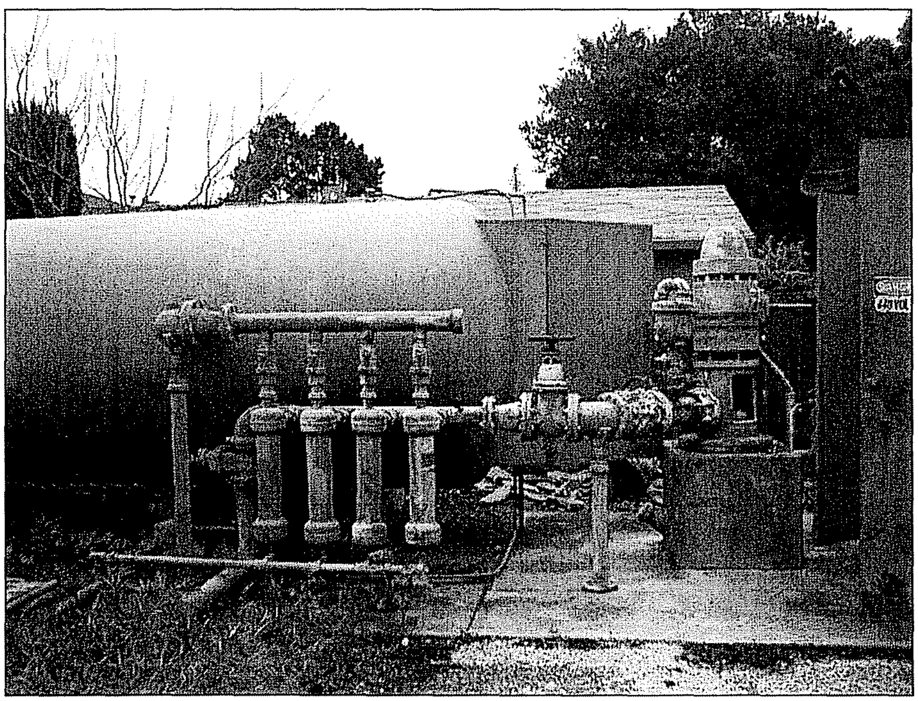
Attention: Rob Watson, PE

Subject: East Palo Alto – Gloria Well –Well Assessment

Dear Mr. Watson:

Presented in this letter report are the findings and conclusions resulting from an investigation into the performance and condition of the Gloria Way Well in East Palo Alto. It is understood that the well's operator, American Water Company, is considering building a water treatment facility to treat the water from this well to allow its use for municipal supply. The purpose of the assessment was to document the well's performance characteristics, condition and construction. These data, along with water quality data, will be used to determine the overall feasibility of the treatment and use proposal.

The work performed included the performance of a constant discharge test to assess the well's performance characteristics. The work also included the physical inspection of the well and pump. The well is located at the intersection of Gloria Way and Bay Street in East Palo Alto. The well is shown in the picture below.



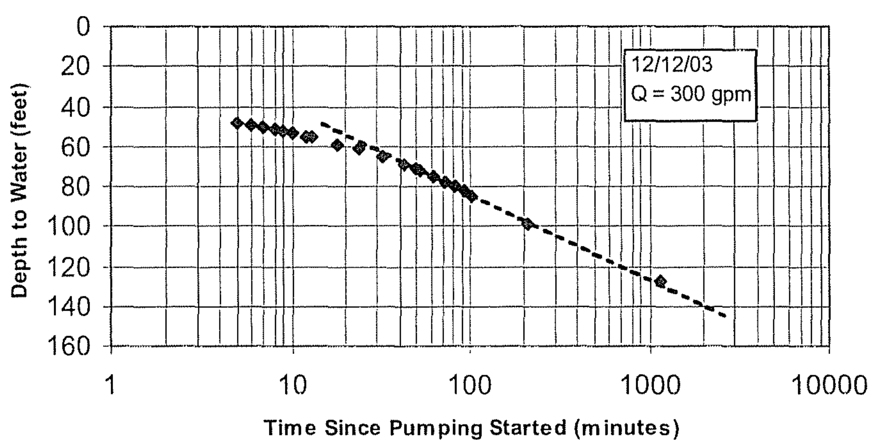
WELL PERFORMANCE TESTING

Well performance testing was performed concurrently with test pumping performed by HDR for purposes of collecting representative water samples for design of the treatment facility. The scope of work for well performance testing proposed a 100-minute test. However, for purposes of getting representative water quality samples HDR decided to perform a 72-hour constant discharge tests. The extended pumping period provided an opportunity to collect well performance data over a longer period.

The constant discharge test was conducted December 12 through 15, 2003. Discharge from the well was routed through the existing pressure tank to an adjacent fire hydrant and then discharged from the fire hydrant into the storm drain through collapsible pipe. Discharge to the storm drain was permitted through the City of East Palo Alto and the Regional Water Quality Control Board. Discharge from the well was controlled at the hydrant and measured with a flow meter. Discharge rate was adjusted to maintain a flow rate of approximately 300 gpm.

During testing, water level measurements were taken with an electric sounder. Static water level prior to testing was 16 feet below top of casing. Water level measurements were collected on a logarithmic schedule through the first 100 minutes and periodically for the next 1,100 minutes. The collected water level data are presented on Figure 1 – Gloria Well – Constant Discharge Drawdown Test.

FIGURE 1 – Gloria Well – Constant Discharge Test



As shown on Figure 1, water level declined from static to approximately 55 feet after 10 minutes. Then, as casing storage was depleted, water level decline steepened, falling along a conventional semi-logarithmic line with the pumping level at approximately 85 feet after 100 minutes and at 125 feet after 1,000 minutes. Utilizing the projected pumping level at 24-hours of 130 feet results in a 24-hour specific capacity[1] of 2.6 gpm/ft.

---

[1] Specific Capacity is the ratio of discharge to drawdown. The conventional units are gallons per minute per foot of drawdown (gpm/ft). Specific capacity values are useful for projecting drawdown at any given discharge rate and for comparing well performance over time.

PHYSICAL INSPECTION

Physical Inspection of the well entailed removal and inspection of the existing pump and the performance of a video survey to document condition of the well. Chappell Pump and Supply of Gilroy, CA removed and replaced the pump. Newman Well Surveys of Salinas, CA performed the video survey.

Pump

The pump was removed on January 5, 2004. Prior to the assessment program, the setting of the existing pump was unknown. The contractor removed 240 feet of 6-inch column pipe and 10-foot pump resulting in a pump setting of approximately 250 feet. Pump was an 8-inch diameter 16-stage Bryon-Jackson consistent with that reported on the DHS Form 228 dated 6/4/84. Column pipe, tube, shaft and spiders were in fair to good condition and were suitable for reuse. After the video survey was performed, the pump was reinstalled to original depth and returned to operating condition. Photographs of pump and column are attached.

Well

After removal of the pump, approximately 5,000 gallons of water was allowed to flow into the well overnight to improve clarity for the video survey. A video survey was performed on January 6, 2004. Visability in the upper portions of the well was very poor, limiting assessment of the upper casing. Below the uppermost perforations, visibility was good revealing the stainless steel wire-wrapped screen and intervening blank sections. Perforations were clean and in excellent condition. Surprisingly, no evidence of galvanically-driven encrustation or corrosion was visible at the joints between the stainless steel screen and mild steel blank. In order to create a complete record, a second video survey was performed on January 10, 2004. Clarity in the upper section was much improved, allowing observation of the upper casing. Casing appeared in good shape with minimal incrustation or corrosion and no evidence of holes or deformation.

Data from the video survey allows documentation of the "as-built" well[2]. Well is constructed of what appears to be 12 ¾ -inch diameter spiral weld mild steel casing. The blank casing is in very good condition. Perforated intervals are 12 ¾-inch diameter stainless steel wire-wrapped screen. No evidence of galvanic isolation couplings were visible. Perforations were visible in the intervals from 259 – 282 and 319.5 – 325 feet below ground surface. These screen placements are generally consistent with the depths reported on the drillers' logs. However, the upper screen, as reported and as placed, does not align well with the available water bearing materials. Fine sand is reported in the interval between 250 and 269 feet whereas the screen is set between 259 and 282 feet. Above and below the sand are clay materials. The lower screen aligns with the 6 feet of sand and gravel reported between 319.5 and 325.5 feet. Bottom of the well was encountered at 333.5 feet and compares well to the reported bottom of 334 feet suggesting minimal fill. An as-built schematic of the well is presented as Figure 2 – Well Schematic.

[2] Depths from video survey have been adjusted by -3 feet to correspond with the below ground surface depths reported in the driller's log.

CONCLUSIONS

- Based on the performance test and the video survey, the Gloria Way well is in good structural and operating condition. Its current physical condition does not limit its use for a supply well for the proposed treatment facility.

- Performance testing reveals the well to have a 24-hour specific capacity of 2.6 gpm/ft at 300 gpm. No historical data are available to assess whether the current specific capacity represents a reduction from the performance when the well was new. However, the existing pump appears well matched with the current performance suggesting no degradation in performance. This conclusion is buttressed by the very clean condition of the well screen. Utilizing the specific capacity of 2.6 gpm/ft and assuming maintenance of regional static water level of approximately 15 feet the well might be capable of 450 gpm with a pumping level of 200 feet.

- However, water quality sampling for treatment facility design were taken at a discharge rate of 300 gpm. At a higher discharge rate the water quality may be different.

- At the time of the video survey static water level was approximately 13 feet below ground surface. Examination of available topographic maps allows estimation of ground surface elevation of 20 feet, resulting in a static water surface elevation of 7 feet msl. Pumping water levels will be substantially below sea level. If the well is to be utilized as a baseline source, operational water levels will be chronically below sea level. Some consideration of the potential for seawater intrusion from the Bay is recommended.

- Although not essential, prior to replacing the well pump, some limited well rehabilitation consisting of swabbing/air-lifting might be beneficial in maximizing well performance.

Sincerely,

Martin B. Feeney

Attachments:

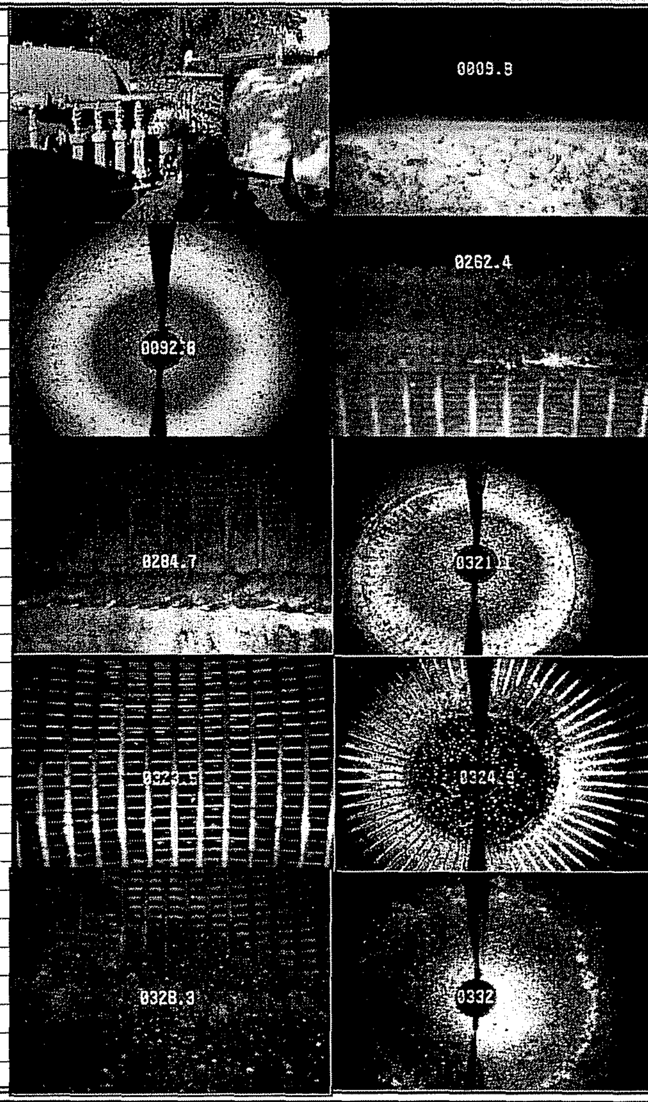
Video Survey Summary
Well Schematic
Well Log
Pump Removal Photographs

Newman Well Surveys

Video Survey Report

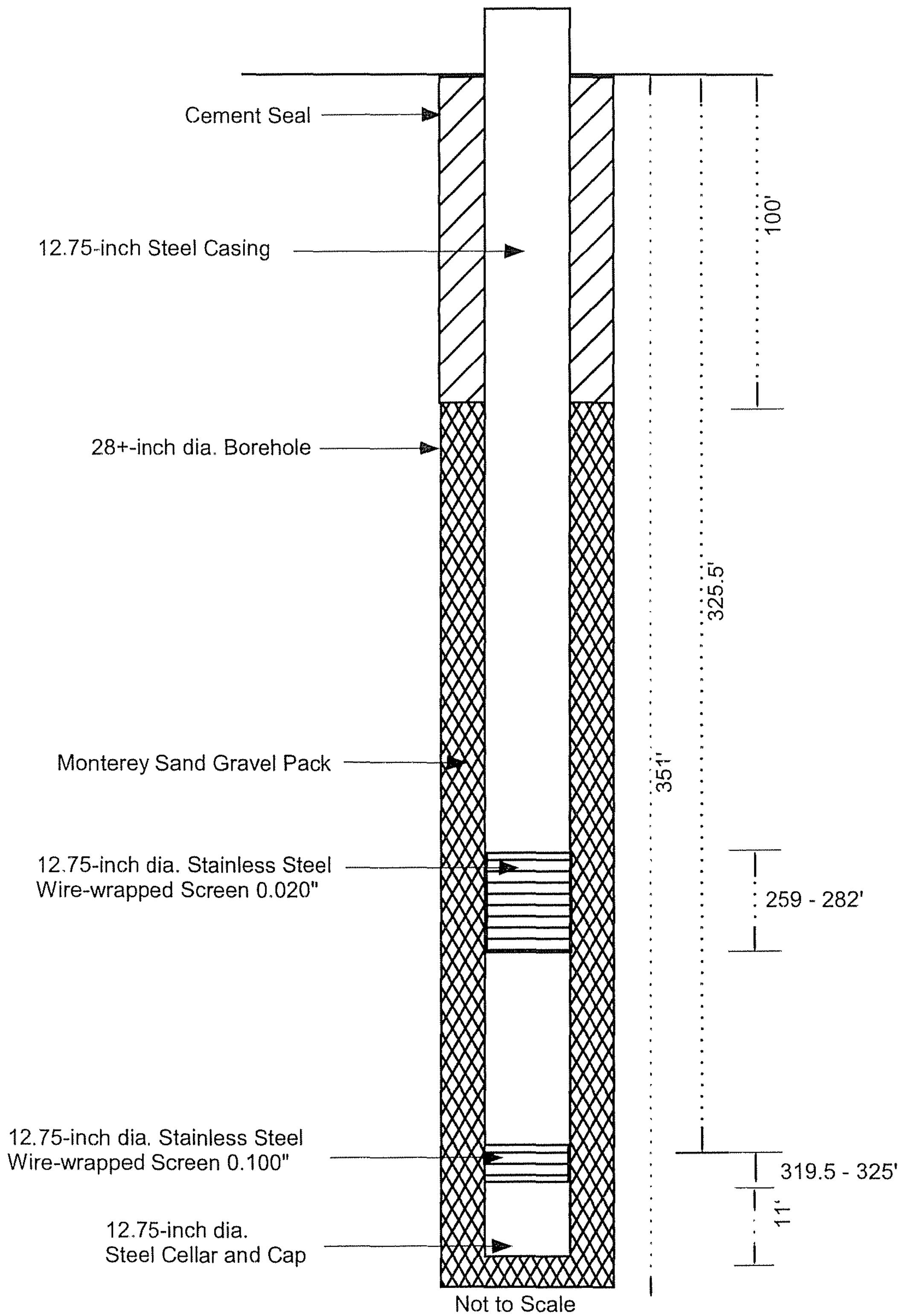
Company:	Martin Feeney	**Date:**	10-Jan-04
Well:	American Water, Gloria Way Well	**Run No.**	One
Field:	Palo Alto	**Job Ticket:**	69538
State:	California	**Total Depth:**	336.4 ft
		Water Level:	9.8 ft
Location:	NW C/O Gloria Way & Bay St.		
Zero Datum:	Top of pump pad	**Tool Zero:**	Side view lens (Add 1.5 ft. to downward view)
Reason for Survey:	General inspection		

Depth	Remarks
0.0 ft	12" Steel casing (spiral seam)
9.8 ft	Water level
262.0 ft	Well screen to 285 ft.
322.5 ft	Well screen to 328 ft.
336.4 ft	Bottom of well



Notes: Well appeared to be in good condition. No casing problems were seen.

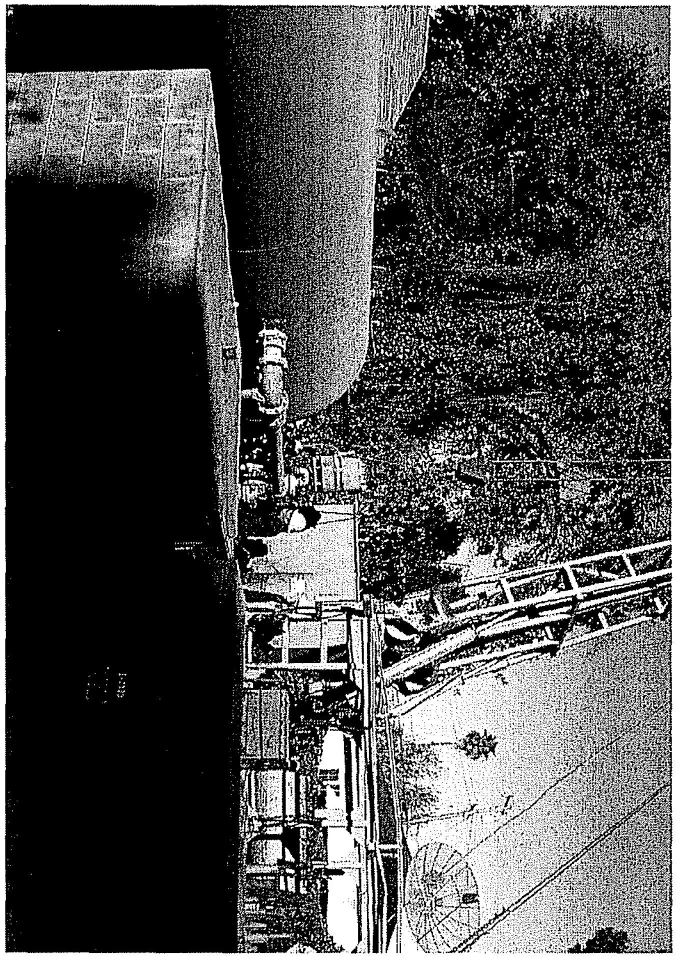
6080 sherry lee lane
salinas ca 93907
(831) 722-2388

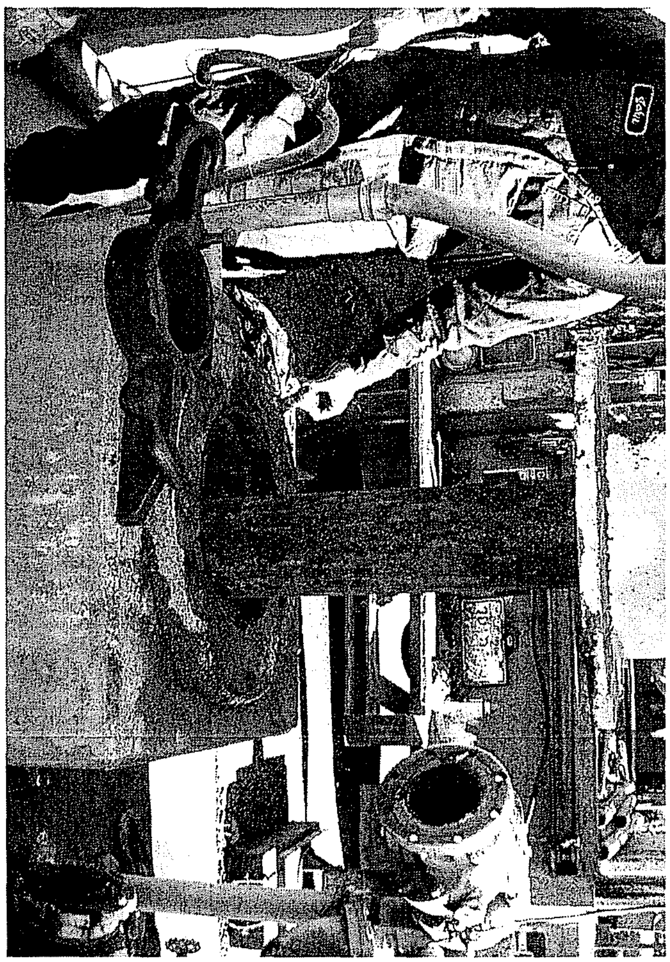


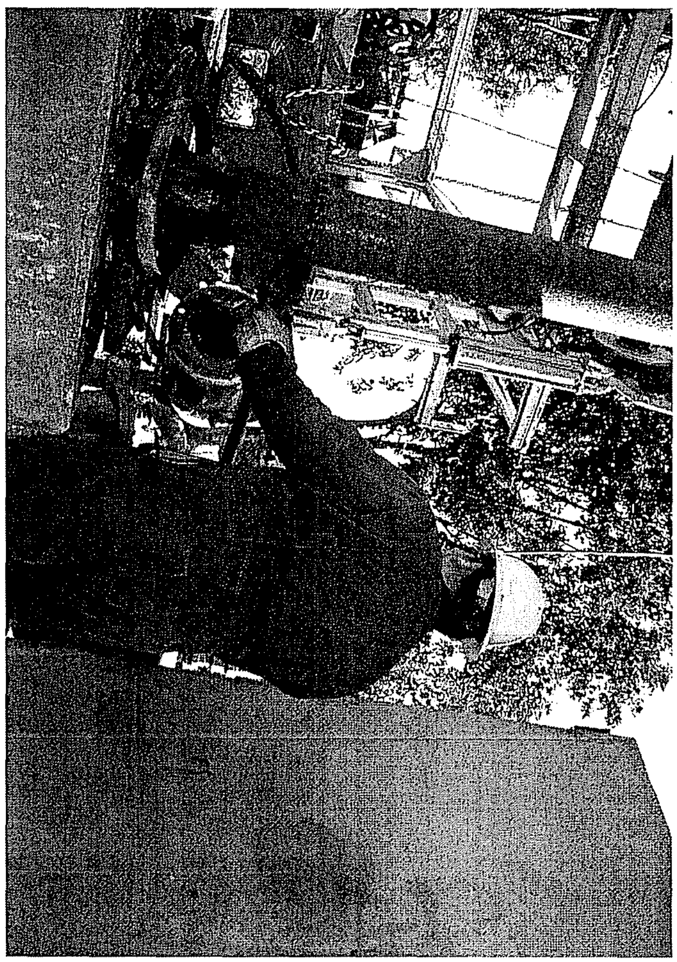
Construction details taken from Drillers
Log as corrected by Video Survey

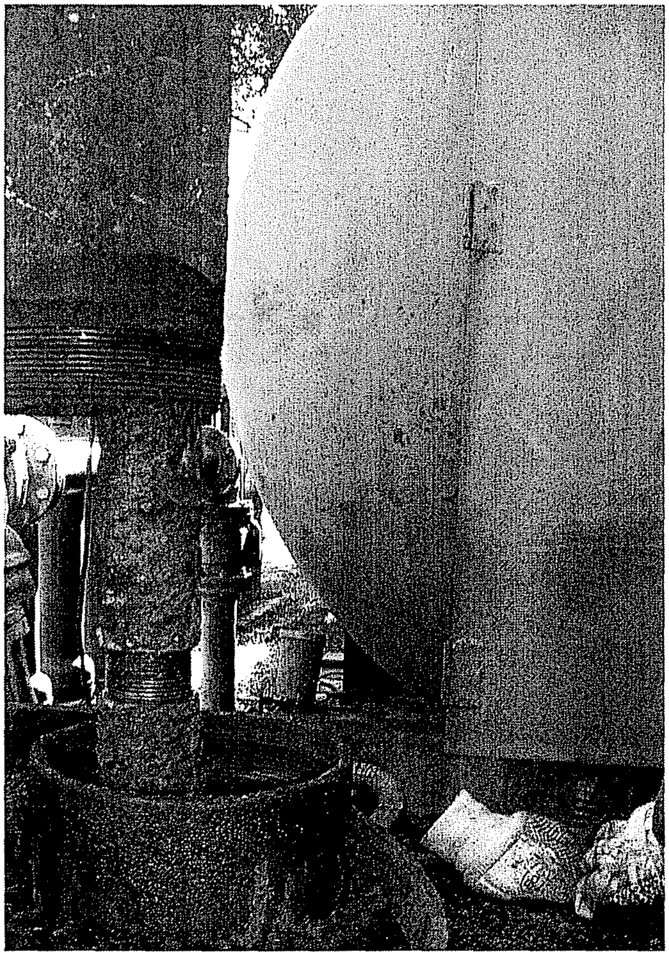
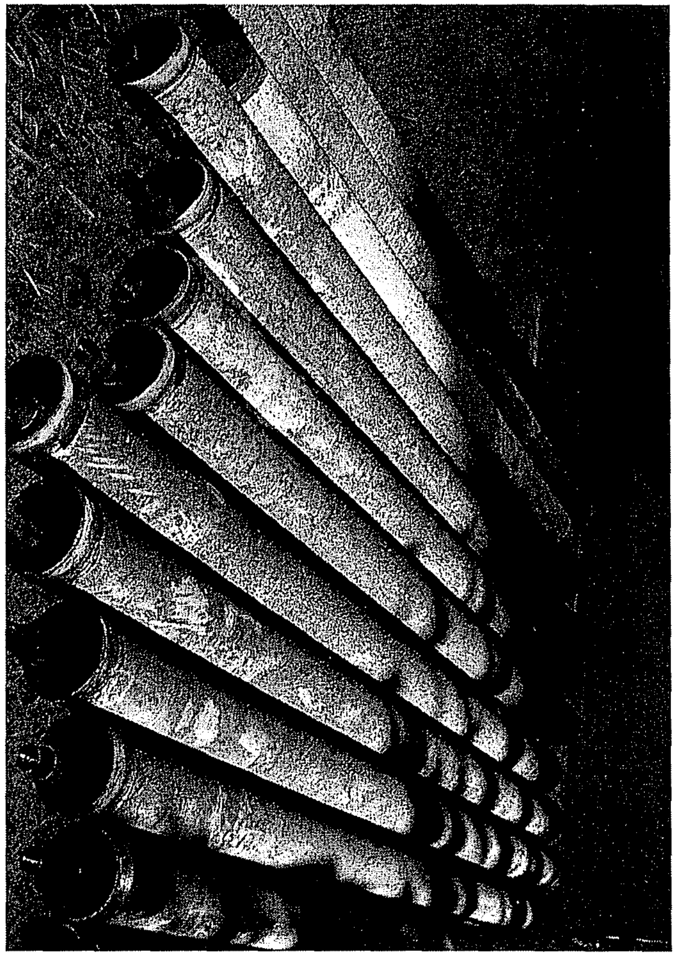
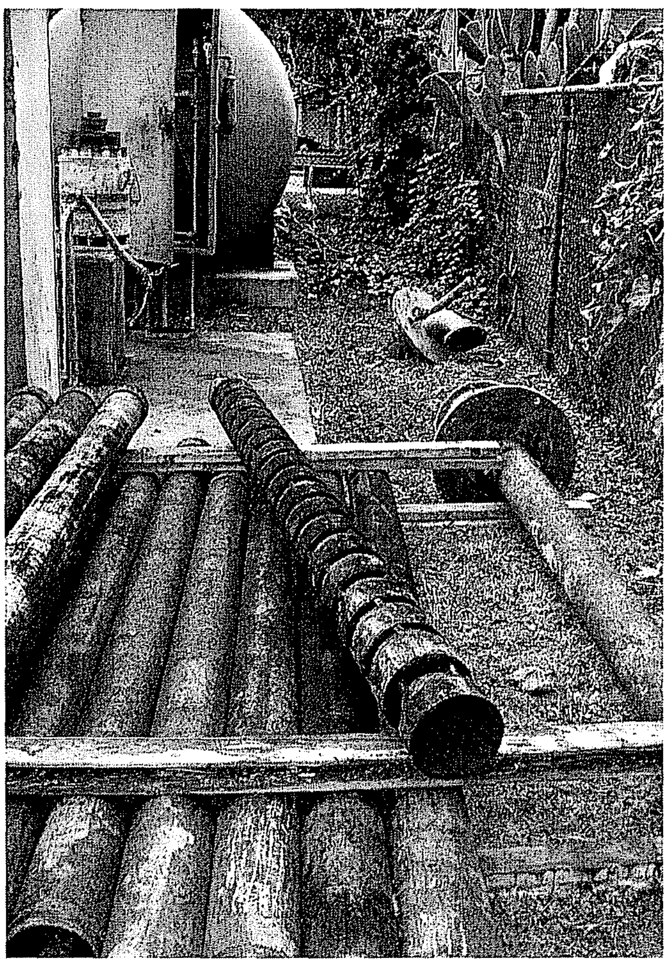
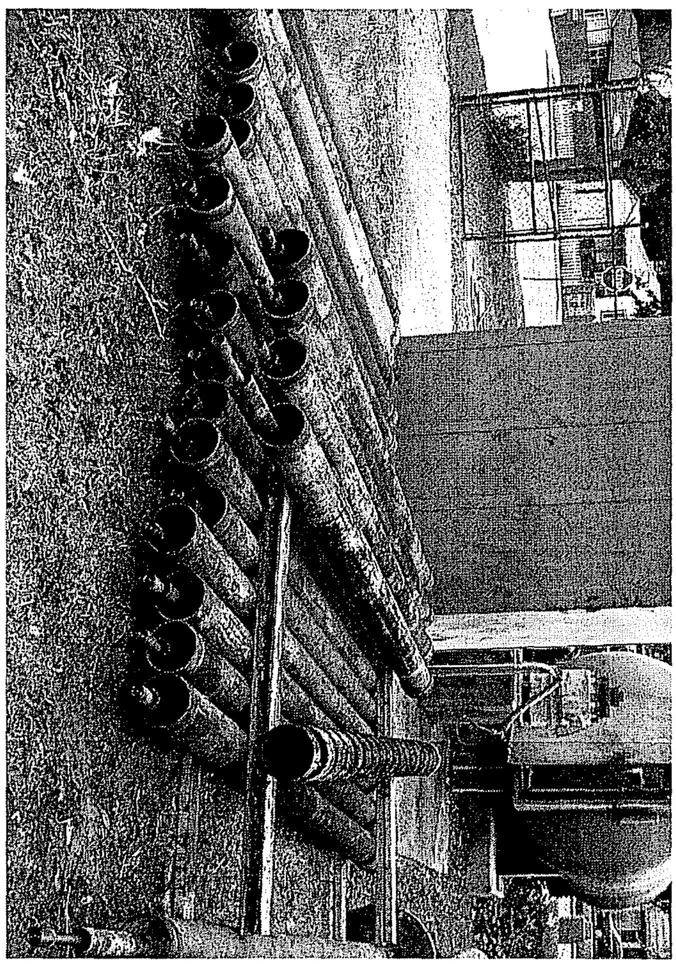
Figure 1 - Well Schematic
"as-built" Gloria Way Well
East Palo Alto

Insert Well Log Copy Here







Appendix D. Video Survey Report.

Newman Well Surveys

Video Survey Report

Company:	Martin Feeney	**Date:**	10-Jan-04
Well:	American Water, Gloria Way Well	**Run No.**	One
Field:	Palo Alto	**Job Ticket:**	69538
State:	California	**Total Depth:**	336.4 ft
		Water Level:	9.8 ft
Location:	NW C/O Gloria Way & Bay St.		
Zero Datum:	Top of pump pad	**Tool Zero:**	Side view lens (Add 1.5 ft. to downward view)
Reason for Survey:	General inspection		

Depth	Remarks
0.0 ft	12" Steel casing (spiral seam)
9.8 ft	Water level
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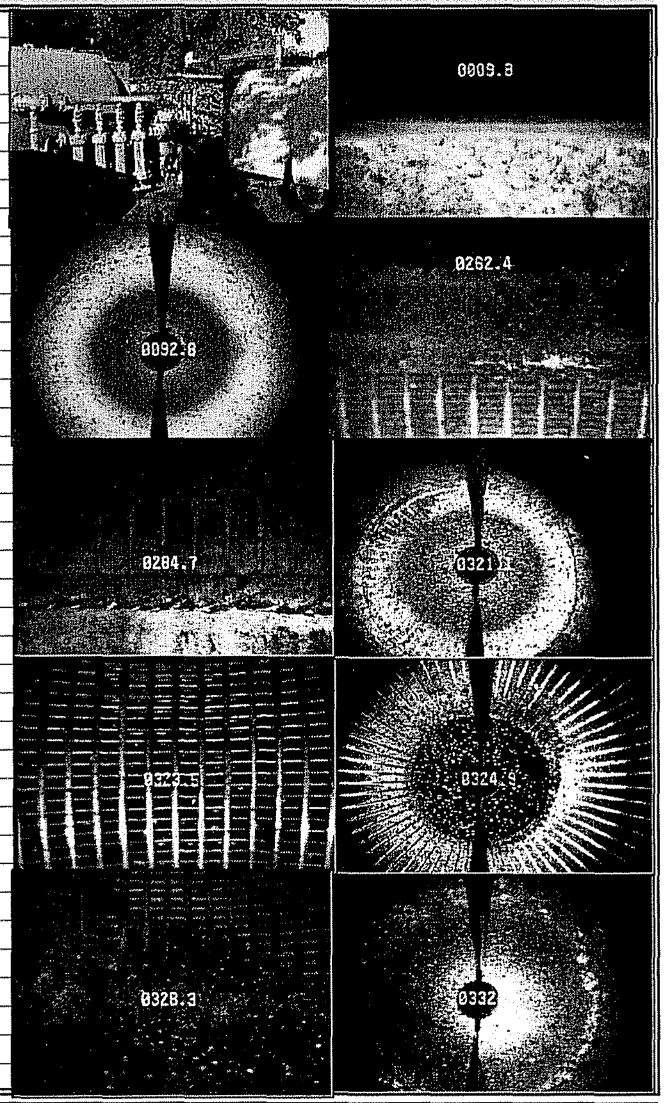

Notes: Well appeared to be in good condition. No casing problems were seen.

6080 sherry lee lane
salinas ca 93907
(831) 722-2388

Appendix E. Correspondence Regarding Water Quality Concerns.

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

FILE

EDMUND G. BROWN JR., Governor

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704 -9980

September 15, 1981

Mr. Edward Barnes
Senior Civil Engineer
County of San Mateo
Redwood City, CA 94063

Dear Ed:

EAST PALO ALTO COUNTY WATERWORKS DISTRICT

In reference to a water quality complaint registered by the Siri Brothers Nursery located at 940 O'Connor Street served by the subject system on August 19, 1981, I have enclosed some useful information in handling taste and odor complaints. Please report to this office corrective actions taken on this problem.

Yours Sincerely,

Catherine S. Ling, P.E.
Sanitary Engineer
Sanitary Engineering Section

CSL:gm

Enclosure

bcc: [illegible] McMillan
C. S. Ling

FILE NOTE July 22, 1981

E. PALO ALTO CWD WATER 41-024

The District's new well was inspected and approved on July 16, 1981. Ed Barnes indicated that they would put it in service next week.

The well is gravel-packed with adequate annular seal. All surface construction features were examined and are properly constructed. The air vent opens downward but was not covered. I told Ed Barnes to put #16 mesh screen on the vents. The sample bib is located downstream of the (after) the check valve and is inside a locked concrete structure. The well is equipped with 4 parallel sand separation units which then feed into a pressure tank (90-120 psi). Water enters distribution main also supplied by SFWD water. A check valve is installed on the well line to prevent backflow of SFWD water at high SFWD water pressure (100-150 psi).

Well water quality analysis results revealed high Fe and Mn. Since blending with SFWD water occurs in the distribution main, I have asked Ed to go ahead to put the well in line but closely monitor the Fe and Mn levels in the blended water. A 3-month demonstration study has been initiated to assess the performance and effectiveness of this blending process, necessary adjustments will be made based on the study results. All copies of quality analyses results will be forwarded to SES for review.

The District will also apply for Prop. 3 loan to put in a second well. The Prop. 3 loan financed Willow Road pipeline improvement project is now in the design stage. Some problem in sewer-main separation is anticipated. I have told Ed and George (City Engineer) to submit plans for comments.

Catherine S. Ling CSL July 20, 1981

CSL:gm

cc: R. E. McMillan
C. S. Ling

Stanford, CA
(Santa Clara C
Stanford Daily
(Cir. 5xW. 15,00

LING

OCT 14 1981

Allen's P. C. B Est. 1888

New well causes an odor in water

by Jonathan Greene

East Palo Alto's drinking water has often had a strong odor since a new well began operation in late July.

"The water is frequently so bad that I consider moving," said Joel Silberman, one of many Stanford students who live in the section of East Palo Alto west of the Bayshore Freeway.

According to Edward Barnes, senior civil engineer for the San Mateo County Department of Public Works, "Some elements in the well water combine with the chlorine in the San Francisco system water to produce an odor." He said he did not know what the substance was.

Until the installation of the new well at Bay and Gloria streets, the East Palo Alto Water District was supplied exclusively by San Francisco's Hetch-Hetchy aqueduct, as are Stanford, Palo Alto and other nearby communities. San Mateo County, which operates the district, decided to install the $200,000 well to replace some of the costly aqueduct water after San Francisco raised the rate to 43 cents per hundred cubic feet.

After tests demonstrated a violation of the state water standard for odor, Barnes was forced to "cut back use of the well to five hours a day, from 10 a.m. to 3 p.m. on weekdays only, when fewer residents are home." Complaints to his office have fallen off from "about seven or eight new ones per day to practically none."

Barnes said he wants to run the well as much as possible, both to detect any equipment problems before the well's warranty runs out and to save money for the district.

Meanwhile, Barnes suggested, residents who are dissatisfied with their water may install filters on their taps or use bottled water.

Barnes insisted the water is safe despite any odor. Art Burton, director of Sequoia Analytical Laboratory, which tests the water for the county, said "We've done all the state required tests, which are very extensive. The water meets all standards (except that) it has exceeded the state odor standard on occasion."

However, Burton admitted that "there are many possible contaminants not on the state list. Other tests to identify the source of the odor could be done and haven't been, such as a complete organic analysis. But they are very expensive — about $1000 a sample."

Catherine Ling, who is following the problem for the California Health Department, defended the state standards. "These criteria are used all over the country," she said. She said she was not aware of any additional tests that should be performed.

"It is not uncommon that this type of problem occurs," she said. "As far as we know, Barnes is doing the best he can to clear up the problem."

(Santa Clara Co.)
Peninsula Times Tribune
(Cir. D. 67,000)

LING

OCT 5 - 1981

Allen's P. C. B Est. 1888

County doesn't know why water smells bad

By Phyllis Brown
Times Tribune staff

EAST PALO ALTO — The water in part of East Palo Alto smells and tastes bad, and a San Mateo County Public Works official said the department has not yet determined why.

Ed Barnes, a representative of the public works department, said last week that he believes the odor is caused by the mixing of water from a new well, sunk at the corner of Bay Road and Gloria Way, and water bought from the San Francisco Water Department.

The well, constructed at a cost of at least $200,000, began operation here in August.

Barnes said the well was sunk to save the department money. Up until August, all water was purchased from the San Francisco Water Department. Now, about a quarter of the area's water is supplied by the new well.

The savings will be used to pay off a $460,000 loan from the Department of Water Resources. The money is being used to make repairs in the East Palo Alto water system.

"Water from the earth is free," Barnes said. "We would like to make enough money on the well to pay off the state loan," Barnes said.

Barnes said the use of well water has not resulted in a rate decrease for the area's customers.

East Palo Alto resident Mike Siri said it was in August that he first noticed the smell, which he describes as that of iodine.

"From day one, when they started the well I noticed it," said Siri, who has a flower farm at 940 O'Connor St.

"There is definitely some kind of iodine smell," Siri said last Thursday.

Siri said the strength of the taste and odor varies, sometimes within a day.

The flavor was at its worst, though, when the well first started up, he said.

"What bothers me is that, seven or eight weeks ago, you would come in and want a drink of water, and it would make a knot in your stomach," Siri said.

Siri said he has talked with Barnes about the problem, but has not been satisfied with his explanation of it.

Siri said Barnes suggested he buy bottled water. "You will just have to learn to live with it," he quoted Barnes as saying.

While Barnes said he is certain that the mixture of the two waters is what causes the unpleasant taste, he said he does not know what chemicals are producing it.

"On the last tests we took eight days ago, there was no odor to the two waters combined," Barnes said. "As far as we know, we have no problem with the well water. Under normal circumstances, you get complaints," he said.

Barnes said, however, that all of the tests on the water have not yet come back from the laboratory.

Siri said his concerns led him to call the California Department of Health.

Catherine Ling, a Health Department representative, visited his farm.

She agreed that the well water is reacting with the water purchased from San Francisco. She also agreed that it smells and tastes badly.

While Barnes asserted that the chlorination from the San Francisco Water Department water might be reacting with the well water, Ling said she has her doubts.

"It is not really the chlorination that gives you the odor. It is more of the mineral content in the well water that gives you the odor," she said.

Ling said the water does meet the Health Department's "aesthetic" standards.

And it is definitely not harmful to drink, she said.

But, whatever the cause of the odor, the citizens of East Palo Alto should be provided a better product for their money, she said.

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY
EDMUND G. BROWN JR., Governor

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704

(415) 540-2158

November 19, 1981

Mr. Ed Barnes
E. Palo Alto County Water District
County of San Mateo
590 Hamilton Street
Redwood City, CA 94303

Dear Ed:

Following are results of bacteriological analyses reported to us by the Division of Laboratories of this Department, on samples from E. Palo Alto County Water District. Date Collected 11-3-81 Collected By Catherine Ling.

Lab. No.		Source and Sample Point
1047	Volatile organics - None detected	Well site - Bay & Gloria (100% well water)
1048	Volatile organics - 72 µg/l ($CHCl_3$)	1593 Woodland (blended water SFWD & well)
1049	Fe - .06 mg/l *Mn - 0.15 mg/l	Well site - (100% well water)
1050	Fe - 0.04 mg/l Mn - <0.01 mg/l	1593 Woodland (Blended water)
1051	Odor - 1 unit	Well site (100% well water)
1052	Odor - 1.4 units	1593 Woodland (Blended water)

Analyses results with * indicate they did not meet California Secondary Drinking Water Standards during the time and on the day of sampling.

Sanitary Engineering Branch

By Catherine S. Ling, P.E.
Sanitary Engineer

cc: San Mateo County Health Department

High Fe and Mn contents in the water can be a possible cause of offensive taste and odor and therefore they should be monitored closely.

2. Odor Monitoring

Analysis reports dated on 8/21 and 9/21 indicated excessively high levels of odor in the water supplied by your system. This problem is also strongly supported by the increased frequency of taste and odor complaints registered by users of your system since the start of the well supply. Taste and odor are not generally hazardous to health, however, it is the water supplier's responsibility to provide pure, wholesome and pure water meeting both primary and secondary drinking water quality standards at all times. Users complaints are generally indicative of a quality problem which should be handled with due care and diligence in an effort to totally eliminate it. We are in full support of the several mitigative measures you have taken including system flushing, reduced well pumping, additional sampling and investigation of treatment alternatives. These efforts should be continued until a viable solution is sought. In order to more extensively assess the extent of this problem, we strongly recommend the following sampling plan to be performed daily continuously for a minimum of 7-day period:

Type of Analysis	Sampling Location	Time of Sampling
Odor	Well site (well water only)	Open
Odor	User's tap (SFWD water only)	Before well pumping
Odor	User's tap (blended water)	After well pumping

Additionally, taste and odor are general by-products of oxidative reactions of Fe, Mn, and other volatile organic compounds. During this 7-day period of odor monitoring, Fe, Mn and volatile organics contents of the well water should also be analyzed. Knowledge of the chemical quality of a water supply source is important in order to determine the type of treatment: aeration, activated carbon, or chlorination required to render the water acceptable for domestic use.

We strongly recommend that the above action plan be executed expeditiously and all findings and results of subsequent quality analyses be submitted to this Department for evaluation. Your cooperation will be greatly appreciated.

Sincerely yours,

Catherine S. Ling, P.E.
Sanitary Engineer
Sanitary Engineering Section

CSL:jhb
cc: San Mateo CHD
bcc: R. E. McMillan

FILE COPY

4

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

EDMUND G. BROWN JR., Governor

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704

(415) 540-2158

November 19, 1981

Mr. Steve Aldridge
798 Green Street
East Palo Alto, CA 94303

Dear Steve:

E. PALO ALTO COUNTY WATER DISTRICT

Knowing of your interest and concerns on the quality of water supply in your area, I have enclosed for your information a copy of results of the most recent analyses performed on water samples collected in the distribution system of East Palo Alto County Water District.

Please note that the only non-compliance of drinking water standards was on manganese (Mn) in the well water (maximum contaminant level is 0.05 mg/l) as shown on the report. The water delivered to the users, however, was found to adequately meet the required standards.

We believe, however, it is the oxidative reactions between manganese and/or iron in the well water, and chlorine in San Francisco Water Department's water, that produce the odor problem in the blended water. Additional water testing and investigation on various treatment alternatives are still ongoing. We have also advised the District to take necessary actions to insure that safe and good quality water is provided for the public.

Your cooperation in providing assistance to resolve the taste and odor problem in the water supply is very much appreciated. Please feel free to contact us again if we can be of further assistance.

Sincerely yours,

Catherine S. Ling, P.E.
Sanitary Engineer
Sanitary Engineering Branch

Encl.
bcc: R. E. McMillan
C. S. Ling
CSL:jhb

STATE OF CALIFORNIA—HEALTH AND WELFARE AG ICY
EDMUND G. BROWN JR., Governor

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704

(415) 540-2147

October 28, 1981

Mr. Ed Barnes
Senior Civil Engineer
County Government Center
590 Hamilton Street
Redwood City, CA 94063

Dear Ed:

Following are results of water quality analyses reported to us by the Division of Laboratories of this Department, on samples from E. Palo Alto CWD. Date Collected 8-20-81 Collected By Catherine S. Ling.

Lab. No.	Analysis Result	Source and Sample Point
0568	Odor - 3 units	Siri Brothers Nursery
0569	Odor - 1 unit	Gloria/Bay Well Site
0570	Fe <.05 mg/l Mn <.03 mg/l TDS - 225 mg/l *Spec. Cond. - 3370 μmhos/cm	Siri Brothers Nursery
0571	Fe <.05 mg/l *Mn <.07 mg/l TDS - 584 mg/l Spec. Cond. - 970 μmhos/cm	Gloria/Bay Well Site

Analysis results with * indicated that the water did not meet the California Secondary Drinking Water Standards at the time and on the day of sampling.

Additionally, reports of Fe, Mn and general physical analyses performed by your District from July 28 through October 20 have been reviewed by this Department. We have the following recommendations:

1. Iron and Manganese Monitoring of Well Water

   The three-month period Fe/Mn monitoring program established on July 15, 1981 should be continued. Reports submitted to this Department indicate that you have stopped sampling after the first month (August). Both well source and the blended water should be sampled to determine compliance with standards.

FILE NOTE October 23, 1981

E. PALO ALTO CWD WATER 41-024

I called Ed Barnes on 10/23/81 regarding the taste and odor problem associated with the District's new well. He said that recent lab analyses of the well water had been meeting standards. He also reported that chlorination, one of the treatment methods under investigation, did not eliminate the taste and odor. Activated carbon adsorption is now being evaluated as an alternate treatment.

He also indicated additional sampling had been performed on the well, however, the lab results had not been sent to him yet.

I again asked him to send lab reports to SES as soon as possible since up to present time, we have not received any follow-up reports relating to this problem. The monthly Fe and Mn sampling plan, set up in July to monitor the levels of Fe and Mn in the well water, has been carried out according to Ed. I told him to submit these reports to SES immediately.

C. S. Ling
CSL:jhb
cc: R. E. McMillan
C. S. Ling

415/697-4424 P.O. BOX 367

5

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION

SAN FRANCISCO WATER DEPARTMENT
WATER QUALITY DIVISION

MILLBRAE, CALIF. 94030

RECEIVED
SANITARY ENGINEERING
BERKELEY
SEP 30 1981

SUBJECT:-

September 28, 1981

Mrs. Kathy Ling ——> Rec'd 10/11/81 CSL
State Dept. of Health Services
2151 Berkeley Way
Berkeley, CA 94704

Dear Mrs. Ling,

On August 18 this Department received a complaint of bad tasting water from Siri Bros. Nursery, 940 O'Connor Street, East Palo Alto. They stated they had been experiencing this since Tuesday, August 11, 1981 and it had a medicinal taste. A Water Department Inspector investigated this complaint and I believe met with you at the nursery. The background of the operation of our system is as follows:

On Tuesday, August 11, 1981 our System increased Hetch Hetchy flow from 230 MGD to 300 MGD and reduced Sunol Filter Plant from 100+ MGD to 10-15 MGD. At about the same time San Mateo County Public Works placed on line in East Palo Alto an unchlorinated well. The well supply is providing approximately 25% of the water to the East Palo Alto service area and is mixing with our Hetch Hetchy supply. The well is operating between the hours of approximately 8:00 am-4 pm.

Approximately one week after the well was placed in service this Division received a call of bad tasting water from the Siri Nursery - Tuesday, August 18.

On Wednesday afternoon August 19 a sample was drawn from the nursery. At that time there was a strong medicinal taste and odor, chlorine residual was 0.30-0.40 mg/l and temperature was approximately 65°F. Analysis attached which indicates a definite influence of well water.

A discussion was held with Ed Barnes of San Mateo County Engineering Department but no decision was made at that time. He stated this was the only complaint, although the people at the nursery stated four or five area residents were complaining. San Francisco Water Department meter was checked and water was sampled at this point, from the SFWD transmission main; there was no taste or odor, chlorine residual was 1.1 mg/l, temperature 57°F.

On Friday, August 21, 1981 approximately 10:15 am the water was resampled at the nursery. No taste or odor was present; chlorine was 0.25 mg/l; temperature 59°F. Analysis indicated 100% Hetch Hetchy water. Sample taken at the well supply indicated the temperature was 71°F and had no taste or odor. Sample taken at Hetch Hetchy service indicated no taste or odor; chlorine residual 1.00 mg/l; temperature 56°F. Analysis checked at all locations.

From the above all indications are that the medicinal taste must be occurring from the mixing of the chlorinated Hetch Hetchy water with unchlorinated well water. In view of this there is nothing the San Francisco Water Department can do about the situation.

The analysis of the water samples collected is attached.

Very truly yours,

Harry W. Tracy
Manager

HWT:pd
Enc.
cc: Siri Bros. Nursery
Ed Barnes

SAN FRANCISCO WATER DEPARTMENT

WATER QUALITY DIVISION
P.O. BOX 367
MILLBRAE, CA 94030

Date report made by phone ____________

by letter ____________

Siri Bro's Nursery
940 O'Connor
East Palo Alto, Ca. 94303

The following analytical report is on water samples recently received from you.

Sampling Point	Siri Nursery	Well	H. H Meter	
Date Sampled	8/21/81	8/21/81	8/21/81	
pH	9.5	8.1	9.5	
Alkalinity (mg/l)	16	228	16	
Chloride (mg/l)	3	146	3	
Hardness (mg/l)	18	120	18	
Turbidity (NTU)	0.25	0.75	0.45	
Conductivity (µmhos)	50	958	49	
Copper (mg/l)				
Iron (mg/l)				
Fluoride (mg/l)				
Chlorine (mg/l)				
MPN	<2.2	<2.2	<2.2	
Membrane Filter				
odor (T.O.N.)	1	1	1	

1 T.O.N = No odor observed

____
Manager of Water Quality

SAN FRANCISCO WATER DEPARTMENT

WATER QUALITY DIVISION
P.O. BOX 367
MILLBRAE, CA 94030

Date report made by phone ______________

by letter ______________

Siri Nursery
940 O'Connor Street
E. Palo Alto, Ca. 94303

The following analytical report is on water samples recently received from you.

Sampling Point	Siri Nursery			
Date Sampled	8/19/81			
pH	8.6			
Alkalinity (mg/1)	110			
Chloride (mg/1)	65			
Hardness (mg/1)	66			
Turbidity (NTU)	1.0			
Conductivity (µmhos)	408			
Copper (mg/1)				
Iron (mg/1)				
Fluoride (mg/1)				
Chlorine (mg/1)				
MPN				
Membrane Filter				
Odor Threshold odor no. @24°C	2			

____
Manager of Water Quality

FILE NOTE

October 2, 1981

E. PALO ALTO CWD

WATER 41-024

Ed Barnes called on 9/17/81 regarding the taste and odor problem caused by blending the District's new well water with SFWD's. He indicated that reduced pumping of the well had only slightly reduced the number of user's complaints. I told him to investigate treatment alternatives for this problem. He said that he would run some chlorination tests on the blended water.

During the interim period, i.e., before any corrective method has been identified, they will run the well on a minimum basis - 4 hrs. on weekdays during industrial peak demand period. Ed indicated that they would voluntarily shut down the well if the problem becomes "unbearable", but they'd prefer to keep it operating as much as possible in order to trouble-shoot any existing operational/mechanical problems with the well before its one-year warranty expires.

Catherine S. Ling CSL

September 30, 1981

CSL:gm

cc: C. S. Ling

FILE NOTE October 2, 1981

E. PALO ALTO CWD WATER 41-024

Ed Barnes called on 10/1/81 to report progress made in the taste and odor problem generated by blending the district's new well water with SFWD water. Last week's sample was tested to be 3 odor units (blended water; 1 unit for SFWD H_2O, 2 units for well water), as compared to the previously reported 32 units. He indicated that the reduced pumping of the well has lessened the T and 0 problem, lesser complaints were received last week. I asked him about the results of the Cl_2 tests on the water samples, he said he had not received the lab reports yet.

It was also learned that they have been taking the routine weekly general physical samples throughout the distribution system. I advised him to sample the problem area more frequently (recommended daily) to assess the degree of odor problem, with understanding that SFWD changes their supply sources from time to time, the end product of blended water also varies in quality. The one set of samples collected last week is not representative of the total dynamic system. I told him to continue monitoring the water daily and run chlorination tests on them accordingly. He concurred that he'd start doing it every other day.

Phillis Brown, reporter of the Palo Alto News, called to inquire about this problem. I told her that corrective measures are being investigated and that results of subsequent water analyses have indicated compliance with drinking 1^{o} and 2^{o} standards, and that the water district has taken positive actions to eliminate the problem, users should be patient and work with water district cooperatively to resolve any differences.

Catherine S. Ling CSL October 1, 1981

CSL:gm

cc: R. E. McMillan
C. S. Ling

FILE

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

EDMUND G. BROWN JR., Governor

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704 -9980

September 15, 1981

Mr. Edward Barnes
Senior Civil Engineer
County of San Mateo
Redwood City, CA 94063

Dear Ed:

EAST PALO ALTO COUNTY WATERWORKS DISTRICT

In reference to a water quality complaint registered by the Siri Brothers Nursery located at 940 O'Connor Street served by the subject system on August 19, 1981, I have enclosed some useful information in handling taste and odor complaints. Please report to this office corrective actions taken on this problem.

Yours Sincerely,

Catherine S. Ling, P.E.
Sanitary Engineer
Sanitary Engineering Section

CSL:gm

Enclosure

bcc: [illegible] McMillan
C. S. Ling

FILE NOTE July 22, 1981

E. PALO ALTO CWD WATER 41-024

The District's new well was inspected and approved on July 16, 1981. Ed Barnes indicated that they would put it in service next week.

The well is gravel-packed with adequate annular seal. All surface construction features were examined and are properly constructed. The air vent opens downward but was not covered. I told Ed Barnes to put #16 mesh screen on the vents. The sample bib is located downstream of the (after) the check valve and is inside a locked concrete structure. The well is equipped with 4 parallel sand separation units which then feed into a pressure tank (90-120 psi). Water enters distribution main also supplied by SFWD water. A check valve is installed on the well line to prevent backflow of SFWD water at high SFWD water pressure (100-150 psi).

Well water quality analysis results revealed high Fe and Mn. Since blending with SFWD water occurs in the distribution main, I have asked Ed to go ahead to put the well in line but closely monitor the Fe and Mn levels in the blended water. A 3-month demonstration study has been initiated to assess the performance and effectiveness of this blending process, necessary adjustments will be made based on the study results. All copies of quality analyses results will be forwarded to SES for review.

The District will also apply for Prop. 3 loan to put in a second well. The Prop. 3 loan financed Willow Road pipeline improvement project is now in the design stage. Some problem in sewer-main separation is anticipated. I have told Ed and George (City Engineer) to submit plans for comments.

Catherine S. Ling CSL July 20, 1981

CSL:gm

cc: R. E. McMillan
C. S. Ling

STATE OF CALIFORNIA - HEALTH AND HUMAN SERVICES AGENCY GRAY DAVIS, *Governor*

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CA 94704-1011

July 22, 1999

Mr. Neil R. Cullen
Director of Public Works
County of San Mateo
10 Twin Dolphin Dr., Suite C-200
Redwood City, CA 94065-1065

East Palo Alto County Waterworks District -- System No. 4110024
Domestic Water Supply Permit Application

Dear Mr. Cullen:

The permit amendment application submitted by East Palo Alto County Waterworks District, dated July 1, 1999, to remove a well from the domestic water supply is considered complete and hereby accepted for filing. A domestic water supply permit amendment will be issued by the Department of Health Services within 90 days of this letter.

Thank you for your assistance and cooperation in this matter. Should you have any questions, please contact Ms. Mona Lee at (510) 540-2153.

Sincerely,

Clifford L. Bowen, P.E.
District Engineer
San Francisco District
Drinking Water Field Operations Branch

cc: San Mateo County Environmental Health Department

bcc: Permit file, Chron. file, M. Lee

CLB:MCL
4110024/990721.ltr

ſE OF CALIFORNIA - HEALTH AND HUMAN SERVICES AGENCY GRAY DAVIS, *Governor*

PARTMENT OF HEALTH SERVICES
BERKELEY WAY
KELEY, CA 94704-1011

July 27, 1999

Mr. Neil R. Cullen
Director of Public Works
County of San Mateo
10 Twin Dolphin Drive, Suite C-200
Redwood City, CA 94065-1065

East Palo Alto County Waterworks District – System No. 4110024
Permit Amendment

Dear Mr. Cullen:

The Department of Health Services (Department) has considered the application by East Palo Alto County Waterworks District for a domestic water supply permit amendment. The application, dated July 1, 1999, was made in accordance with Sections 116525 and 116550 of the *California Health and Safety Code*, and filed by the Department on July 22, 1999.

It is the Finding of the State Department of Health Services that Sections 116275 through 116750, inclusive, of the *California Health and Safety Code* can be met by East Palo Alto County Waterworks District. This finding is based on the enclosed Engineering Report, dated July 1999, prepared by the Drinking Water Field Operations Branch. The domestic water supply permit granted to East Palo Alto County Waterworks District on March 28, 1979 is hereby amended to operate the existing water system with the well source disconnected from the domestic water supply subject to the following provisions:

1. East Palo Alto County Waterworks District shall serve water only from approved sources of supply. Currently, the only approved source of supply is the water purchased from the San Francisco Water Department, an agency of the San Francisco Public Utilities Commission. East Palo Alto County Waterworks District shall submit for the Department's review and approval a permit application prior to the construction, connection, or use of any new water source.

2. East Palo Alto County Waterworks District shall submit a permit application when a change in ownership occurs.

Appendix F

Analytical Laboratory Reports for May 2012 Gloria Way Well Sample

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
Satellite Laboratory: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309

ELAP Certificate Numbers 1551 and 2728

08 June 2012

Todd Engineers
Attn: Dr. Bill Motzer
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
RE: East Palo Alto Gloria Way Well
Work Order: 12E0923

Enclosed are the results of analyses for samples received by the laboratory on 05/22/12 20:35. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jeanette L. Poplin For David S. Pingatore
Project Manager

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Gloria Way Well	12E0923-01	Water	05/22/12 14:00	05/22/12 20:35
Trip Blank	12E0923-02	Water	05/22/12 00:00	05/22/12 20:35

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Bruce Gove
Laboratory Director

6/8/2012

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Alpha Analytical Laboratories, Inc.

	METHOD	BATCH	PREPARED	ANALYZED	DILUTION	RESULT	PQL	NOTE
Gloria Way Well (12E0923-01)			**Sample Type: Water**			**Sampled: 05/22/12 14:00**		
Metals (Drinking Water) by EPA 200 Series Methods								
Calcium	EPA 200.7	AE21822	05/23/12 14:04	05/24/12 18:07	1	**59 mg/l**	**1.0**	
Magnesium	"	"	"	"	"	**25 "**	**1.0**	
Mercury	EPA 245.1	AE22522	05/29/12 09:05	05/29/12 12:23	"	ND "	0.0010	
Potassium	EPA 200.7	AE21822	05/23/12 14:04	05/24/12 18:07	"	**1.1 "**	**1.0**	
Sodium	"	"	"	"	"	**240 "**	**1.0**	
Metals by EPA Method 200.8 ICP/MS								
Aluminum	EPA 200.8	AE21825	05/23/12 14:43	05/25/12 17:00	1	ND ug/l	50	
Antimony	"	"	"	"	"	ND "	6.0	
Arsenic	"	"	"	"	"	**2.8 "**	**2.0**	
Barium	"	"	"	"	"	**380 "**	**100**	
Beryllium	"	"	"	"	"	ND "	1.0	
Cadmium	"	"	"	"	"	ND "	1.0	
Chromium	"	"	"	"	"	ND "	10	
Copper	"	"	"	"	"	ND "	50	
Iron	"	"	"	"	"	**130 "**	**100**	
Lead	"	"	"	"	"	ND "	5.0	
Manganese	"	"	"	"	"	**160 "**	**20**	
Nickel	"	"	"	"	"	ND "	10	
Selenium	"	"	"	"	"	**7.5 "**	**5.0**	
Silver	"	"	"	"	"	ND "	10	
Thallium	"	"	"	"	"	ND "	1.0	
Zinc	"	"	"	"	"	ND "	50	

Bruce Gove
Laboratory Director

6/8/2012

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e-mail: clientservices@alpha-labs.com
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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Alpha Analytical Laboratories, Inc.

	METHOD	BATCH	PREPARED	ANALYZED	DILUTION	RESULT	PQL	NOTE
Gloria Way Well (12E0923-01)		**Sample Type: Water**			**Sampled: 05/22/12 14:00**			
Conventional Chemistry Parameters by APHA/EPA Methods								
Total Alkalinity as CaCO3	SM2320B	AE22327	05/23/12 13:00	05/23/12 17:00	1	**200 mg/l**	**5.0**	
Aggressive Index	AWWA	AE21822	05/23/12 14:04	06/05/12 07:03	"	**12.36 NU**	**2.00**	
Bicarbonate	SM2320B	AE22327	05/23/12 13:00	05/23/12 17:00	"	**250 mg/l**	**5.0**	
Carbonate	"	"	"	"	"	ND "	5.0	
Color	SM2120B	AE22339	05/22/12 19:30	05/22/12 19:30	"	ND Color Units	5.0	
Hardness, Total	SM2340B	AE21822	05/23/12 14:04	05/24/12 18:07	"	**251 mg/l**	**5**	
Hydroxide	SM2320B	AE22327	05/23/12 13:00	05/23/12 17:00	"	ND "	1.0	
Methylene Blue Active Substances	SM5540C	AE22419	05/24/12 09:14	06/06/12 12:36	"	ND "	0.050	
Nitrate + Nitrite as N	EPA 300.0	AE22432	05/24/12 10:06	05/30/12 15:01	"	ND "	0.40	
Odor	EPA 140.1	AE22339	05/22/12 19:30	05/22/12 19:30	"	ND T.O.N.	1.0	
Perchlorate	EPA 314.0	AE22956	05/29/12 15:03	05/29/12 19:18	"	ND ug/l	4.0	
pH	SM4500-H+ B	AE22327	05/23/12 13:00	05/23/12 17:00	"	**7.98 pH Units**	**1.68**	T-14
Specific Conductance (EC)	SM2510B	"	"	"	"	**1500 umhos/cm**	**20**	
Total Dissolved Solids	SM2540C	AE22927	05/29/12 09:00	05/31/12 13:00	"	**820 mg/l**	**10**	
Turbidity	SM2310B	AE22338	05/22/12 20:00	05/22/12 20:00	"	**0.44 NTU**	**0.10**	
Miscellaneous Physical/Conventional Chemistry Parameters								
Cyanide (total)	10-204-00-1X	AE23017	05/30/12 07:01	05/30/12 12:08	1	ND mg/l	0.10	
Anions by EPA Method 300.0								
Nitrate as NO3	EPA 300.0	AE22318	05/23/12 07:56	05/23/12 13:30	1	ND mg/l	2.0	
Chloride	"	"	"	"	25	**350 "**	**12**	
Fluoride	"	"	"	05/23/12 13:45	1	**0.14 "**	**0.10**	
Nitrite as N	"	"	"	"	"	ND "	0.40	
Sulfate as SO4	"	"	"	"	"	**33 "**	**0.50**	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Bruce Gove
Laboratory Director

6/8/2012

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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Alpha Analytical Laboratories, Inc.

	METHOD	BATCH	PREPARED	ANALYZED	DILUTION	RESULT	PQL	NOTE
Gloria Way Well (12E0923-01)		**Sample Type: Water**			**Sampled: 05/22/12 14:00**			
Volatile Organic Compounds by EPA Method 524.2								
Benzene	EPA 524.2	AE23036	05/30/12 08:00	05/30/12 15:49	1	ND ug/l	0.50	
Carbon tetrachloride	"	"	"	"	"	ND "	0.50	
Chlorobenzene	"	"	"	"	"	ND "	0.50	
1,2-Dichlorobenzene	"	"	"	"	"	ND "	0.50	
1,4-Dichlorobenzene	"	"	"	"	"	ND "	0.50	
1,1-Dichloroethane	"	"	"	"	"	ND "	0.50	
1,2-Dichloroethane	"	"	"	"	"	ND "	0.50	
1,1-Dichloroethene	"	"	"	"	"	ND "	0.50	
cis-1,2-Dichloroethene	"	"	"	"	"	ND "	0.50	
trans-1,2-Dichloroethene	"	"	"	"	"	ND "	0.50	
1,2-Dichloropropane	"	"	"	"	"	ND "	0.50	
1,3-Dichloropropene (total)	"	"	"	"	"	ND "	0.50	
Ethylbenzene	"	"	"	"	"	ND "	0.50	
Methyl tert-butyl ether	"	"	"	"	"	ND "	3.0	
Methylene chloride	"	"	"	"	"	ND "	0.50	
Styrene	"	"	"	"	"	ND "	0.50	
1,1,2,2-Tetrachloroethane	"	"	"	"	"	ND "	0.50	
Tetrachloroethene	"	"	"	"	"	ND "	0.50	
Toluene	"	"	"	"	"	ND "	0.50	
1,2,4-Trichlorobenzene	"	"	"	"	"	ND "	0.50	
1,1,1-Trichloroethane	"	"	"	"	"	ND "	0.50	
1,1,2-Trichloroethane	"	"	"	"	"	ND "	0.50	
Trichloroethene	"	"	"	"	"	ND "	0.50	
Trichlorofluoromethane	"	"	"	"	"	ND "	5.0	
Trichlorotrifluoroethane	"	"	"	"	"	ND "	10	

Bruce Gove
Laboratory Director

6/8/2012

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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Alpha Analytical Laboratories, Inc.

	METHOD	BATCH	PREPARED	ANALYZED	DILUTION	RESULT		PQL	NOTE
Gloria Way Well (12E0923-01)			**Sample Type: Water**		**Sampled: 05/22/12 14:00**				
Volatile Organic Compounds by EPA Method 524.2 (cont'd)									
Vinyl chloride	EPA 524.2	"	"	05/30/12 15:49	"	ND "		0.50	
Xylenes (total)	"	"	"	"	"	ND "		0.50	
Surrogate: Bromofluorobenzene	"	"	"	"		*75.7 %*	*70-130*		
Surrogate: Dibromofluoromethane	"	"	"	"		*90.4 %*	*70-130*		
Surrogate: Toluene-d8	"	"	"	"		*88.8 %*	*70-130*		
Chlorinated Pesticides and PCBs by EPA Method 508									
Endrin	EPA 508	AE22925	05/29/12 06:51	05/30/12 04:12	1	ND ug/l		0.10	
HCH-gamma (Lindane)	"	"	"	"	"	ND "		0.20	
Heptachlor	"	"	"	"	"	ND "		0.010	
Heptachlor epoxide	"	"	"	"	"	ND "		0.010	
Hexachlorobenzene	"	"	"	"	"	ND "		0.50	
Hexachlorocyclopentadiene	"	"	"	"	"	ND "		1.0	
Methoxychlor	"	"	"	"	"	ND "		10	
PCB-1016	"	"	"	"	"	ND "		0.50	
PCB-1221	"	"	"	"	"	ND "		0.50	
PCB-1232	"	"	"	"	"	ND "		0.50	
PCB-1242	"	"	"	"	"	ND "		0.50	
PCB-1248	"	"	"	"	"	ND "		0.50	
PCB-1254	"	"	"	"	"	ND "		0.50	
PCB-1260	"	"	"	"	"	ND "		0.50	
Total PCBs	"	"	"	"	"	ND "		0.50	
Toxaphene	"	"	"	"	"	ND "		1.0	
Chlordane (tech)	"	"	"	"	"	ND "		0.10	
Surrogate: Dibutylchlorendate	"	"	"	"		*87.2 %*	*63-123*		

Bruce Gove
Laboratory Director

6/8/2012

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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Alpha Analytical Laboratories, Inc.

	METHOD	BATCH	PREPARED	ANALYZED	DILUTION	RESULT		PQL	NOTE
Gloria Way Well (12E0923-01)			**Sample Type: Water**			**Sampled: 05/22/12 14:00**			
Chlorinated Acids by EPA Method 515.1									
Bentazon	EPA 515.1	AF20115	06/01/12 08:56	06/08/12 01:52	1	ND ug/l		2.0	
2,4-D	"	"	"	"	"	ND "		10	
Dalapon	"	"	"	"	"	ND "		10	
Dinoseb	"	"	"	"	"	ND "		2.0	
Pentachlorophenol	"	"	"	"	"	ND "		0.20	
Picloram	"	"	"	"	"	ND "		1.0	
2,4,5-TP (Silvex)	"	"	"	"	"	ND "		1.0	
Surrogate: DCAA	"	"	"	"		*103 %*	*70-130*		
Carbamates by EPA Method 531.1									
Carbofuran	EPA 531.1	AE22931	05/29/12 08:43	05/30/12 04:19	1	ND ug/l		5.0	
Oxamyl	"	"	"	"	"	ND "		20	
Endothall by EPA Method 548.1									
Endothall	EPA 548.1	AE22446	05/24/12 14:16	05/25/12 18:44	1	ND ug/l		45	
Glyphosate by EPA Method 547									
Glyphosate	EPA 547	AE22426	05/24/12 09:42	05/24/12 23:40	1	ND ug/l		25	
Diquat by EPA Method 549.2									
Diquat	EPA 549.2	AE22515	05/25/12 09:16	05/30/12 23:45	1	ND ug/l		4.0	
Trip Blank (12E0923-02)			**Sample Type: Water**			**Sampled: 05/22/12 00:00**			
Volatile Organic Compounds by EPA Method 524.2									
Benzene	EPA 524.2	AE23036	05/30/12 08:00	05/30/12 14:07	1	ND ug/l		0.50	
Carbon tetrachloride	"	"	"	"	"	ND "		0.50	
Chlorobenzene	"	"	"	"	"	ND "		0.50	

Bruce Gove
Laboratory Director

6/8/2012

Alpha Analytical Laboratories Inc.
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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Alpha Analytical Laboratories, Inc.

	METHOD	BATCH	PREPARED	ANALYZED	DILUTION	RESULT		PQL	NOTE
Trip Blank (12E0923-02)			**Sample Type: Water**		**Sampled: 05/22/12 00:00**				
Volatile Organic Compounds by EPA Method 524.2 (cont'd)									
1,2-Dichlorobenzene	EPA 524.2	"	"	05/30/12 14:07	"	ND "		0.50	
1,4-Dichlorobenzene	"	"	"	"	"	ND "		0.50	
1,1-Dichloroethane	"	"	"	"	"	ND "		0.50	
1,2-Dichloroethane	"	"	"	"	"	ND "		0.50	
1,1-Dichloroethene	"	"	"	"	"	ND "		0.50	
cis-1,2-Dichloroethene	"	"	"	"	"	ND "		0.50	
trans-1,2-Dichloroethene	"	"	"	"	"	ND "		0.50	
1,2-Dichloropropane	"	"	"	"	"	ND "		0.50	
1,3-Dichloropropene (total)	"	"	"	"	"	ND "		0.50	
Ethylbenzene	"	"	"	"	"	ND "		0.50	
Methyl tert-butyl ether	"	"	"	"	"	ND "		3.0	
Methylene chloride	"	"	"	"	"	ND "		0.50	
Styrene	"	"	"	"	"	ND "		0.50	
1,1,2,2-Tetrachloroethane	"	"	"	"	"	ND "		0.50	
Tetrachloroethene	"	"	"	"	"	ND "		0.50	
Toluene	"	"	"	"	"	ND "		0.50	
1,2,4-Trichlorobenzene	"	"	"	"	"	ND "		0.50	
1,1,1-Trichloroethane	"	"	"	"	"	ND "		0.50	
1,1,2-Trichloroethane	"	"	"	"	"	ND "		0.50	
Trichloroethene	"	"	"	"	"	ND "		0.50	
Trichlorofluoromethane	"	"	"	"	"	ND "		5.0	
Trichlorotrifluoroethane	"	"	"	"	"	ND "		10	
Vinyl chloride	"	"	"	"	"	ND "		0.50	
Xylenes (total)	"	"	"	"	"	ND "		0.50	
Surrogate: Bromofluorobenzene	"	"	"	"		*82.6 %*	*70-130*		
Surrogate: Dibromofluoromethane	"	"	"	"		*88.1 %*	*70-130*		

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Alpha Analytical Laboratories, Inc.

	METHOD	BATCH	PREPARED	ANALYZED	DILUTION	RESULT		PQL	NOTE
Trip Blank (12E0923-02)			**Sample Type: Water**			**Sampled: 05/22/12 00:00**			
Volatile Organic Compounds by EPA Method 524.2 (cont'd)									
Surrogate: Toluene-d8	*EPA 524.2*	*"*	*"*	*05/30/12 14:07*		*94.0 %*	*70-130*		

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Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE21822 - Metals Digest										
Blank (AE21822-BLK1)				Prepared: 05/18/12 Analyzed: 05/21/12						
Calcium	ND	1.0	mg/l							
Magnesium	ND	1.0	"							
Potassium	ND	1.0	"							
Sodium	ND	1.0	"							
LCS (AE21822-BS1)				Prepared: 05/18/12 Analyzed: 05/21/12						
Calcium	7.86	1.0	mg/l	8.00		98.3	85-115			
Magnesium	8.03	1.0	"	8.00		100	85-115			
Potassium	7.29	1.0	"	8.00		91.1	85-115			
Sodium	7.53	1.0	"	8.00		94.2	85-115			
Duplicate (AE21822-DUP1)	**Source: 12E0821-03**			Prepared: 05/18/12 Analyzed: 05/21/12						
Calcium	45.4	1.0	mg/l		44.4			2.29	20	
Magnesium	4.96	1.0	"		4.89			1.44	20	
Potassium	18.6	1.0	"		18.2			2.27	20	
Sodium	126	1.0	"		123			2.27	20	
Matrix Spike (AE21822-MS1)	**Source: 12E0821-03**			Prepared: 05/18/12 Analyzed: 05/21/12						
Calcium	54.5	1.0	mg/l	8.00	44.4	127	70-130			
Magnesium	12.9	1.0	"	8.00	4.89	100	70-130			
Potassium	27.2	1.0	"	8.00	18.2	112	70-130			
Sodium	135	1.0	"	8.00	123	152	70-130			QM-4X
Matrix Spike (AE21822-MS2)	**Source: 12E0884-02**			Prepared: 05/22/12 Analyzed: 05/23/12						
Potassium	10.9	1.0	mg/l	8.00	2.84	101	70-130			
Matrix Spike Dup (AE21822-MSD1)	**Source: 12E0821-03**			Prepared: 05/18/12 Analyzed: 05/21/12						

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Metals (Drinking Water) by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE21822 - Metals Digest										
Matrix Spike Dup (AE21822-MSD1)	**Source: 12E0821-03**			Prepared: 05/18/12 Analyzed: 05/21/12						
Calcium	54.4	1.0	mg/l	8.00	44.4	126	70-130	0.170	20	
Magnesium	13.0	1.0	"	8.00	4.89	102	70-130	0.808	20	
Potassium	27.0	1.0	"	8.00	18.2	109	70-130	0.777	20	
Sodium	135	1.0	"	8.00	123	150	70-130	0.110	20	QM-4X
Batch AE22522 - EPA 245.1 Hg Water										
Blank (AE22522-BLK1)				Prepared & Analyzed: 05/29/12						
Mercury	ND	0.0010	mg/l							
LCS (AE22522-BS1)				Prepared & Analyzed: 05/29/12						
Mercury	0.00258	0.0010	mg/l	0.00250		103	80-120			
Duplicate (AE22522-DUP1)	**Source: 12E0923-01**			Prepared & Analyzed: 05/29/12						
Mercury	ND	0.0010	mg/l		ND				20	
Matrix Spike (AE22522-MS1)	**Source: 12E0923-01**			Prepared & Analyzed: 05/29/12						
Mercury	0.00207	0.0010	mg/l	0.00250	ND	82.8	60-140			
Matrix Spike Dup (AE22522-MSD1)	**Source: 12E0923-01**			Prepared & Analyzed: 05/29/12						
Mercury	0.00224	0.0010	mg/l	0.00250	ND	89.6	60-140	7.89	20	

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Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE21825 - EPA 200.8										
Blank (AE21825-BLK1)				Prepared: 05/18/12 Analyzed: 05/23/12						
Aluminum	ND	50	ug/l							
Antimony	ND	6.0	"							
Arsenic	ND	2.0	"							
Barium	ND	100	"							
Beryllium	ND	1.0	"							
Cadmium	ND	1.0	"							
Chromium	ND	10	"							
Copper	ND	50	"							
Iron	ND	100	"							
Lead	ND	5.0	"							
Manganese	ND	20	"							
Nickel	ND	10	"							
Selenium	ND	5.0	"							
Silver	ND	10	"							
Thallium	ND	1.0	"							
Zinc	ND	50	"							
LCS (AE21825-BS1)				Prepared: 05/18/12 Analyzed: 05/23/12						
Aluminum	459	50	ug/l	520		88.3	85-115			
Antimony	19.6	6.0	"	20.0		98.0	85-115			
Arsenic	19.8	2.0	"	20.0		99.1	85-115			
Barium	19.1	100	"	20.0		95.3	85-115			
Beryllium	19.2	1.0	"	20.0		95.9	85-115			
Cadmium	19.9	1.0	"	20.0		99.4	85-115			
Chromium	19.5	10	"	20.0		97.7	85-115			
Copper	19.8	50	"	20.0		99.0	85-115			
Iron	503	100	"	520		96.8	85-115			

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Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE21825 - EPA 200.8										
LCS (AE21825-BS1)				Prepared: 05/18/12 Analyzed: 05/23/12						
Lead	19.4	5.0	"	20.0		97.0	85-115			
Manganese	19.3	20	"	20.0		96.3	85-115			
Nickel	19.6	10	"	20.0		98.2	85-115			
Selenium	20.5	5.0	"	20.0		103	85-115			
Silver	19.5	10	"	20.0		97.5	85-115			
Thallium	19.5	1.0	"	20.0		97.6	85-115			
Zinc	101	50	"	100		101	85-115			
Duplicate (AE21825-DUP1)	**Source: 12E0818-04**			Prepared: 05/18/12 Analyzed: 05/23/12						
Aluminum	49.7	50	ug/l		ND				20	
Antimony	0.159	6.0	"		ND				20	
Arsenic	2.46	2.0	"		2.58			4.85	20	
Barium	69.4	100	"		ND				20	
Beryllium	ND	1.0	"		ND				20	
Cadmium	0.0296	1.0	"		ND				20	
Chromium	1.75	10	"		ND				20	
Copper	3.80	50	"		ND				20	
Iron	66.7	100	"		ND				20	
Lead	0.215	5.0	"		ND				20	
Manganese	5.42	20	"		ND				20	
Nickel	0.275	10	"		ND				20	
Selenium	0.101	5.0	"		ND				20	
Silver	0.0338	10	"		ND				20	
Thallium	ND	1.0	"		ND				20	
Zinc	18.8	50	"		ND				20	
Matrix Spike (AE21825-MS1)	**Source: 12E0818-04**			Prepared: 05/18/12 Analyzed: 05/23/12						

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Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE21825 - EPA 200.8										
Matrix Spike (AE21825-MS1)	**Source: 12E0818-04**			Prepared: 05/18/12 Analyzed: 05/23/12						
Aluminum	489	50	ug/l	520	ND	84.8	70-130			
Antimony	21.1	6.0	"	20.0	ND	105	70-130			
Arsenic	23.4	2.0	"	20.0	2.58	104	70-130			
Barium	93.3	100	"	20.0	ND	107	70-130			
Beryllium	20.2	1.0	"	20.0	ND	101	70-130			
Cadmium	20.6	1.0	"	20.0	ND	103	70-130			
Chromium	21.0	10	"	20.0	ND	96.0	70-130			
Copper	23.8	50	"	20.0	ND	99.8	70-130			
Iron	566	100	"	520	ND	95.4	70-130			
Lead	20.1	5.0	"	20.0	ND	99.2	70-130			
Manganese	24.4	20	"	20.0	ND	93.8	70-130			
Nickel	20.5	10	"	20.0	ND	100	70-130			
Selenium	20.2	5.0	"	20.0	ND	100	70-130			
Silver	19.7	10	"	20.0	ND	98.6	70-130			
Thallium	20.2	1.0	"	20.0	ND	101	70-130			
Zinc	120	50	"	100	ND	101	70-130			
Matrix Spike (AE21825-MS2)	**Source: 12E0814-02**			Prepared: 05/21/12 Analyzed: 05/24/12						
Aluminum	386	50	ug/l	520	ND	74.2	70-130			
Antimony	17.5	6.0	"	20.0	ND	87.4	70-130			
Arsenic	17.7	2.0	"	20.0	ND	87.8	70-130			
Barium	50.3	100	"	20.0	ND	74.4	70-130			
Beryllium	17.1	1.0	"	20.0	ND	85.6	70-130			
Cadmium	16.9	1.0	"	20.0	ND	84.0	70-130			
Chromium	16.4	10	"	20.0	ND	82.1	70-130			
Copper	27.8	50	"	20.0	ND	93.1	70-130			
Iron	1390	100	"	520	1020	70.9	70-130			

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Metals by EPA Method 200.8 ICP/MS - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE21825 - EPA 200.8										
Matrix Spike (AE21825-MS2)	**Source: 12E0814-02**			Prepared: 05/21/12 Analyzed: 05/24/12						
Lead	24.4	5.0	"	20.0	7.84	82.8	70-130			
Manganese	62.9	20	"	20.0	48.6	71.5	70-130			
Nickel	16.5	10	"	20.0	ND	80.4	70-130			
Selenium	17.0	5.0	"	20.0	ND	83.9	70-130			
Silver	16.1	10	"	20.0	ND	80.7	70-130			
Thallium	16.5	1.0	"	20.0	ND	82.4	70-130			
Zinc	285	50	"	100	209	75.1	70-130			
Matrix Spike Dup (AE21825-MSD1)	**Source: 12E0818-04**			Prepared: 05/18/12 Analyzed: 05/23/12						
Aluminum	486	50	ug/l	520	ND	84.0	70-130	0.756	20	
Antimony	21.1	6.0	"	20.0	ND	105	70-130	0.152	20	
Arsenic	23.6	2.0	"	20.0	2.58	105	70-130	0.766	20	
Barium	97.9	100	"	20.0	ND	130	70-130	4.82	20	
Beryllium	20.4	1.0	"	20.0	ND	102	70-130	1.17	20	
Cadmium	20.9	1.0	"	20.0	ND	104	70-130	1.23	20	
Chromium	20.8	10	"	20.0	ND	95.1	70-130	0.920	20	
Copper	24.3	50	"	20.0	ND	102	70-130	1.93	20	
Iron	556	100	"	520	ND	93.6	70-130	1.69	20	
Lead	21.0	5.0	"	20.0	ND	104	70-130	4.45	20	
Manganese	24.1	20	"	20.0	ND	92.4	70-130	1.14	20	
Nickel	20.5	10	"	20.0	ND	100	70-130	0.0187	20	
Selenium	20.8	5.0	"	20.0	ND	103	70-130	2.94	20	
Silver	20.3	10	"	20.0	ND	101	70-130	2.67	20	
Thallium	20.9	1.0	"	20.0	ND	104	70-130	3.51	20	
Zinc	121	50	"	100	ND	102	70-130	1.20	20	

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Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE21822 - Metals Digest										
Duplicate (AE21822-DUP1)	**Source: 12E0821-03**			Prepared: 05/18/12 Analyzed: 05/21/12						
Hardness, Total	134	5	mg/l		131			2.16	20	
Batch AE22338 - General Preparation										
Blank (AE22338-BLK1)				Prepared & Analyzed: 05/22/12						
Turbidity	ND	0.10	NTU							
Duplicate (AE22338-DUP1)	**Source: 12E0955-01**			Prepared & Analyzed: 05/22/12						
Turbidity	0.180	0.10	NTU		0.190			5.41	30	
Batch AE22419 - General Preparation										
Blank (AE22419-BLK1)				Prepared: 05/25/12 Analyzed: 06/06/12						
Methylene Blue Active Substances	ND	0.050	mg/l							
LCS (AE22419-BS1)				Prepared: 05/25/12 Analyzed: 06/06/12						
Methylene Blue Active Substances	0.192	0.050	mg/l	0.200		95.9	80-120			
Duplicate (AE22419-DUP1)	**Source: 12E0923-01**			Prepared: 05/25/12 Analyzed: 06/06/12						
Methylene Blue Active Substances	ND	0.050	mg/l		ND				20	
Matrix Spike (AE22419-MS1)	**Source: 12E0923-01**			Prepared: 05/25/12 Analyzed: 06/06/12						
Methylene Blue Active Substances	0.190	0.050	mg/l	0.200	ND	95.0	80-120			
Matrix Spike Dup (AE22419-MSD1)	**Source: 12E0923-01**			Prepared: 05/25/12 Analyzed: 06/06/12						
Methylene Blue Active Substances	0.192	0.050	mg/l	0.200	ND	95.9	80-120	0.864	20	

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Laboratory Director

6/8/2012

Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com
Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
Satellite Laboratory: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309

CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22927 - General Preparation										
Blank (AE22927-BLK1)				Prepared: 05/29/12 Analyzed: 05/31/12						
Total Dissolved Solids	ND	10	mg/l							
Duplicate (AE22927-DUP1)	**Source: 12E0923-01**			Prepared: 05/29/12 Analyzed: 05/31/12						
Total Dissolved Solids	832	10	mg/l		824			0.966	30	
Duplicate (AE22927-DUP2)	**Source: 12E0943-07**			Prepared: 05/29/12 Analyzed: 05/31/12						
Total Dissolved Solids	34700	10	mg/l		34100			1.98	30	
Batch AE22956 - General Preparation										
Blank (AE22956-BLK1)				Prepared & Analyzed: 05/29/12						
Perchlorate	ND	4.0	ug/l							
LCS (AE22956-BS1)				Prepared & Analyzed: 05/29/12						
Perchlorate	26.4	4.0	ug/l	25.0		106	85-115			
Duplicate (AE22956-DUP1)	**Source: 12E0781-01**			Prepared & Analyzed: 05/29/12						
Perchlorate	1.91	4.0	ug/l		ND				15	
Matrix Spike (AE22956-MS1)	**Source: 12E0781-01**			Prepared & Analyzed: 05/29/12						
Perchlorate	25.9	4.0	ug/l	25.0	ND	95.7	70-130			
Matrix Spike Dup (AE22956-MSD1)	**Source: 12E0781-01**			Prepared & Analyzed: 05/29/12						
Perchlorate	25.2	4.0	ug/l	25.0	ND	93.2	70-130	2.42	15	

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Miscellaneous Physical/Conventional Chemistry Parameters - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE23017 - General Preparation										
Blank (AE23017-BLK1)				Prepared & Analyzed: 05/30/12						
Cyanide (total)	ND	0.10	mg/l							
LCS (AE23017-BS1)				Prepared & Analyzed: 05/30/12						
Cyanide (total)	0.202	0.10	mg/l	0.200		101	85-115			
Duplicate (AE23017-DUP1)	**Source: 12E0918-09**			Prepared & Analyzed: 05/30/12						
Cyanide (total)	0.00233	0.10	mg/l		ND				25	
Matrix Spike (AE23017-MS1)	**Source: 12E0918-09**			Prepared & Analyzed: 05/30/12						
Cyanide (total)	0.209	0.10	mg/l	0.200	ND	103	85-115			
Matrix Spike (AE23017-MS2)	**Source: 12E1070-02**			Prepared & Analyzed: 05/30/12						
Cyanide (total)	0.204	0.10	mg/l	0.200	ND	102	85-115			
Matrix Spike Dup (AE23017-MSD1)	**Source: 12E0918-09**			Prepared & Analyzed: 05/30/12						
Cyanide (total)	0.205	0.10	mg/l	0.200	ND	101	85-115	2.17	25	

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Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22318 - General Preparation										
Blank (AE22318-BLK1)				Prepared & Analyzed: 05/23/12						
Nitrate as NO3	ND	2.0	mg/l							
Sulfate as SO4	ND	0.50	"							
Chloride	ND	0.50	"							
Fluoride	ND	0.10	"							
Nitrite as N	ND	0.40	"							
LCS (AE22318-BS1)				Prepared & Analyzed: 05/23/12						
Nitrate as NO3	24	2.0	mg/l	24.7		97.4	90-110			
Nitrite as N	5.54	0.40	"	5.56		99.8	90-110			
Sulfate as SO4	21.6	0.50	"	22.2		97.1	90-110			
Chloride	10.9	0.50	"	11.1		97.7	90-110			
Fluoride	5.51	0.10	"	5.56		99.1	90-110			
Duplicate (AE22318-DUP1)	**Source: 12E0921-02**			Prepared & Analyzed: 05/23/12						
Nitrate as NO3	0.72	2.0	mg/l		ND				20	
Sulfate as SO4	0.522	0.50	"		0.514			1.54	20	
Fluoride	ND	0.10	"		ND				20	
Chloride	0.191	0.50	"		ND				20	
Nitrite as N	ND	0.40	"		ND				20	
Matrix Spike (AE22318-MS1)	**Source: 12E0921-02**			Prepared & Analyzed: 05/23/12						
Nitrate as NO3	25	2.0	mg/l	24.7	ND	98.3	80-120			
Chloride	11.1	0.50	"	11.1	ND	98.2	80-120			
Fluoride	5.68	0.10	"	5.56	ND	102	80-120			
Nitrite as N	5.60	0.40	"	5.56	ND	101	80-120			
Sulfate as SO4	22.0	0.50	"	22.2	0.514	96.9	80-120			
Matrix Spike (AE22318-MS2)	**Source: 12E0933-06**			Prepared & Analyzed: 05/23/12						

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Anions by EPA Method 300.0 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22318 - General Preparation										
Matrix Spike (AE22318-MS2)	**Source: 12E0933-06**			Prepared & Analyzed: 05/23/12						
Nitrate as NO3	23	10	mg/l	24.7	ND	94.9	80-120			
Sulfate as SO4	36.6	2.5	"	22.2	15.9	92.7	80-120			
Nitrite as N	5.33	2.0	"	5.56	ND	95.9	80-120			
Chloride	18.2	2.5	"	11.1	7.50	96.6	80-120			
Fluoride	5.25	0.50	"	5.56	ND	92.0	80-120			
Matrix Spike Dup (AE22318-MSD1)	**Source: 12E0921-02**			Prepared & Analyzed: 05/23/12						
Nitrate as NO3	25	2.0	mg/l	24.7	ND	98.6	80-120	0.280	20	
Nitrite as N	5.60	0.40	"	5.56	ND	101	80-120	0.0595	20	
Sulfate as SO4	22.0	0.50	"	22.2	0.514	96.9	80-120	0.0303	20	
Fluoride	5.65	0.10	"	5.56	ND	102	80-120	0.510	20	
Chloride	11.2	0.50	"	11.1	ND	99.0	80-120	0.807	20	

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Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE23036 - VOAs in Water GCMS										
Blank (AE23036-BLK1)				Prepared & Analyzed: 05/30/12						
Benzene	ND	0.50	ug/l							
Carbon tetrachloride	ND	0.50	"							
Chlorobenzene	ND	0.50	"							
1,2-Dichlorobenzene	ND	0.50	"							
1,4-Dichlorobenzene	ND	0.50	"							
1,1-Dichloroethane	ND	0.50	"							
1,2-Dichloroethane	ND	0.50	"							
1,1-Dichloroethene	ND	0.50	"							
cis-1,2-Dichloroethene	ND	0.50	"							
trans-1,2-Dichloroethene	ND	0.50	"							
1,2-Dichloropropane	ND	0.50	"							
1,3-Dichloropropene (total)	ND	0.50	"							
Ethylbenzene	ND	0.50	"							
Methyl tert-butyl ether	ND	3.0	"							
Methylene chloride	ND	0.50	"							
Styrene	ND	0.50	"							
1,1,2,2-Tetrachloroethane	ND	0.50	"							
Tetrachloroethene	ND	0.50	"							
Toluene	ND	0.50	"							
1,2,4-Trichlorobenzene	ND	0.50	"							
1,1,1-Trichloroethane	ND	0.50	"							
1,1,2-Trichloroethane	ND	0.50	"							
Trichloroethene	ND	0.50	"							
Trichlorofluoromethane	ND	5.0	"							
Trichlorotrifluoroethane	ND	10	"							
Vinyl chloride	ND	0.50	"							

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Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE23036 - VOAs in Water GCMS										
Blank (AE23036-BLK1)				Prepared & Analyzed: 05/30/12						
Xylenes (total)	ND	0.50	"							
Surrogate: Bromofluorobenzene	*19.8*		"	*25.0*		*79.4*	*70-130*			
Surrogate: Dibromofluoromethane	*21.0*		"	*25.0*		*84.2*	*70-130*			
Surrogate: Toluene-d8	*23.4*		"	*25.0*		*93.8*	*70-130*			
LCS (AE23036-BS1)				Prepared & Analyzed: 05/30/12						
Benzene	4.74	0.50	ug/l	5.00		94.8	70-130			
Carbon tetrachloride	3.95	0.50	"	5.00		79.0	70-130			
Chlorobenzene	5.04	0.50	"	5.00		101	70-130			
1,2-Dichlorobenzene	5.13	0.50	"	5.00		103	70-130			
1,4-Dichlorobenzene	4.91	0.50	"	5.00		98.2	70-130			
1,1-Dichloroethane	4.46	0.50	"	5.00		89.2	70-130			
1,2-Dichloroethane	4.81	0.50	"	5.00		96.2	70-130			
1,1-Dichloroethene	4.14	0.50	"	5.00		82.8	70-130			
cis-1,2-Dichloroethene	4.51	0.50	"	5.00		90.2	70-130			
trans-1,2-Dichloroethene	4.29	0.50	"	5.00		85.8	70-130			
1,2-Dichloropropane	4.86	0.50	"	5.00		97.2	70-130			
Ethylbenzene	4.92	0.50	"	5.00		98.4	70-130			
Methyl tert-butyl ether	4.38	3.0	"	5.00		87.6	70-130			
Methylene chloride	4.22	0.50	"	5.00		84.4	70-130			
Styrene	5.15	0.50	"	5.00		103	70-130			
1,1,2,2-Tetrachloroethane	4.90	0.50	"	5.00		98.0	70-130			
Tetrachloroethene	4.57	0.50	"	5.00		91.4	70-130			
Toluene	5.35	0.50	"	5.00		107	70-130			
1,2,4-Trichlorobenzene	5.09	0.50	"	5.00		102	70-130			
1,1,1-Trichloroethane	3.98	0.50	"	5.00		79.6	70-130			

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Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE23036 - VOAs in Water GCMS										
LCS (AE23036-BS1)				Prepared & Analyzed: 05/30/12						
1,1,2-Trichloroethane	5.18	0.50	"	5.00		104	70-130			
Trichloroethene	4.74	0.50	"	5.00		94.8	70-130			
Trichlorofluoromethane	3.84	5.0	"	5.00		76.8	70-130			
Trichlorotrifluoroethane	4.18	10	"	5.00		83.6	70-130			
Vinyl chloride	4.84	0.50	"	5.00		96.8	70-130			
Xylenes (total)	15.2	0.50	"	15.0		101	70-130			
Surrogate: Bromofluorobenzene	*20.6*		"	*25.0*		*82.6*	*70-130*			
Surrogate: Dibromofluoromethane	*19.9*		"	*25.0*		*79.6*	*70-130*			
Surrogate: Toluene-d8	*24.1*		"	*25.0*		*96.4*	*70-130*			
LCS Dup (AE23036-BSD1)				Prepared & Analyzed: 05/30/12						
Benzene	4.57	0.50	ug/l	5.00		91.4	70-130	3.65	30	
Carbon tetrachloride	3.98	0.50	"	5.00		79.6	70-130	0.757	30	
Chlorobenzene	5.01	0.50	"	5.00		100	70-130	0.597	30	
1,2-Dichlorobenzene	4.95	0.50	"	5.00		99.0	70-130	3.57	30	
1,4-Dichlorobenzene	4.86	0.50	"	5.00		97.2	70-130	1.02	30	
1,1-Dichloroethane	4.39	0.50	"	5.00		87.8	70-130	1.58	30	
1,2-Dichloroethane	4.67	0.50	"	5.00		93.4	70-130	2.95	30	
1,1-Dichloroethene	4.24	0.50	"	5.00		84.8	70-130	2.39	30	
cis-1,2-Dichloroethene	4.57	0.50	"	5.00		91.4	70-130	1.32	30	
trans-1,2-Dichloroethene	4.27	0.50	"	5.00		85.4	70-130	0.467	30	
1,2-Dichloropropane	4.70	0.50	"	5.00		94.0	70-130	3.35	30	
Ethylbenzene	4.92	0.50	"	5.00		98.4	70-130	0.00	30	
Methyl tert-butyl ether	4.39	3.0	"	5.00		87.8	70-130	0.228	30	
Methylene chloride	4.18	0.50	"	5.00		83.6	70-130	0.952	30	
Styrene	5.04	0.50	"	5.00		101	70-130	2.16	30	

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Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE23036 - VOAs in Water GCMS										
LCS Dup (AE23036-BSD1)				Prepared & Analyzed: 05/30/12						
1,1,2,2-Tetrachloroethane	4.85	0.50	"	5.00		97.0	70-130	1.03	30	
Tetrachloroethene	4.49	0.50	"	5.00		89.8	70-130	1.77	30	
Toluene	5.24	0.50	"	5.00		105	70-130	2.08	30	
1,2,4-Trichlorobenzene	5.00	0.50	"	5.00		100	70-130	1.78	30	
1,1,1-Trichloroethane	4.01	0.50	"	5.00		80.2	70-130	0.751	30	
1,1,2-Trichloroethane	5.09	0.50	"	5.00		102	70-130	1.75	30	
Trichloroethene	4.63	0.50	"	5.00		92.6	70-130	2.35	30	
Trichlorofluoromethane	4.18	5.0	"	5.00		83.6	70-130	8.48	30	
Trichlorotrifluoroethane	4.40	10	"	5.00		88.0	70-130	5.13	30	
Vinyl chloride	4.85	0.50	"	5.00		97.0	70-130	0.206	30	
Xylenes (total)	15.0	0.50	"	15.0		100	70-130	0.861	30	
Surrogate: Bromofluorobenzene	*20.4*		"	*25.0*		*81.6*	*70-130*			
Surrogate: Dibromofluoromethane	*20.2*		"	*25.0*		*80.8*	*70-130*			
Surrogate: Toluene-d8	*24.0*		"	*25.0*		*95.8*	*70-130*			
Matrix Spike (AE23036-MS1)	**Source: 12E0811-01**			Prepared & Analyzed: 05/30/12						
Benzene	4.98	0.50	ug/l	5.00	ND	99.6	70-130			
Carbon tetrachloride	4.44	0.50	"	5.00	ND	88.8	70-130			
Chlorobenzene	5.26	0.50	"	5.00	ND	105	70-130			
1,2-Dichlorobenzene	5.13	0.50	"	5.00	ND	103	70-130			
1,4-Dichlorobenzene	5.03	0.50	"	5.00	ND	101	70-130			
1,1-Dichloroethane	4.98	0.50	"	5.00	ND	99.6	70-130			
1,2-Dichloroethane	4.99	0.50	"	5.00	ND	99.8	70-130			
1,1-Dichloroethene	5.03	0.50	"	5.00	ND	101	70-130			
cis-1,2-Dichloroethene	4.93	0.50	"	5.00	ND	98.6	70-130			
trans-1,2-Dichloroethene	4.90	0.50	"	5.00	ND	98.0	70-130			

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Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE23036 - VOAs in Water GCMS										
Matrix Spike (AE23036-MS1)	**Source: 12E0811-01**			Prepared & Analyzed: 05/30/12						
1,2-Dichloropropane	4.87	0.50	"	5.00	ND	97.4	70-130			
Ethylbenzene	5.31	0.50	"	5.00	ND	106	70-130			
Methyl tert-butyl ether	4.18	3.0	"	5.00	ND	83.6	70-130			
Methylene chloride	4.14	0.50	"	5.00	ND	82.8	70-130			
Styrene	5.23	0.50	"	5.00	ND	105	70-130			
1,1,2,2-Tetrachloroethane	4.94	0.50	"	5.00	ND	98.8	70-130			
Tetrachloroethene	4.87	0.50	"	5.00	ND	97.4	70-130			
Toluene	5.40	0.50	"	5.00	ND	108	70-130			
1,2,4-Trichlorobenzene	5.12	0.50	"	5.00	ND	102	70-130			
1,1,1-Trichloroethane	4.45	0.50	"	5.00	ND	89.0	70-130			
1,1,2-Trichloroethane	4.95	0.50	"	5.00	ND	99.0	70-130			
Trichloroethene	5.23	0.50	"	5.00	ND	105	70-130			
Trichlorofluoromethane	5.21	5.0	"	5.00	ND	104	70-130			
Trichlorotrifluoroethane	5.31	10	"	5.00	ND	106	70-130			
Vinyl chloride	6.24	0.50	"	5.00	ND	125	70-130			
Xylenes (total)	16.0	0.50	"	15.0	ND	107	70-130			
Surrogate: Bromofluorobenzene	*20.1*		*"*	*25.0*		*80.5*	*70-130*			
Surrogate: Dibromofluoromethane	*20.2*		*"*	*25.0*		*80.7*	*70-130*			
Surrogate: Toluene-d8	*22.4*		*"*	*25.0*		*89.8*	*70-130*			
Matrix Spike Dup (AE23036-MSD1)	**Source: 12E0811-01**			Prepared & Analyzed: 05/30/12						
Benzene	5.16	0.50	ug/l	5.00	ND	103	70-130	3.55	30	
Carbon tetrachloride	4.66	0.50	"	5.00	ND	93.2	70-130	4.84	30	
Chlorobenzene	5.30	0.50	"	5.00	ND	106	70-130	0.758	30	
1,2-Dichlorobenzene	5.24	0.50	"	5.00	ND	105	70-130	2.12	30	
1,4-Dichlorobenzene	5.07	0.50	"	5.00	ND	101	70-130	0.792	30	

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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Volatile Organic Compounds by EPA Method 524.2 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE23036 - VOAs in Water GCMS										
Matrix Spike Dup (AE23036-MSD1)	**Source: 12E0811-01**			Prepared & Analyzed: 05/30/12						
1,1-Dichloroethane	5.26	0.50	"	5.00	ND	105	70-130	5.47	30	
1,2-Dichloroethane	5.30	0.50	"	5.00	ND	106	70-130	6.03	30	
1,1-Dichloroethene	5.33	0.50	"	5.00	ND	107	70-130	5.79	30	
cis-1,2-Dichloroethene	5.31	0.50	"	5.00	ND	106	70-130	7.42	30	
trans-1,2-Dichloroethene	5.25	0.50	"	5.00	ND	105	70-130	6.90	30	
1,2-Dichloropropane	5.00	0.50	"	5.00	ND	100	70-130	2.63	30	
Ethylbenzene	5.38	0.50	"	5.00	ND	108	70-130	1.31	30	
Methyl tert-butyl ether	4.48	3.0	"	5.00	ND	89.6	70-130	6.93	30	
Methylene chloride	4.84	0.50	"	5.00	ND	96.8	70-130	15.6	30	
Styrene	5.63	0.50	"	5.00	ND	113	70-130	7.37	30	
1,1,2,2-Tetrachloroethane	5.43	0.50	"	5.00	ND	109	70-130	9.45	30	
Tetrachloroethene	5.35	0.50	"	5.00	ND	107	70-130	9.39	30	
Toluene	5.67	0.50	"	5.00	ND	113	70-130	4.88	30	
1,2,4-Trichlorobenzene	4.99	0.50	"	5.00	ND	99.8	70-130	2.57	30	
1,1,1-Trichloroethane	4.86	0.50	"	5.00	ND	97.2	70-130	8.81	30	
1,1,2-Trichloroethane	5.11	0.50	"	5.00	ND	102	70-130	3.18	30	
Trichloroethene	5.39	0.50	"	5.00	ND	108	70-130	3.01	30	
Trichlorofluoromethane	5.55	5.0	"	5.00	ND	111	70-130	6.32	30	
Trichlorotrifluoroethane	5.67	10	"	5.00	ND	113	70-130	6.56	30	
Vinyl chloride	6.72	0.50	"	5.00	ND	134	70-130	7.41	30	QM-05
Xylenes (total)	17.4	0.50	"	15.0	ND	116	70-130	8.24	30	
Surrogate: Bromofluorobenzene	*22.2*		"	*25.0*		*89.0*	*70-130*			
Surrogate: Dibromofluoromethane	*21.5*		"	*25.0*		*86.1*	*70-130*			
Surrogate: Toluene-d8	*23.5*		"	*25.0*		*94.0*	*70-130*			

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2490 Mariner Square Loop, Suite 215
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Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

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12E0923	05/22/2012 20:35	DP TODENG	

Chlorinated Pesticides and PCBs by EPA Method 508 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22925 - SVOAs in Water GC										
Blank (AE22925-BLK1)				Prepared: 05/29/12 Analyzed: 05/30/12						
Endrin	ND	0.10	ug/l							
HCH-gamma (Lindane)	ND	0.20	"							
Heptachlor	ND	0.010	"							
Heptachlor epoxide	ND	0.010	"							
Hexachlorobenzene	ND	0.50	"							
Hexachlorocyclopentadiene	ND	1.0	"							
Methoxychlor	ND	10	"							
PCB-1016	ND	0.50	"							
PCB-1221	ND	0.50	"							
PCB-1232	ND	0.50	"							
PCB-1242	ND	0.50	"							
PCB-1248	ND	0.50	"							
PCB-1254	ND	0.50	"							
PCB-1260	ND	0.50	"							
Total PCBs	ND	0.50	"							
Toxaphene	ND	1.0	"							
Chlordane (tech)	ND	0.10	"							
Surrogate: Dibutylchlorendate	*0.738*		*"*	*0.867*		*85.2*	*63-123*			
LCS (AE22925-BS1)				Prepared: 05/29/12 Analyzed: 05/30/12						
Endrin	0.282	0.10	ug/l	0.280		101	74-134			
Heptachlor	0.231	0.010	"	0.280		82.4	41-113			
Heptachlor epoxide	0.259	0.010	"	0.280		92.5	57-117			
Hexachlorobenzene	0.232	0.50	"	0.280		82.7	41-122			
Hexachlorocyclopentadiene	0.293	1.0	"	0.560		52.2	10-70			
Methoxychlor	0.265	10	"	0.280		94.7	63-146			

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Chlorinated Pesticides and PCBs by EPA Method 508 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22925 - SVOAs in Water GC										
LCS (AE22925-BS1)				Prepared: 05/29/12 Analyzed: 05/30/12						
Surrogate: Dibutylchlorendate	*0.774*		*"*	*0.867*		*89.2*	*63-123*			
LCS Dup (AE22925-BSD1)				Prepared: 05/29/12 Analyzed: 05/30/12						
Endrin	0.283	0.10	ug/l	0.280		101	74-134	0.367	25	
Heptachlor	0.239	0.010	"	0.280		85.4	41-113	3.57	25	
Heptachlor epoxide	0.265	0.010	"	0.280		94.6	57-117	2.31	25	
Hexachlorocyclopentadiene	0.270	1.0	"	0.560		48.3	10-70	7.86	50	
Hexachlorobenzene	0.235	0.50	"	0.280		83.8	41-122	1.35	25	
Methoxychlor	0.277	10	"	0.280		99.1	63-146	4.53	25	
Surrogate: Dibutylchlorendate	*1.56*		*"*	*1.73*		*90.2*	*63-123*			
Matrix Spike (AE22925-MS1)	**Source: 12E0923-01**			Prepared: 05/29/12 Analyzed: 05/30/12						
Endrin	0.232	0.10	ug/l	0.280	ND	82.9	74-134			
Heptachlor	0.203	0.010	"	0.280	ND	72.3	41-113			
Heptachlor epoxide	0.217	0.010	"	0.280	ND	77.4	57-117			
Hexachlorobenzene	0.193	0.50	"	0.280	ND	69.0	41-122			
Hexachlorocyclopentadiene	0.248	1.0	"	0.560	ND	44.2	10-70			
Methoxychlor	0.231	10	"	0.280	ND	82.5	63-146			
Surrogate: Dibutylchlorendate	*0.648*		*"*	*0.867*		*74.8*	*63-123*			
Matrix Spike Dup (AE22925-MSD1)	**Source: 12E0923-01**			Prepared: 05/29/12 Analyzed: 05/30/12						
Endrin	0.281	0.10	ug/l	0.280	ND	100	74-134	18.9	25	
Heptachlor	0.236	0.010	"	0.280	ND	84.1	41-113	15.1	25	
Heptachlor epoxide	0.258	0.010	"	0.280	ND	92.2	57-117	17.5	25	
Hexachlorobenzene	0.223	0.50	"	0.280	ND	79.5	41-122	14.2	25	
Hexachlorocyclopentadiene	0.299	1.0	"	0.560	ND	53.5	10-70	18.9	50	
Methoxychlor	0.276	10	"	0.280	ND	98.4	63-146	17.6	25	

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Chlorinated Pesticides and PCBs by EPA Method 508 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22925 - SVOAs in Water GC										
Matrix Spike Dup (AE22925-MSD1)	**Source: 12E0923-01**		Prepared: 05/29/12 Analyzed: 05/30/12							
Surrogate: Dibutylchlorendate	*0.779*		*"*	*0.867*		*89.8*	*63-123*			

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12E0923	05/22/2012 20:35	DP TODENG	

Chlorinated Acids by EPA Method 515.1 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AF20115 - EPA 515.1										
Blank (AF20115-BLK1)				Prepared: 06/01/12 Analyzed: 06/08/12						
Bentazon	ND	2.0	ug/l							
2,4-D	ND	10	"							
Dalapon	ND	10	"							
Dinoseb	ND	2.0	"							
Pentachlorophenol	ND	0.20	"							
Picloram	ND	1.0	"							
2,4,5-TP (Silvex)	ND	1.0	"							
Surrogate: DCAA	*13.8*		*"*	*13.6*		*102*	*70-130*			
LCS (AF20115-BS1)				Prepared: 06/01/12 Analyzed: 06/08/12						
Bentazon	1.99	2.0	ug/l	1.92		104	69-118			
2,4-D	1.21	10	"	1.92		63.3	48-124			
Dalapon	7.53	10	"	12.5		60.3	40-112			
Dinoseb	4.99	2.0	"	6.42		77.7	0-85			
Pentachlorophenol	0.907	0.20	"	0.960		94.5	36-112			
Picloram	0.766	1.0	"	0.960		79.8	44-133			
2,4,5-TP (Silvex)	0.650	1.0	"	0.960		67.7	44-115			
Surrogate: DCAA	*13.1*		*"*	*13.6*		*96.4*	*70-130*			
LCS Dup (AF20115-BSD1)				Prepared: 06/01/12 Analyzed: 06/08/12						
Bentazon	2.03	2.0	ug/l	1.92		106	69-118	2.03	50	
2,4-D	1.41	10	"	1.92		73.7	48-124	15.2	50	
Dalapon	10.9	10	"	12.5		87.2	40-112	36.4	50	
Dinoseb	4.38	2.0	"	6.42		68.2	0-85	13.0	50	
Pentachlorophenol	0.879	0.20	"	0.960		91.5	36-112	3.19	50	
Picloram	0.867	1.0	"	0.960		90.3	44-133	12.4	50	

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12E0923	05/22/2012 20:35	DP TODENG	

Chlorinated Acids by EPA Method 515.1 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AF20115 - EPA 515.1										
LCS Dup (AF20115-BSD1)				Prepared: 06/01/12 Analyzed: 06/08/12						
2,4,5-TP (Silvex)	0.766	1.0	"	0.960		79.8	44-115	16.3	50	
Surrogate: DCAA	*13.7*		*"*	*13.6*		*100*	*70-130*			
Matrix Spike (AF20115-MS1)	**Source: 12E0923-01**			Prepared: 06/01/12 Analyzed: 06/08/12						
Bentazon	1.10	2.0	ug/l	0.960	ND	114	69-118			
2,4-D	0.877	10	"	0.960	ND	91.4	48-124			
Dalapon	4.78	10	"	6.24	ND	76.7	40-112			
Dinoseb	2.22	2.0	"	3.21	ND	69.1	0-85			
Pentachlorophenol	0.293	0.20	"	0.480	ND	61.1	36-112			
Picloram	0.394	1.0	"	0.480	ND	82.2	44-133			
2,4,5-TP (Silvex)	0.313	1.0	"	0.480	ND	65.3	44-115			
Surrogate: DCAA	*6.21*		*"*	*6.80*		*91.3*	*70-130*			
Matrix Spike Dup (AF20115-MSD1)	**Source: 12E0923-01**			Prepared: 06/01/12 Analyzed: 06/08/12						
Bentazon	1.12	2.0	ug/l	0.960	ND	116	69-118	1.48	50	
2,4-D	0.912	10	"	0.960	ND	95.0	48-124	3.89	50	
Dalapon	4.13	10	"	6.24	ND	66.2	40-112	14.6	50	
Dinoseb	2.15	2.0	"	3.21	ND	67.1	0-85	2.95	50	
Pentachlorophenol	0.326	0.20	"	0.480	ND	67.9	36-112	10.6	50	
Picloram	0.450	1.0	"	0.480	ND	93.7	44-133	13.2	50	
2,4,5-TP (Silvex)	0.369	1.0	"	0.480	ND	76.8	44-115	16.3	50	
Surrogate: DCAA	*6.62*		*"*	*6.80*		*97.4*	*70-130*			

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Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Carbamates by EPA Method 531.1 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22931 - HPLC										
Blank (AE22931-BLK1)				Prepared: 05/29/12 Analyzed: 05/30/12						
Carbofuran	ND	5.0	ug/l							
Oxamyl	ND	20	"							
LCS (AE22931-BS1)				Prepared: 05/29/12 Analyzed: 05/30/12						
Carbofuran	23.4	5.0	ug/l	20.0		117	80-120			
Oxamyl	24.0	20	"	20.0		120	80-120			
LCS Dup (AE22931-BSD1)				Prepared: 05/29/12 Analyzed: 05/30/12						
Carbofuran	21.7	5.0	ug/l	20.0		108	80-120	7.39	20	
Oxamyl	21.3	20	"	20.0		107	80-120	11.9	20	
Matrix Spike (AE22931-MS1)	**Source: 12E0923-01**			Prepared: 05/29/12 Analyzed: 05/30/12						
Carbofuran	20.7	5.0	ug/l	20.0	ND	103	80-120			
Oxamyl	21.3	20	"	20.0	ND	107	80-120			
Matrix Spike Dup (AE22931-MSD1)	**Source: 12E0923-01**			Prepared: 05/29/12 Analyzed: 05/30/12						
Carbofuran	21.2	5.0	ug/l	20.0	ND	106	80-120	2.54	20	
Oxamyl	21.9	20	"	20.0	ND	109	80-120	2.44	20	

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12E0923	05/22/2012 20:35	DP TODENG	

Endothall by EPA Method 548.1 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22446 - EPA 548.1										
Blank (AE22446-BLK1)				Prepared: 05/24/12 Analyzed: 05/25/12						
Endothall	ND	45	ug/l							
LCS (AE22446-BS1)				Prepared: 05/24/12 Analyzed: 05/25/12						
Endothall	174	45	ug/l	200		86.9	80-120			
LCS Dup (AE22446-BSD1)				Prepared: 05/24/12 Analyzed: 05/25/12						
Endothall	182	45	ug/l	200		91.0	80-120	4.66	30	
Matrix Spike (AE22446-MS1)	**Source: 12E0923-01**			Prepared: 05/24/12 Analyzed: 05/25/12						
Endothall	ND	45	ug/l	200	ND		80-120			A-01

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Bruce Gove
Laboratory Director

6/8/2012

Alpha Analytical Laboratories Inc.
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Corporate: 208 Mason St., Ukiah, CA 95482 • Phone: (707) 468-0401 • Fax: (707) 468-5267
Satellite Laboratory: 6398 Dougherty Rd., Suite 35, Dublin, CA 94568 • Phone: (925) 828-6226 • Fax: (925) 828-6309

CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Glyphosate by EPA Method 547 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22426 - HPLC										
Blank (AE22426-BLK1)				Prepared & Analyzed: 05/24/12						
Glyphosate	ND	25	ug/l							
LCS (AE22426-BS1)				Prepared & Analyzed: 05/24/12						
Glyphosate	124	25	ug/l	120		103	66-126			
LCS Dup (AE22426-BSD1)				Prepared & Analyzed: 05/24/12						
Glyphosate	123	25	ug/l	120		102	66-126	1.05	30	
Matrix Spike (AE22426-MS1)	**Source: 12E0923-01**			Prepared: 05/24/12 Analyzed: 05/25/12						
Glyphosate	126	25	ug/l	120	ND	105	66-126			
Matrix Spike Dup (AE22426-MSD1)	**Source: 12E0923-01**			Prepared: 05/24/12 Analyzed: 05/25/12						
Glyphosate	123	25	ug/l	120	ND	102	66-126	2.65	30	

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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Diquat by EPA Method 549.2 - Quality Control

Analyte(s)	Result	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flag
Batch AE22515 - HPLC										
Blank (AE22515-BLK1)				Prepared: 05/25/12 Analyzed: 05/30/12						
Diquat	ND	4.0	ug/l							
LCS (AE22515-BS1)				Prepared: 05/25/12 Analyzed: 05/30/12						
Diquat	19.3	4.0	ug/l	20.0		96.3	70-130			
LCS Dup (AE22515-BSD1)				Prepared: 05/25/12 Analyzed: 05/30/12						
Diquat	18.5	4.0	ug/l	20.0		92.5	70-130	3.94	25	
Matrix Spike (AE22515-MS1)	**Source: 12E0923-01**			Prepared: 05/25/12 Analyzed: 05/31/12						
Diquat	19.3	4.0	ug/l	20.0	ND	96.3	70-130			

Bruce Gove
Laboratory Director

6/8/2012

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CHEMICAL EXAMINATION REPORT

Todd Engineers
2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
Attn: Dr. Bill Motzer

Report Date: 06/08/12 14:04
Project No: [none]
Project ID: East Palo Alto Gloria Way Well

Order Number	Receipt Date/Time	Client Code	Client PO/Reference
12E0923	05/22/2012 20:35	DP TODENG	

Notes and Definitions

A-01	Analyst error, MS was not spiked.
QM-05	The spike recovery was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
QM-4X	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
T-14	Residual chlorine, dissolved oxygen, and pH must be analyzed in the field to meet the EPA specified 15 minute hold time. Sample was received and analyzed outside of this "window."
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
PQL	Practical Quantitation Limit

Bruce Gove
Laboratory Director

6/8/2012

LABORATORY REPORT

This report contains 23 pages.
(including the cover page)

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

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UL LLC
110 S. Hill St., South Bend, IN 46617-2702 USA
T: 800.332.4345 / F: 574.233.8207 / W: UL.com

NELAC NARRATIVE PAGE

Client: Alpha Analytical

Report #: 280172NP

Underwriters Laboratories is a NELAP accredited laboratory. All reported results meet the requirements of the NELAC standards, unless otherwise noted.

UL contact person: James Van Fleit

NELAP requires complete reporting of deviations from method requirements, regardless of the suspected impact on the data. Quality control failures not reported within the report summary are noted here.

There were no quality control failures.

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Authorized Signature | Title | Date 6-12-12

UL LLC
110 S. Hill St., South Bend, IN 46617-2702 USA
T: 800.332.4345 / F: 574.233.8207 / W: UL.com

Laboratory Report

Client:	Alpha Analytical	Report:	280172
Attn:	David Pingatore 6398 Dougherty Road, Ste. 35 Dublin, CA 94568	Priority:	Standard Written
		Status:	Final
		PWS ID:	Not Supplied

Copies to: None

Sample Information

UL ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
2647719	12E0923-01	1613	05/22/12 14:00	Client	05/25/12 09:45
2647720	12E0923-01	300.0	05/22/12 14:00	Client	05/25/12 09:45
2647721	12E0923-01	504.1	05/22/12 14:00	Client	05/25/12 09:45

Report Summary

Note: See attached page for additional comments.

Note: Sample containers were provided by the client.

Note: The bromide sample was provided by the client in a glass container. Method 300.0 requires that the samples be collected in plastic containers.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call James Van Fleit at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from UL. UL is accredited by the National Environmental Laboratory Accreditation Program (NELAP).

Authorized Signature ________ Title PM ________ Date 6-12-12

Client Name: Alpha Analytical
Report #: 280172

UL LLC
110 S. Hill St., South Bend, IN 46617-2702 USA
T: 800.332.4345 / F: 574.233.8207 / W: UL.com

Client Name: Alpha Analytical

Report #: 280172

Sampling Point: 12E0923-01

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
24959-67-9	Bromide	300.0	---	0.010	1.3	mg/L	---	06/05/12 18:29	2647720

Semivolatile Organic Chemicals									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed	UL ID #
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-Dioxin	1613	30 *	5.0	< 5.0	pg/L	06/05/12 09:14	06/06/12 19:15	2647719
96-12-8	1,2-Dibromo-3-chloropropane (DBCP)	504.1	0.2 *	0.01	< 0.01	ug/L	05/29/12 15:13	05/30/12 01:49	2647721
106-93-4	1,2-Dibromoethane (EDB)	504.1	0.05 *	0.02	< 0.02	ug/L	05/29/12 15:13	05/30/12 01:49	2647721

† UL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

: 0000U

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

UL Drinking Water Laboratory
Continuing Calibration Low

Sample Matrix: RW
Acquisition File: 052912a
Data Directory: \cp\052912a
Today's Date: 06/11/2012
Instrument: GC/ECD - CP
Extracted Date: 05/29/2012 15:13
Sample Number: 2648154
State of Origin: Not Available

Method: 504.1
Calibration File: 504_1-031612CP
Analysis Date: 05/29/2012
Analysis Time: 15:58
Analyst: jpalmer
Results Submitted By: morse
Run Number: 189020
Project QC: Standard

Sample Quality Control

Internal Standards Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass / Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass / Fail
4-Bromofluorobenzene	69790.0	Not Found	N/A	N/A	N/A	N/A	69750	100	50	150	PASS

Surrogate Standards Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail

Ordered Parameter Results

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
1,2-Dibromo-3-chloropropane (DBCP)	0.0172	ug/L	0.02	86	60	140	PASS
1,2-Dibromoethane (EDB)	0.0198	ug/L	0.02	99	60	140	PASS

UL Drinking Water Laboratory
Continuing Calibration Check

Sample Matrix: RW
Acquisition File: 052912a
Data Directory: \cp\052912a
Today's Date: 06/11/2012
Instrument: GC/ECD - CP
Extracted Date: 05/29/2012 15:13
Sample Number: 2648157
State of Origin: Not Available

Method: 504.1
Calibration File: 504_1-031612CP
Analysis Date: 05/29/2012
Analysis Time: 16:24
Analyst: jpalmer
Results Submitted By: morse
Run Number: 169020
Project QC: Standard

Sample Quality Control

Internal Standards

Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass /Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass /Fail
4-Bromofluorobenzene	67806.0	Not Found	N/A	N/A	N/A	N/A	69750	97	50	150	PASS

Surrogate Standards

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail

Ordered Parameter Results

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
1,2-Dibromo-3-chloropropane (DBCP)	0.1008	ug/L	0.1	101	70	130	PASS
1,2-Dibromoethane (EDB)	0.106	ug/L	0.1	106	70	130	PASS

UL Drinking Water Laboratory
Laboratory Method Blank

Sample Matrix: RW
Acquisition File: 052912a
Data Directory: \cp\052912a
Instrument: GC/ECD - CP
Extracted Date: 05/29/2012 15:13
Sample Number: 2648153
Dilution Factor: 1
Sample Site: Not Available
Sample Location: Not Available

Method: 504.1
Calibration File: 504_1-031612CP
Analysis Date: 05/29/2012
Analysis Time: 17:15
Analyst: jpalmer
Results Submitted By: morse
Run Number: 169020
State of Origin: Not Available
Project QC: Standard

Sample Quality Control

Internal Standards Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass / Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass / Fail
4-Bromofluorobenzene	69205.0	Not Found	N/A	N/A	N/A	N/A	69750	99	50	150	PASS

Surrogate Standards Parameter	Amount	Normalized	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail

Ordered Parameter Results

Parameter	Amount	MRL	Units	MCL	SMCL
1,2-Dibromo-3-chloropropane (DBCP)	< 0.01	0.01	ug/L	0.2	
1,2-Dibromoethane (EDB)	< 0.01	0.01	ug/L	0.05	

Additional Found Parameters

Parameter	Amount	MRL	Units	MCL	SMCL

The symbol * in the Amount column above indicates that the sample was re-analyzed for that paramater and the results are presented on another page.

UL Drinking Water Laboratory
Laboratory Fortified Blank

Sample Matrix: RW
Acquisition File: 052912a
Data Directory: \cp\052912a
Today's Date: 06/11/2012
Instrument: GC/ECD - CP
Extracted Date: 05/29/2012 15:13
Sample Number: 2648160
State of Origin: Not Available

Method: 504.1
Calibration File: 504_1-031612CP
Analysis Date: 05/29/2012
Analysis Time: 22:24
Analyst: jpalmer
Results Submitted By: morse
Run Number: 169020
Project QC: Standard

Sample Quality Control

Internal Standards Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass / Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass / Fail
4-Bromofluorobenzene	62903.0	Not Found	N/A	N/A	N/A	N/A	69750	90	50	150	PASS

Surrogate Standards Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail

Ordered Parameter Results

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
1,2-Dibromo-3-chloropropane (DBCP)	0.2714	ug/L	0.257	106	70	130	PASS
1,2-Dibromoethane (EDB)	0.2719	ug/L	0.257	106	70	130	PASS

UL Drinking Water Laboratory
Sample Result Record Sheet

Sample Matrix: DW
Acquisition File: 052912a
Data Directory: \cp\052912a
Instrument: GC/ECD - CP
Extracted Date: 05/29/2012 15:13
Sample Number: 2647721
Dilution Factor: 1.0200
Sample Site: 12E0923-01
Sample Location: Not Available

Method: 504.1
Calibration File: 504_1-031612CP
Analysis Date: 05/30/2012
Analysis Time: 01:49
Analyst: jpalmer
Results Submitted By: morse
Run Number: 169020
State of Origin: California
Project QC: State Compliance

Sample Quality Control

Internal Standards		CCC					IC				
Parameter	Area	CCC Area	% Resp	Area Limits Lwr	Area Limits Upr	Pass / Fail	IC Avg Area	% Resp	Area Limits Lwr	Area Limits Upr	Pass / Fail
4-Bromofluorobenzene	67265.0	Not Found	N/A	N/A	N/A	N/A	69750	96	50	150	PASS

Surrogate Standards Parameter	Amount	Normalized	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail

Ordered Parameter Results

Parameter	Amount	MRL	Units	MCL	SMCL
1,2-Dibromo-3-chloropropane (DBCP)	< 0.01	0.01	ug/L	0.2	
1,2-Dibromoethane (EDB)	< 0.02	0.02	ug/L	0.05	

Additional Found Parameters

Parameter	Amount	MRL	Units	MCL	SMCL

The symbol * in the Amount column above indicates that the sample was re-analyzed for that parameter and the results are presented on another page.

UL Drinking Water Laboratory
Matrix Spike Report

File Name: ms;26481
Acquisition File: 052912a
Data Directory: \cp\052912a
Today's Date: 06/11/2012
Instrument: GC/ECD - CP
Extracted Date: 05/29/2012 15:13
Sample Number: 2648162
Associated Sample: 2647721
Project QC: State Compliance

Method: 504.1
Calibration File: 504_1-031612CP
Analysis Date: 05/30/2012
Analysis Time: 02:14
Analyst: jpalmer
Results Submitted By: morse
Run Number: 169020
State of Origin: California

Sample Quality Control

Internal Standards Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass /Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass /Fail
4-Bromofluorobenzene	59030.0	Not Found	N/A	N/A	N/A	N/A	69750	85	50	150	PASS

Surrogate Standards Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail

Ordered Parameter Results

Parameter	Conc Units	Spike Added	Sample Conc	MS Conc	MS %Rec	Pass/Fail
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	0.1	Not Found	0.1	98	PASS
1,2-Dibromoethane (EDB)	ug/L	0.1	Not Found	0.1092	107	PASS

UL Drinking Water Laboratory
Continuing Calibration Check

Sample Matrix: RW
Acquisition File: 052912a
Data Directory: \cp\052912a
Today's Date: 06/11/2012
Instrument: GC/ECD - CP
Extracted Date: 05/29/2012 15:13
Sample Number: 2648158
State of Origin: Not Available

Method: 504.1
Calibration File: 504_1-031612CP
Analysis Date: 05/30/2012
Analysis Time: 03:57
Analyst: jpalmer
Results Submitted By: morse
Run Number: 169020
Project QC: Standard

Sample Quality Control

Internal Standards		CCC					IC				
Parameter	Area	CCC Area	% Resp	Area Limits Lwr	Area Limits Upr	Pass / Fail	IC Avg Area	% Resp	Area Limits Lwr	Area Limits Upr	Pass / Fail
4-Bromofluorobenzene	65065.0	Not Found	N/A	N/A	N/A	N/A	69750	93	50	150	PASS

Surrogate Standards Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail

Ordered Parameter Results

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
1,2-Dibromo-3-chloropropane (DBCP)	0.1092	ug/L	0.1	109	70	130	PASS
1,2-Dibromoethane (EDB)	0.105	ug/L	0.1	105	70	130	PASS

UL Drinking Water Laboratory
Continuing Calibration Check

Sample Matrix: OS
Acquisition File: Not Available
Data Directory: 060612a
Today's Date: 06/11/2012
Instrument: GC/MS/MS - BR
Extracted Date: Not Available
Sample Number: 2653034
State of Origin: Not Available

Method: 1613
Calibration File: 1613-br-051512.mth
Analysis Date: 06/06/2012
Analysis Time: 13:04
Analyst: polite
Results Submitted By: polite
Run Number: 169291
Project QC: Standard

Sample Quality Control

Internal Standards Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass /Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass /Fail
IS-13C12-1,2,3,4-TCDD	296500000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A
IS-13C12-2,3,7,8-TCDD	385600000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A

Surrogate Standards Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
SS-13C12-2,3,7,8-TCDD	1998.128	pg/L	2000	100	85	117	PASS

Ordered Parameter Results

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
2,3,7,8-Tetrachlorodibenzo-p-Dioxin	204.71	pg/L	200	102	82	123	PASS

UL Drinking Water Laboratory
Continuing Calibration Low

Sample Matrix: OS
Acquisition File: Not Available
Data Directory: 060612a
Today's Date: 06/11/2012
Instrument: GC/MS/MS - BR
Extracted Date: Not Available
Sample Number: 2653033
State of Origin: Not Available

Method: 1613
Calibration File: 1613-br-051512.mth
Analysis Date: 06/06/2012
Analysis Time: 13:46
Analyst: polite
Results Submitted By: polite
Run Number: 169291
Project QC: Standard

Sample Quality Control

Internal Standards Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass / Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass / Fail
IS-13C12-1,2,3,4-TCDD	160500000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A
IS-13C12-2,3,7,8-TCDD	204300000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A

Surrogate Standards Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
SS-13C12-2,3,7,8-TCDD	1955.172	pg/L	2000	98	85	117	PASS

Ordered Parameter Results

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
2,3,7,8-Tetrachlorodibenzo-p-Dioxin	6.728	pg/L	5.0	135	60	140	PASS

UL Drinking Water Laboratory
Laboratory Fortified Blank

Sample Matrix: RW
Acquisition File: Not Available
Data Directory: 060612a
Today's Date: 06/11/2012
Instrument: GC/MS/MS - BR
Extracted Date: 06/05/2012 09:14
Sample Number: 2651580
State of Origin: Not Available

Method: 1613
Calibration File: 1613-br-051512.mth
Analysis Date: 06/06/2012
Analysis Time: 15:22
Analyst: polite
Results Submitted By: polite
Run Number: 169291
Project QC: Standard

Sample Quality Control

Internal Standards		CCC					IC				
Parameter	Area	CCC Area	% Resp	Area Limits Lwr	Area Limits Upr	Pass /Fail	IC Avg Area	% Resp	Area Limits Lwr	Area Limits Upr	Pass /Fail
IS-13C12-1,2,3,4-TCDD	131200000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A
IS-13C12-2,3,7,8-TCDD	81450000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A

Surrogate Standards Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
SS-13C12-2,3,7,8-TCDD	954.097	pg/L	2000	48	25	141	PASS

Ordered Parameter Results

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
2,3,7,8-Tetrachlorodibenzo-p-Dioxin	197.71	pg/L	200	99	73	146	PASS

UL Drinking Water Laboratory
Laboratory Method Blank

Sample Matrix: RW
Acquisition File: Not Available
Data Directory: 060612a
Instrument: GC/MS/MS - BR
Extracted Date: 06/05/2012 09:14
Sample Number: 2651578
Dilution Factor: 0.9800
Sample Site: Not Available
Sample Location: Not Available

Method: 1613
Calibration File: 1613-br-051512.mth
Analysis Date: 06/06/2012
Analysis Time: 16:01
Analyst: polite
Results Submitted By: polite
Run Number: 169291
State of Origin: Not Available
Project QC: Standard

Sample Quality Control

Internal Standards Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass / Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass / Fail
IS-13C12-1,2,3,4-TCDD	123300000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A
IS-13C12-2,3,7,8-TCDD	102200000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A

Surrogate Standards Parameter	Amount	Normalized	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
SS-13C12-2,3,7,8-TCDD	1273.944896	1248.466	pg/L	2000	64	31	137	PASS

Ordered Parameter Results

Parameter	Amount	MRL	Units	MCL	SMCL
2,3,7,8-Tetrachlorodibenzo-p-Dioxin	< 4.0	4.0	pg/L	30	

Additional Found Parameters

Parameter	Amount	MRL	Units	MCL	SMCL

The symbol * in the Amount column above indicates that the sample was re-analyzed for that parameter and the results are presented on another page.

UL Drinking Water Laboratory
Sample Result Record Sheet

Sample Matrix: DW
Acquisition File: Not Available
Data Directory: 060612a
Instrument: GC/MS/MS - BR
Extracted Date: 06/05/2012 09:14
Sample Number: 2647719
Dilution Factor: 1.0100
Sample Site: 12E0923-01
Sample Location: Not Available

Method: 1613
Calibration File: 1613-br-051512.mth
Analysis Date: 06/06/2012
Analysis Time: 19:15
Analyst: polite
Results Submitted By: polite
Run Number: 169291
State of Origin: California
Project QC: State Compliance

Sample Quality Control

Internal Standards

Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass / Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass / Fail
IS-13C12-1,2,3,4-TCDD	112800000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A
IS-13C12-2,3,7,8-TCDD	74360000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A

Surrogate Standards

Parameter	Amount	Normalized	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
SS-13C12-2,3,7,8-TCDD	1013.363366	1023.497	pg/L	2000	51	31	137	PASS

Ordered Parameter Results

Parameter	Amount	MRL	Units	MCL	SMCL
2,3,7,8-Tetrachlorodibenzo-p-Dioxin	< 5.0	5.0	pg/L	30	

Additional Found Parameters

Parameter	Amount	MRL	Units	MCL	SMCL

The symbol * in the Amount column above indicates that the sample was re-analyzed for that parameter and the results are presented on another page.

UL Drinking Water Laboratory
Continuing Calibration Check

Sample Matrix: OS
Acquisition File: Not Available
Data Directory: 060612a
Today's Date: 06/11/2012
Instrument: GC/MS/MS - BR
Extracted Date: Not Available
Sample Number: 2653035
State of Origin: Not Available

Method: 1613
Calibration File: 1613-br-051512.mth
Analysis Date: 06/07/2012
Analysis Time: 00:23
Analyst: polite
Results Submitted By: polite
Run Number: 169291
Project QC: Standard

Sample Quality Control

Internal Standards

Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass / Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass / Fail
IS-13C12-1,2,3,4-TCDD	275700000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A
IS-13C12-2,3,7,8-TCDD	376500000.0	Not Found	N/A	N/A	N/A	N/A	Not Found	N/A	N/A	N/A	N/A

Surrogate Standards

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
SS-13C12-2,3,7,8-TCDD	2098.493	pg/L	2000	105	85	117	PASS

Ordered Parameter Results

Parameter	Amount	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail
2,3,7,8-Tetrachlorodibenzo-p-Dioxin	194.168	pg/L	200	97	82	123	PASS

Certificate of Analysis

Client: Alpha Analytical Laboratories - Ukiah
208 Mason St
Ukiah, CA 95482

Report Date: 06/07/12 15:16
Received Date: 05/24/12 10:00
Turnaround Time: Normal

Phones: (925) 872-9637
Fax: (707) 468-5267

Attn: David S. Pingatore
Project: 12E0923
P.O. #:

Dear David S. Pingatore :

Enclosed are the results of analyses for samples received 5/24/2012 with the Chain of Custody document. The samples were received in good condition, at 1.6 °C and on ice. All analysis met the method criteria except as noted below or in the report with data qualifiers.

Lab Sample ID: 2E24023-01 **Sample ID: 12E0923-01 Gloria Way Well** **Matrix:** Water
Sampled by: Client **Sampled: 05/22/12 13:30**

Analyte	Result	MDL	MRL	Units	Dil	Method	Prepared	Analyzed	Batch	Qualifier
Alachlor	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Atrazine	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Benzo (a) pyrene	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Bis(2-ethylhexyl)adipate	ND		5.0	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Bis(2-ethylhexyl)phthalate	ND		3.0	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Bromacil	ND		0.50	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Butachlor	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Captan	ND		1.0	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Chloropropham	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Cyanazine	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Diazinon	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Dimethoate	ND		0.20	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Diphenamid	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Disulfoton	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
EPTC	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Metolachlor	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Metribuzin	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Molinate	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Prometon	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Prometryn	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Simazine	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Terbacil	ND		2.0	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Thiobencarb	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Trithion	ND		0.10	ug/l	1	EPA 525.2	5/30/12	6/2/12 13:38	W2E1317	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*97 %*		*73-136*	%	Concentration: *4.87*					
Surrogate: Perylene-d12	*108 %*		*48-141*	%	Concentration: *5.38*					
Surrogate: Triphenyl phosphate	*97 %*		*71-150*	%	Concentration: *4.83*					
Iodide	**530**		100	ug/l	10	EPA 9056aM	6/6/12	6/6/12 19:38	W2F0275	

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Quality Control Section

Anions by EPA Method 300.0/300.1/326 - Quality Control

Batch W2F0275 - EPA 9056aM

Blank (W2F0275-BLK1) **Prepared: 06/06/12 Analyzed: 06/06/12 19:38**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Iodide		ND		ug/l					

LCS (W2F0275-BS1) **Prepared: 06/06/12 Analyzed: 06/06/12 19:38**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Iodide		41.1		ug/l	40.0	103	80-120		

Matrix Spike (W2F0275-MS1) **Source: 2E24023-01** **Prepared: 06/06/12 Analyzed: 06/06/12 19:38**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Iodide	528	940		ug/l	400	103	80-120		

Matrix Spike Dup (W2F0275-MSD1) **Source: 2E24023-01** **Prepared: 06/06/12 Analyzed: 06/06/12 19:38**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Iodide	528	931		ug/l	400	101	80-120	1	20

Semivolatile Organic Compounds by GC/MS - Quality Control

Batch W2E1317 - EPA 525.2

Blank (W2E1317-BLK1) **Prepared: 05/30/12 Analyzed: 06/02/12 04:33**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Surrogate: 1,3-Dimethyl-2-nitrobenzene		*4.88*		ug/l	*5.00*	*98*	*73-136*		
Surrogate: Perylene-d12		*4.57*		ug/l	*5.00*	*91*	*48-141*		
Surrogate: Triphenyl phosphate		*4.55*		ug/l	*5.00*	*91*	*71-150*		
Benzo (a) pyrene		ND		ug/l					
Bis(2-ethylhexyl)adipate		ND		ug/l					
Bis(2-ethylhexyl)phthalate		ND		ug/l					
Alachlor		ND		ug/l					
Atrazine		ND		ug/l					
Molinate		ND		ug/l					
Simazine		ND		ug/l					
Thiobencarb		ND		ug/l					

LCS (W2E1317-BS1) **Prepared: 05/30/12 Analyzed: 06/02/12 11:22**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Surrogate: 1,3-Dimethyl-2-nitrobenzene		*5.28*		ug/l	*5.00*	*106*	*73-136*		
Surrogate: Perylene-d12		*3.66*		ug/l	*5.00*	*73*	*48-141*		
Surrogate: Triphenyl phosphate		*5.23*		ug/l	*5.00*	*105*	*71-150*		
Benzo (a) pyrene		3.49		ug/l	5.00	70	54-136		
Bis(2-ethylhexyl)adipate		6.00		ug/l	5.00	120	50-145		
Bis(2-ethylhexyl)phthalate		5.56		ug/l	5.00	111	54-142		
Alachlor		4.24		ug/l	5.00	85	58-164		
Atrazine		5.44		ug/l	5.00	109	68-133		
Bromacil		5.34		ug/l	5.00	107	43-177		

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Semivolatile Organic Compounds by GC/MS - Quality Control

Batch W2E1317 - EPA 525.2

LCS (W2E1317-BS1) **Prepared: 05/30/12 Analyzed: 06/02/12 11:22**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Butachlor		4.22		ug/l	5.00	84	55-178		
Captan		4.97		ug/l	5.00	99	20-215		
Chloropropham		5.71		ug/l	5.00	114	74-133		
Cyanazine		4.47		ug/l	5.00	89	69-131		
Diazinon		3.35		ug/l	5.00	67	42-212		
Dimethoate		5.57	Q-08	ug/l	5.00	111	24-110		
Diphenamid		5.17		ug/l	5.00	103	82-144		
Disulfoton		3.81		ug/l	5.00	76	71-122		
EPTC		5.34		ug/l	5.00	107	75-110		
Metolachlor		4.12		ug/l	5.00	82	55-170		
Metribuzin		4.19		ug/l	5.00	84	44-149		
Molinate		5.20		ug/l	5.00	104	76-116		
Prometon		3.19		ug/l	5.00	64	6-110		
Prometryn		4.33		ug/l	5.00	87	34-152		
Simazine		3.74		ug/l	5.00	75	54-156		
Terbacil		5.21		ug/l	5.00	104	66-140		
Thiobencarb		4.20		ug/l	5.00	84	57-162		
Trithion		4.46		ug/l	5.00	89	62-149		

Matrix Spike (W2E1317-MS1) **Source: 2E24002-01** **Prepared: 05/30/12 Analyzed: 06/02/12 10:55**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Surrogate: 1,3-Dimethyl-2-nitrobenzene		*5.37*		ug/l	*5.00*	*107*	*73-136*		
Surrogate: Perylene-d12		*3.33*		ug/l	*5.00*	*67*	*48-141*		
Surrogate: Triphenyl phosphate		*5.14*		ug/l	*5.00*	*103*	*71-150*		
Benzo (a) pyrene	ND	3.81		ug/l	5.00	76	29-153		
Bis(2-ethylhexyl)adipate	ND	5.17		ug/l	5.00	103	28-147		
Bis(2-ethylhexyl)phthalate	ND	4.79		ug/l	5.00	96	23-154		
Alachlor	ND	3.71		ug/l	5.00	74	58-177		
Atrazine	ND	4.92		ug/l	5.00	98	53-142		
Bromacil	ND	4.68		ug/l	5.00	94	71-182		
Butachlor	ND	3.95		ug/l	5.00	79	67-181		
Captan	ND	4.46		ug/l	5.00	89	45-182		
Chloropropham	ND	5.44		ug/l	5.00	109	76-137		
Cyanazine	ND	3.67		ug/l	5.00	73	26-145		
Diazinon	ND	2.95		ug/l	5.00	59	43-219		
Dimethoate	ND	5.30		ug/l	5.00	106	39-120		
Diphenamid	ND	4.43		ug/l	5.00	89	86-130		
Disulfoton	ND	2.46		ug/l	5.00	49	24-133		
EPTC	ND	5.00		ug/l	5.00	100	67-119		
Metolachlor	ND	3.75		ug/l	5.00	75	53-178		
Metribuzin	ND	3.68		ug/l	5.00	74	64-155		
Molinate	ND	4.86		ug/l	5.00	97	68-125		
Prometon	ND	3.17		ug/l	5.00	63	5-148		
Prometryn	ND	3.90		ug/l	5.00	78	44-169		

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Semivolatile Organic Compounds by GC/MS - Quality Control

Batch W2E1317 - EPA 525.2

Matrix Spike (W2E1317-MS1) **Source: 2E24002-01** **Prepared: 05/30/12 Analyzed: 06/02/12 10:55**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Simazine	ND	3.51		ug/l	5.00	70	53-152		
Terbacil	ND	4.63		ug/l	5.00	93	56-159		
Thiobencarb	ND	3.69		ug/l	5.00	74	71-160		
Trithion	ND	3.96	MS-05	ug/l	5.00	79	86-144		

Matrix Spike Dup (W2E1317-MSD1) **Source: 2E24002-01** **Prepared: 05/30/12 Analyzed: 06/02/12 11:22**

Analyte	Sample Result	QC Result	Qualifier	Units	Spike Level	%REC	%REC Limits	RPD	RPD Limit
Surrogate: 1,3-Dimethyl-2-nitrobenzene		*5.28*		ug/l	*5.00*	*106*	*73-136*		
Surrogate: Perylene-d12		*3.66*		ug/l	*5.00*	*73*	*48-141*		
Surrogate: Triphenyl phosphate		*5.23*		ug/l	*5.00*	*105*	*71-150*		
Benzo (a) pyrene	ND	3.49		ug/l	5.00	70	29-153	9	30
Bis(2-ethylhexyl)adipate	ND	6.00		ug/l	5.00	120	28-147	15	30
Bis(2-ethylhexyl)phthalate	ND	5.56		ug/l	5.00	111	23-154	15	30
Alachlor	ND	4.24		ug/l	5.00	85	58-177	13	30
Atrazine	ND	5.44		ug/l	5.00	109	53-142	10	30
Bromacil	ND	5.34		ug/l	5.00	107	71-182	13	30
Butachlor	ND	4.22		ug/l	5.00	84	67-181	7	30
Captan	ND	4.97		ug/l	5.00	99	45-182	11	30
Chloropropham	ND	5.71		ug/l	5.00	114	76-137	5	30
Cyanazine	ND	4.47		ug/l	5.00	89	26-145	20	30
Diazinon	ND	3.35		ug/l	5.00	67	43-219	13	30
Dimethoate	ND	5.57		ug/l	5.00	111	39-120	5	30
Diphenamid	ND	5.17		ug/l	5.00	103	86-130	15	30
Disulfoton	ND	3.81	MS-05	ug/l	5.00	76	24-133	43	30
EPTC	ND	5.34		ug/l	5.00	107	67-119	7	30
Metolachlor	ND	4.12		ug/l	5.00	82	53-178	9	30
Metribuzin	ND	4.19		ug/l	5.00	84	64-155	13	30
Molinate	ND	5.20		ug/l	5.00	104	68-125	7	30
Prometon	ND	3.19		ug/l	5.00	64	5-148	0.6	30
Prometryn	ND	4.33		ug/l	5.00	87	44-169	10	30
Simazine	ND	3.74		ug/l	5.00	75	53-152	6	30
Terbacil	ND	5.21		ug/l	5.00	104	56-159	12	30
Thiobencarb	ND	4.20		ug/l	5.00	84	71-160	13	30
Trithion	ND	4.46		ug/l	5.00	89	86-144	12	30

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Notes:
The Chain of Custody document is part of the analytical report.
Any remaining sample(s) for testing will be disposed of one month from the final report date unless other arrangements are made in advance.
All results are expressed on wet weight basis unless otherwise specified.

An Absence of Total Coliform meets the drinking water standards as established by the State of California Department of Health Services.
The Reporting Limit (RL) is referenced as laboratory's Practical Quantitation Limit (PQL).
For Potable water analysis, the Reporting Limit (RL) is referenced as Detection Limit for reporting purposes (DLRs) defined by EPA.

If sample collected by Weck Laboratories, sampled in accordance to lab SOP MIS002

Authorized Signature
Contact: Kim G Tu (Project Manager)

ELAP # 1132
LACSD # 10143
NELAC # 04229CA

The results in this report apply to the samples analyzed in accordance with the chain of custody document. Weck Laboratories certifies that the test results meet all requirements of NELAC unless noted in the Case Narrative. This analytical report must be reproduced in its entirety.

Flags for Data Qualifiers:

MS-05	The spike recovery and/or RPD were outside acceptance limits for the MS and/or MSD due to possible matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
Q-08	High bias in the QC sample does not affect sample result since analyte was not detected or below the reporting limit.
ND	NOT DETECTED at or above the Reporting Limit. If J-value reported, then NOT DETECTED at or above the Method Detection Limit (MDL).
Sub	Subcontracted analysis, original report enclosed.
DL	Method Detection Limit
RL	Method Reporting Limit
MDA	Minimum Detectable Activity
NR	Not Reportable

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McCampbell Analytical, Inc.
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Toll Free Telephone: (877) 252-9262 / Fax: (925) 252-9269
http://www.mccampbell.com / E-mail: main@mccampbell.com

Analytical Report

Alpha Analytical Laboratories	Client Project ID: #12E0923	Date Sampled: 05/22/12
208 Mason Street		Date Received: 05/22/12
	Client Contact: David S. Pingatore	Date Reported: 05/30/12
Ukiah, CA 95482	Client P.O.:	Date Completed: 05/30/12

WorkOrder: 1205642

May 31, 2012

Dear David:

Enclosed within are:

1) The results of the **1** analyzed sample from your project: **#12E0923,**
2) QC data for the above sample, and
3) A copy of the chain of custody.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions or concerns, please feel free to give me a call. Thank you for choosing McCampbell Analytical Laboratories for your analytical needs.

Best regards,

Angela Rydelius
Laboratory Manager
McCampbell Analytical, Inc.

The analytical results relate only to the items tested.

McCampbell Analytical, Inc.
"When Quality Counts"
1534 Willow Pass Road, Pittsburg, CA 94565-1701
Toll Free Telephone: (877) 252-9262 / Fax: (925) 252-9269
http://www.mccampbell.com / E-mail: main@mccampbell.com

Alpha Analytical Laboratories 208 Mason Street Ukiah, CA 95482	Client Project ID: #12E0923	Date Sampled: 05/22/12 Date Received: 05/22/12
	Client Contact: David S. Pingatore	Date Extracted: 05/22/12
	Client P.O.:	Date Analyzed: 05/22/12

Hexachrome by IC*

Analytical Method: E218.6

Work Order: 1205642

Lab ID	Client ID	Matrix	Hexachrome	DF	Comments
1205642-001A	Gloria Way Well	W	ND	1	

Reporting Limit for DF = 1; ND means not detected at or above the reporting limit	W	0.05 µg/L	
	S	NA	

* water samples are reported in µg/L.

N/A means surrogate not applicable to this analysis; # means surrogate diluted out of range or surrogate coelutes with another peak.

%SS = Percent Recovery of Surrogate Standard
DF = Dilution Factor

DHS ELAP Certification 1644

Angela Rydelius, Lab Manager

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QC SUMMARY REPORT FOR E218.6

W.O. Sample Matrix: Water | QC Matrix: Water | BatchID: 67752 | WorkOrder: 1205642

EPA Method: E218.6 **Extraction: E218.6** **Spiked Sample ID: 1205642-001A**

Analyte	Sample	Spiked	MS	MSD	MS-MSD	LCS	Acceptance Criteria (%)		
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	MS / MSD	RPD	LCS
Hexachrome	ND	25	110	109	0.548	102	90 - 110	10	90 - 110

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
NONE

BATCH 67752 SUMMARY

Lab ID	Date Sampled	Date Extracted	Date Analyzed	Lab ID	Date Sampled	Date Extracted	Date Analyzed
1205642-001A	05/22/12 2:00 PM	05/22/12	05/22/12 8:49 PM				

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 * (MS-Sample) / (Amount Spiked); RPD = 100 * (MS - MSD) / ((MS + MSD) / 2).

MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.

DHS ELAP Certification 1644 QA/QC Officer

ASBESTOS TEM LABORATORIES, INC.

EPA 600/4-83 Drinking Water Transmission Electron Microscopy Analytical Report

Laboratory Job # 1288-00343

630 Bancroft Way
Berkeley, CA 94710
(510) 704-8930
FAX (510) 704-8429

ASBESTOS TEM LABORATORIES, INC

Certified by
CA DPH ELAP
Lab No. 1866

Jun/08/2012

David Pingatore
Alpha Analytical Laboratories, Inc.
208 Mason Street
Ukiah, CA 95482

RE: LABORATORY JOB # 1288-00343
Transmission electron microscopy analytical results for 1 water sample(s).
Job Site: Gloria Way Well
Job No.: 12E0923

Enclosed please find results for the TEM analysis of one or more water samples. The analytical procedures were performed according to EPA Method 100.2 for the analysis of asbestos in drinking water.

Prior to analysis, samples are checked for damage, disruption of any chain-of-custody seals, and completeness of accompanying paperwork. If no problems are found, samples are then logged-in, each given a unique laboratory number, and a hard copy containing all pertinent information is generated. This, and all other relevant paper work are kept with each sample throughout the analytical procedures to assure proper analysis.

Preparation of water samples is performed within a HEPA filtered, Class 100 air, laminar flow clean bench environment. Prior to filtration, water sample containers are ultrasonicated, and the exterior surfaces cleaned. An aliquot of water is drawn from the sample container and drawn through a special filtration apparatus and collected onto a mixed cellulose ester (MCE) or polycarbonate (PC) filter. The filters are removed from the apparatus and dried. A portion of each sample filter is sectioned, placed onto a glass microscope slide, and carbon coated. The filters are further sectioned and placed carbon side up onto 200-mesh copper TEM sample grids in a solvent bath until all filter material is dissolved. The TEM grids are removed and placed into labeled grid storage boxes.

TEM analysis is performed on a Philips EM-300 or CM-12 transmission electron microscope operating at 80 or 100 kV. Initially, the grid is scanned at low and medium magnification to insure proper sample loading, and coherence of the carbon support film. Then TEM grid openings are analyzed at a magnification of 10,000X. All fibers >10 um in length and exhibiting an aspect ratio >3:1 are analyzed. Scanning continues until either 100 asbestiform fibers >10um in length are counted, or an analytical sensitivity of 0.2 million fibers per liter (MFL) is achieved. Analyzed fibers are subjected to detailed morphological and selected area diffraction (SAED) analysis. Fibers indicated as asbestos, or potentially asbestos, are further analyzed by energy dispersive X-ray (EDX) analysis as needed. The number of asbestos fibers detected, and other analytical parameters, are then used to calculate the concentration of asbestos in MFL. The results are entered into a standard report format and reviewed by the analyst and the laboratory manager before release to the client.

Sincerely Yours,

Laboratory Manager
ASBESTOS TEM LABORATORIES, INC.

--- These results relate only to the samples tested and must not be reproduced, except in full, with the approval of the laboratory. This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government. ---

TRANSMISSION ELECTRON MICROSCOPY ANALYTICAL REPORT

Contact: David Pingatore

Address: Alpha Analytical Laboratories, Inc.
208 Mason Street
Ukiah, CA 95482

Job Site / No.: Gloria Way Well
12E0923

Report No.: **310095**
Date: Jun-08-12
Total Samples Analyzed: 1
Sample Collector:

CLIENT SAMPLE # **12E0923-01**

Laboratory Sample # 1288-00343-001

SAMPLE LOCATION/DESCRIPTION

WATER SAMPLE DATA

Date/Time Collected	May-22-12 / 1:30 pm		Volume Submitted (ml)	1000
Date/Time Lab Received	May-23-12 / 4:01 pm		Volume Filtered (ml)	15
Date/Time Filtered	May-23-12 / 5:42 pm		Filter & Pore Size	MCE 0.22
Date/Time Analyzed	Jun-07-12 / 4:00 pm		UV/Ozone Treated:	NO

IDENTIFIED STRUCTURES (>10um)			
ASBESTOS		OTHER	
CHRYS	AMPH	AMBIG	NON-ASB
NSD	NSD	NSD	NSD

CALCULATED ASBESTOS STRUCTURE CONCENTRATION (>10um)		
CHRYS	AMPH	TOTAL
< 0.2 MFL	< 0.2 MFL	< 0.2 MFL

COMMENTS

Filter Loading: MODERATE

SAED Photo ID Nos.

TEM / ANALYTICAL PARAMETERS

Grid Openings Scanned at 10,000X	8	Analytical Sensitivity	0.2 MFL
Grid Opening Area (mm2)	0.0095	95% UCL	0.65 MFL
Scan Area (mm2)	0.0760	95% LCL	0 MFL

WATER SAMPLE LAB BLANK RESULTS

Lab ID#	TLB-10672	Analytical Sensitivity	0.01 MFL
Grid Openings Scanned at 10,000X	8	Asbestos Structure Concentration	<0.01 MFL
Volume Filtered (ml)	300		

NOTATION KEY

Chrys. - Chrysotile Asbestos
Amph. - Amphibole Asbestos
NSD - No Structures Detected
1 mm = 1 millimeter
1 um = 1 micron = 0.001 mm
MFL = Millions of Fibers per Liter
UCL = Upper Confidence Level
LCL = Lower Confidence Level

Stephanie Dunn
ANALYST SIGNATURE

LAB QC REVIEWER SIGNATURE

June 7, 2012

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482

Lab ID : SP 1205160
Customer : 2-20626

Laboratory Report

Introduction: This report package contains total of 3 pages divided into 3 sections:

Case Narrative	(1 pages)	: An overview of the work performed at FGL.
Sample Results	(1 page)	: Results for each sample submitted.
Quality Control	(1 page)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
Gloria Way Well	05/22/2012	05/25/2012	SP 1205160-001	DW

Sampling and Receipt Information: The sample was received, prepared and analyzed within the method specified holding times. All samples arrived at 3 °C. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Radio QC

905.0	06/06/2012:208178 All analysis quality controls are within established criteria
	06/02/2012:206073 All preparation quality controls are within established criteria

Certification:: I certify that this data package is in compliance with NELAC standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:DMB

Approved By **Kelly A. Dunnahoo, B.S.** Digitally signed by Kelly A. Dunnahoo, B.S. Title: Laboratory Director Date: 2012-06-07

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Mobile: (559)737-2399
FAX: (559)734-8435

June 7, 2012

Alpha Analytical Laboratories, Inc.
208 Mason St.
Ukiah, CA 95482

Lab ID : SP 1205160-001
Customer ID : 2-20626

Sampled On : May 22, 2012-14:00
Sampled By : Not Available
Received On : May 25, 2012-10:15
Matrix : Drinking Water

Description : Gloria Way Well
Project : 12E0923-01

Sample Result - Radio

Constituent	Result ± Error	MDA	Units	MCL/AL	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Radio Chemistry[P:1'5]								
Strontium 90	0.000 ± 0.384	0.636	pCi/L	8	905.0	06/02/12-06:30 2P1206073	905.0	06/06/12-14:00 2A1208178

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: HNO3 pH < 2 * PQL adjusted for dilution.

MDA = Minimum Detectable Activity (Calculated at the 95% confidence level) = Data utilized by DHS to determine matrix interference.
MCL / AL = Maximum Contamination Level / Action Level. Alpha's Action Level of 5 pCi/L is based on the Assigned Value (AV).
AV = Assigned Value(Gross Alpha Result + (0.84 x Error)). CCR Section 64442: Drinking Water Compliance Note: Do the following
If Gross Alpha's (AV) exceeds 5 pCi/L run Uranium. If Gross Alpha's (AV) minus Uranium exceeds 5 pCi/L run Radium 226.

Drinking Water Compliance:
Gross Alpha (AV) minus Uranium is less than or equal to 15 pCi/L
Uranium is less than or equal to 20 pCi/L
Radium 226 + Radium 228 is less than or equal to 5 pCi/L

Note: Samples are held for 3-6 months prior to disposal.

nelac

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June 7, 2012
Alpha Analytical Laboratories, Inc.

Lab ID : SP 1205160
Customer : 2-20626

Quality Control - Radio

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Radio								
Beta	905.0	06/06/12:208178FHH	CCV	cpm	10240	87.9 %	86 - 105	
			CCB	cpm		0.3000	0.56	
Total Strontium	905.0	06/02/12:206073FHH	RgBlk	pCi/L		0.26	2	
			LRS	pCi/L	18.98	83.2 %	53-133	
			BS	pCi/L	18.97	102 %	75-125	
			BSD	pCi/L	18.97	99.1 %	75-125	
			BSRPD	pCi/L	18.97	2.8%	≤20	

Definition

CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
CCB	: Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria.
RgBlk	: Method Reagent Blank - Prepared to correct for any reagent contributions to sample result.
LRS	: Laboratory Recovery Standard - Prepared to establish the batch recovery factor used in result calculations.
BS	: Blank Spikes - A blank is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery.
BSD	: Blank Spike Duplicate of BS/BSD pair - A blank duplicate is spiked with a known amount of analyte. It is prepared to verify that the preparation process is not affecting analyte recovery.
BSRPD	: BS/BSD Relative Percent Difference (RPD) - The BS relative percent difference is an indication of precision for the preparation and analysis.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.

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LABORATORY REPORT

This report contains 18 pages.
(including the cover page)

If you have any questions concerning this report, please do not hesitate to call us at (800) 332-4345 or (574) 233-4777.

UL LLC
110 S. Hill St., South Bend, IN 46617-2702 USA
T: 800.332.4345 / F: 574.233.8207 / W: UL.com

NELAC NARRATIVE PAGE

Client: Alpha Analytical Report #: 280173NP

Underwriters Laboratories is a NELAP accredited laboratory. All reported results meet the requirements of the NELAC standards, unless otherwise noted.

UL contact person: James Van Fleit

NELAP requires complete reporting of deviations from method requirements, regardless of the suspected impact on the data. Quality control failures not reported within the report summary are noted here.

There were no quality control failures.

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Authorized Signature Title Date

UL LLC
110 S. Hill St., South Bend, IN 46617-2702 USA
T: 800.332.4345 / F: 574.233.8207 / W: UL.com

Laboratory Report

Client:	Alpha Analytical	Report:	280173
Attn:	David Pingatore 6398 Dougherty Road, Suite 35 Dublin, CA 94568	Priority:	Standard Written
		Status:	Final
		PWS ID:	Not Supplied

Copies to: None

Sample Information

UL ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
2647722	12E0923-01	906.0	05/22/12 14:00	Client	05/25/12 09:45
2647723	12E0923-01	903.1	05/22/12 14:00	Client	05/25/12 09:45
2647723	12E0923-01	904.0	05/22/12 14:00	Client	05/25/12 09:45
2647724	12E0923-01	200.8	05/22/12 14:00	Client	05/25/12 09:45
2647724	12E0923-01	900.0	05/22/12 14:00	Client	05/25/12 09:45

Report Summary

Note: See attached page for additional comments.

Project: Gloria Way Well

Note: Gross Alpha & Beta and Radium 226 & 228 analyses were performed by GEL Laboratories LLC, Charleston, SC.

Note: Sample containers were provided by the client.

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call James Van Fleit at (574) 233-4777.

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Authorized Signature　　Title　　Date

UL LLC
110 S. Hill St., South Bend, IN 46617-2702 USA
T: 800.332.4345 / F: 574.233.8207 / W: UL.com

Client Name: Alpha Analytical Report #: 280173

Sampling Point: 12E0923-01 PWS ID: Not Supplied

Radionuclides

Analyte ID #	Analyte	Method	Reg Limit	DL**	Result	Units	Preparation Date	Analyzed	UL ID #
7440-61-1	Uranium	200.8	20.1 *	1.00	0.27 ± 0.020	pCi/L	05/31/12 15:00	05/31/12 18:19	2647724
10028-17-8	Tritium	906.0	20000 *	1000	0.00 ± 400.25	pCi/L	06/04/12 09:11	06/04/12 22:23	2647722

** Detection Limit (DL) shall be that concentration which can be counted with a precision of plus or minus 100% at the 95 % confidence level.

Reference Lab Tests

Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed	UL ID #
---	Gross Alpha	900.0	15 *	3	< 3 ± 1.370	pCi/L	---	07/30/12 20:05	2647724
---	Gross Beta	900.0	50 *	4.00	**2.69 ± 1.120**	pCi/L	---	07/30/12 20:05	2647724
13982-63-3	Radium-226	903.1	3 *	1	< 1 ± 0.461	pCi/L	---	07/26/12 13:20	2647723
15262-20-1	Radium-228	904.0	2 *	1	< 1 ± 0.535	pCi/L	---	08/01/12 13:04	2647723
---	Combined Radium	calc.	---	1	< 1 ± 0.000	pCi/L	---	07/26/12 13:20	2647723

† UL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC) / Continuing Calibration Verification (CCV) / Initial Calibration Verification Standard (ICV) / Initial Performance Check (IPC) - is a standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. This standard is used to verify the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of continuing standards may be varied, when prescribed by the reference method, so that the range of the calibration curve is verified on a regular basis.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) / Field Reagent Blank (FRB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The FRB/LTB container follows the collection bottles to and from the collection site, but the FRB/LTB is not opened at any time during the trip. The FRB/LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Sample Matrix Duplicate (LFSMD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix.

Matrix Spike Sample (MS) / Laboratory Fortified Sample Matrix (LFSM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The solution is obtained from a second manufacturer or lot if the lot can be demonstrated by the manufacturer as prepared independently from other lots. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis.

Reporting Limit Check (RLC) / Initial Calibration Check Standard (ICCS) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.

UL Drinking Water Laboratory
Extended Result Record Sheet

Run Number: 169106
PC File Name:
Order Number: 223968

Instrument: ICP-MS CN
Analyst: N. Banaszak
Receipt Batch: 280173

Method(s): 200.8
Submitted By: N. Banaszak
Today's Date: 08/07/2012

Client: Alpha Analytical (CA) / David Pingatore

Generated By: P. Mahler

Sample ID: 2649904 Type: Initial Calibration Blank
Extracted: N/A Analyzed: 05/31/2012 16:13 Dil Factor: 1.000

CAS Number	Parameter	MRL	Amount	Report	Units
7440-69-9	IS-Bismuth Channel 1	N/A	1.0000	100	% Recovery
7440-20-2	IS-Scandium Channel 1	N/A	1.0000	100	% Recovery
7440-27-9	IS-Terbium Channel 1	N/A	1.0000	100	% Recovery
7440-65-5	IS-Yttrium Channel 1	N/A	1.0000	100	% Recovery
7440-61-1	Uranium	1.0	0.0000	< 1.0	ug/L

Sample ID: 2649910 Type: Initial Cali. Verification
Extracted: N/A Analyzed: 05/31/2012 16:31 Dil Factor: 1.000

CAS Number	Parameter	Target	Amount	% Rec	Limits	P/F
7440-69-9	IS-Bismuth Channel 1	1.0	1.0092	101	60-125	Pass
7440-20-2	IS-Scandium Channel 1	1.0	0.9911	99	60-125	Pass
7440-27-9	IS-Terbium Channel 1	1.0	0.9899	99	60-125	Pass
7440-65-5	IS-Yttrium Channel 1	1.0	0.9937	99	60-125	Pass
7440-61-1	Uranium	50.0	49.7600	100	90-110	Pass

Sample ID: 2649911 Type: Initial Calibration Blank
Extracted: N/A Analyzed: 05/31/2012 16:34 Dil Factor: 1.000

CAS Number	Parameter	MRL	Amount	Report	Units
7440-69-9	IS-Bismuth Channel 1	N/A	1.0000	100	% Recovery
7440-20-2	IS-Scandium Channel 1	N/A	1.0061	101	% Recovery
7440-27-9	IS-Terbium Channel 1	N/A	1.0051	101	% Recovery
7440-65-5	IS-Yttrium Channel 1	N/A	1.0125	101	% Recovery
7440-61-1	Uranium	1.0	0.0006	< 1.0	ug/L

Sample ID: 2649912 Type: Reporting Level Check
Extracted: N/A Analyzed: 05/31/2012 16:37 Dil Factor: 1.000

CAS Number	Parameter	Target	Amount	% Rec	Limits	P/F
7440-69-9	IS-Bismuth Channel 1	1.0	0.9908	99	60-125	Pass
7440-20-2	IS-Scandium Channel 1	1.0	0.9860	99	60-125	Pass
7440-27-9	IS-Terbium Channel 1	1.0	0.9899	99	60-125	Pass
7440-65-5	IS-Yttrium Channel 1	1.0	0.9937	99	60-125	Pass
7440-61-1	Uranium	0.3	0.3033	101	89-115	Pass

Sample ID: 2649913 Type: Quality Control Sample
Extracted: N/A Analyzed: 05/31/2012 16:40 Dil Factor: 1.000

CAS Number	Parameter	Target	Amount	% Rec	Limits	P/F
7440-69-9	IS-Bismuth Channel 1	1.0	1.0000	100	60-125	Pass
7440-20-2	IS-Scandium Channel 1	1.0	0.9832	98	60-125	Pass
7440-27-9	IS-Terbium Channel 1	1.0	0.9899	99	60-125	Pass
7440-65-5	IS-Yttrium Channel 1	1.0	0.9937	99	60-125	Pass
7440-61-1	Uranium	50.0	49.4700	99	90-110	Pass

Sample ID: 2649914 Type: Laboratory Reagent Blank
Extracted: N/A Analyzed: 05/31/2012 16:43 Dil Factor: 1.000

CAS Number	Parameter	MRL	Amount	Report	Units
7440-69-9	IS-Bismuth Channel 1	N/A	0.9908	99	% Recovery
7440-20-2	IS-Scandium Channel 1	N/A	0.9769	98	% Recovery
7440-27-9	IS-Terbium Channel 1	N/A	0.9899	99	% Recovery
7440-65-5	IS-Yttrium Channel 1	N/A	0.9937	99	% Recovery
7440-61-1	Uranium	1.0	-0.0025	< 1.0	ug/L

NOTE: The dilution factor is included
in the percent recovery calculation.

UL Drinking Water Laboratory
Extended Result Record Sheet

Run Number: 169106
PC File Name:
Order Number: 223968

Instrument: ICP-MS CN
Analyst: N. Banaszak
Receipt Batch: 280173

Method(s): 200.8
Submitted By: N. Banaszak
Today's Date: 08/07/2012

Client: Alpha Analytical (CA) / David Pingatore

Generated By: P. Mahler

Sample ID: 2649915
Extracted: N/A
Type: Reporting Level Check
Analyzed: 05/31/2012 16:46
Dil Factor: 1.000

CAS Number	Parameter	Target	Amount	% Rec	Limits	P/F
7440-69-9	IS-Bismuth Channel 1	1.0	0.9908	99	60-125	Pass
7440-20-2	IS-Scandium Channel 1	1.0	0.9810	98	60-125	Pass
7440-27-9	IS-Terbium Channel 1	1.0	0.9949	99	60-125	Pass
7440-65-5	IS-Yttrium Channel 1	1.0	0.9937	99	60-125	Pass
7440-61-1	Uranium	1.0	1.0150	101	89-115	Pass

Sample ID: 2649916
Extracted: N/A
Type: Laboratory Fortified Blank
Analyzed: 05/31/2012 16:49
Dil Factor: 1.000

CAS Number	Parameter	Target	Amount	% Rec	Limits	P/F
7440-69-9	IS-Bismuth Channel 1	1.0	1.0000	100	60-125	Pass
7440-20-2	IS-Scandium Channel 1	1.0	0.9955	100	60-125	Pass
7440-27-9	IS-Terbium Channel 1	1.0	1.0000	100	60-125	Pass
7440-65-5	IS-Yttrium Channel 1	1.0	1.0000	100	60-125	Pass
7440-61-1	Uranium	100	99.7300	100	85-115	Pass

Sample ID: 2648416
Extracted: N/A
Type: Continuing Cali. Verification
Analyzed: 05/31/2012 17:28
Dil Factor: 1.000

CAS Number	Parameter	Target	Amount	% Rec	Limits	P/F
7440-69-9	IS-Bismuth Channel 1	1.0	0.9817	98	60-125	Pass
7440-20-2	IS-Scandium Channel 1	1.0	0.9718	97	60-125	Pass
7440-27-9	IS-Terbium Channel 1	1.0	0.9899	99	60-125	Pass
7440-65-5	IS-Yttrium Channel 1	1.0	0.9812	98	60-125	Pass
7440-61-1	Uranium	50.0	48.8500	98	85-115	Pass

Sample ID: 2648417
Extracted: N/A
Type: Continuing Calibration Blank
Analyzed: 05/31/2012 17:31
Dil Factor: 1.000

CAS Number	Parameter	MRL	Amount	Report	Units
7440-69-9	IS-Bismuth Channel 1	N/A	0.9817	98	% Recovery
7440-20-2	IS-Scandium Channel 1	N/A	0.9991	100	% Recovery
7440-27-9	IS-Terbium Channel 1	N/A	0.9899	99	% Recovery
7440-65-5	IS-Yttrium Channel 1	N/A	1.0000	100	% Recovery
7440-61-1	Uranium	1.0	0.0004	< 1.0	ug/L

Sample ID: 2649917
Extracted: N/A
Type: Continuing Cali. Verification
Analyzed: 05/31/2012 18:10
Dil Factor: 1.000

CAS Number	Parameter	Target	Amount	% Rec	Limits	P/F
7440-69-9	IS-Bismuth Channel 1	1.0	0.9633	96	60-125	Pass
7440-20-2	IS-Scandium Channel 1	1.0	0.9340	93	60-125	Pass
7440-27-9	IS-Terbium Channel 1	1.0	0.9798	98	60-125	Pass
7440-65-5	IS-Yttrium Channel 1	1.0	0.9750	98	60-125	Pass
7440-61-1	Uranium	50.0	48.7600	98	85-115	Pass

Sample ID: 2649918
Extracted: N/A
Type: Continuing Calibration Blank
Analyzed: 05/31/2012 18:13
Dil Factor: 1.000

CAS Number	Parameter	MRL	Amount	Report	Units
7440-69-9	IS-Bismuth Channel 1	N/A	0.9633	96	% Recovery
7440-20-2	IS-Scandium Channel 1	N/A	0.9247	92	% Recovery
7440-27-9	IS-Terbium Channel 1	N/A	0.9697	97	% Recovery
7440-65-5	IS-Yttrium Channel 1	N/A	0.9812	98	% Recovery
7440-61-1	Uranium	1.0	-0.0010	< 1.0	ug/L

NOTE: The dilution factor is included
in the percent recovery calculation.

UL Drinking Water Laboratory
Extended Result Record Sheet

Run Number: 169106
PC File Name:
Order Number: 223968

Instrument: ICP-MS CN
Analyst: N. Banaszak
Receipt Batch: 280173

Method(s): 200.8
Submitted By: N. Banaszak
Today's Date: 08/07/2012

Client: Alpha Analytical (CA) / David Pingatore

Generated By: P. Mahler

Sample ID: 2647724
Extracted: 05/31/2012 15:00

Type: Field Sample
Analyzed: 05/31/2012 18:19

Site: 12E0923-01
Dil Factor: 1.000

CAS Number	Parameter	MRL	Amount	Report	Units
7440-69-9	IS-Bismuth Channel 1	N/A	0.8074	81	% Recovery
7440-20-2	IS-Scandium Channel 1	N/A	0.9097	91	% Recovery
7440-27-9	IS-Terbium Channel 1	N/A	0.8990	90	% Recovery
7440-65-5	IS-Yttrium Channel 1	N/A	0.8875	89	% Recovery
7440-61-1	Uranium	1.5	0.4052	0.41	ug/L

Sample ID: 2649919
Extracted: N/A

Type: Continuing Cali. Verification
Analyzed: 05/31/2012 18:37

Dil Factor: 1.000

CAS Number	Parameter	Target	Amount	% Rec	Limits	P/F
7440-69-9	IS-Bismuth Channel 1	1.0	0.9633	96	60-125	Pass
7440-20-2	IS-Scandium Channel 1	1.0	0.9139	91	60-125	Pass
7440-27-9	IS-Terbium Channel 1	1.0	0.9798	98	60-125	Pass
7440-65-5	IS-Yttrium Channel 1	1.0	0.9750	98	60-125	Pass
7440-61-1	Uranium	50.0	48.2600	97	85-115	Pass

Sample ID: 2649920
Extracted: N/A

Type: Continuing Calibration Blank
Analyzed: 05/31/2012 18:40

Dil Factor: 1.000

CAS Number	Parameter	MRL	Amount	Report	Units
7440-69-9	IS-Bismuth Channel 1	N/A	0.9541	95	% Recovery
7440-20-2	IS-Scandium Channel 1	N/A	0.9246	92	% Recovery
7440-27-9	IS-Terbium Channel 1	N/A	0.9697	97	% Recovery
7440-65-5	IS-Yttrium Channel 1	N/A	0.9688	97	% Recovery
7440-61-1	Uranium	1.0	-0.0001	< 1.0	ug/L

NOTE: The dilution factor is included
in the percent recovery calculation.

UL Drinking Water Laboratory
Run Log

Run Id: **169244** Method: **906.0** Analyst: **oke**

Type	Sample Id	File Name	Sample Site	Matrix	Analysis Date	Analysis Time
LRB	2652285	No File	Not Available	RW	06/04/2012	15:41
LFB	2652286	No File	Not Available	RW	06/04/2012	18:07
FS	2647722	No File	12E0923-01	DW	06/04/2012	22:23

UL Drinking Water Laboratory
Laboratory Reagent Blank

Sample Matrix: RW
Acquisition File: Not Available
Data Directory: No File
Instrument: Prop Counter - CI
Extracted Date: 06/04/2012 09:11
Sample Number: 2652285
Dilution Factor: 1
Sample Site: Not Available
Sample Location: Not Available

Method: 906.0
Calibration File: Not Available
Analysis Date: 06/04/2012
Analysis Time: 15:41
Analyst: oke
Results Submitted By: oke
Run Number: 169244
State of Origin: Not Available
Project QC: Not Available

Sample Quality Control

Internal Standards Parameter	Area	CCC: CCC Area	CCC: % Resp	CCC: Area Limits Lwr	CCC: Area Limits Upr	CCC: Pass / Fail	IC: IC Avg Area	IC: % Resp	IC: Area Limits Lwr	IC: Area Limits Upr	IC: Pass / Fail

Surrogate Standards Parameter	Amount	Normalized	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail

Ordered Parameter Results

Parameter	Amount	MRL	Units	MCL	SMCL
Tritium	< 1000	1000	pCi/L	20000	

Additional Found Parameters

Parameter	Amount	MRL	Units	MCL	SMCL

The symbol * in the Amount column above indicates that the sample was re-analyzed for that parameter and the results are presented on another page.

UL Drinking Water Laboratory
Laboratory Fortified Blank

Sample Matrix: RW
Acquisition File: Not Available
Data Directory: No File
Today's Date: 08/07/2012
Instrument: Prop Counter - CI
Extracted Date: 06/04/2012 09:11
Sample Number: 2652286
State of Origin: Not Available

Method: 906.0
Calibration File: Not Available
Analysis Date: 06/04/2012
Analysis Time: 18:07
Analyst: oke
Results Submitted By: oke
Run Number: 169244
Project QC: Standard

Sample Quality Control

Internal Standards		------------------ CCC ------------------					------------------ IC ------------------				
		CCC	%	Area Limits		Pass	IC Avg	%	Area Limits		Pass
Parameter	Area	Area	Resp	Lwr	Upr	/ Fail	Area	Resp	Lwr	Upr	/ Fail

Surrogate Standards					Limits		
Parameter	Amount	Units	Target	%Rec	Lower	Upper	Pass/Fail

Ordered Parameter Results

					Limits		
Parameter	Amount	Units	Target	%Rec	Lower	Upper	Pass/Fail
Tritium	26324.169	pCi/L	27982	94	90	110	PASS

UL Drinking Water Laboratory
Sample Result Record Sheet

Sample Matrix: DW
Acquisition File: Not Available
Data Directory: No File
Instrument: Prop Counter - CI
Extracted Date: 06/04/2012 09:11
Sample Number: 2647722
Dilution Factor: 1
Sample Site: 12E0923-01
Sample Location: Not Available

Method: 906.0
Calibration File: Not Available
Analysis Date: 06/04/2012
Analysis Time: 22:23
Analyst: oke
Results Submitted By: oke
Run Number: 169244
State of Origin: California
Project QC: State Compliance

Sample Quality Control

Internal Standards Parameter	Area	CCC Area	CCC % Resp	CCC Area Limits Lwr	CCC Area Limits Upr	CCC Pass / Fail	IC Avg Area	IC % Resp	IC Area Limits Lwr	IC Area Limits Upr	IC Pass / Fail

Surrogate Standards Parameter	Amount	Normalized	Units	Target	%Rec	Limits Lower	Limits Upper	Pass/Fail

Ordered Parameter Results

Parameter	Amount	MRL	Units	MCL	SMCL
Tritium	< 1000	**1000**	pCi/L	20000	

Additional Found Parameters

Parameter	Amount	MRL	Units	MCL	SMCL

The symbol * in the Amount column above indicates that the sample was re-analyzed for that parameter and the results are presented on another page.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: August 1, 2012

Company : UL Drinking Water Laboratory
Address : 110 South Hill Street

South Bend, Indiana 46617
Contact: Ms. Jessie Varab
Project: Drinking Water Analytical

Client Sample ID:	2647723	Project:	ENHL00196
Sample ID:	308066001	Client ID:	ENHL001
Matrix:	Drinking Water (Potable)		
Collect Date:	22-MAY-12 14:00		
Receive Date:	18-JUL-12		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Radium-228 in Drinking Water EPA 904.0 "As Received"												
Radium-228	U	ND	+/-0.535	0.958	1.00	pCi/L		KDF1	08/01/12	1304	1231029	1
Rad Radium-226												
Radium-226 in Drinking Water EPA 903.1 (De-emanati "As Received"												
Radium-226	U	ND	+/-0.461	0.940	1.00	pCi/L		KSD1	07/26/12	1320	1230775	2

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/ EPA 9320	
2	EPA 903.1	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Yttrium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			81.0	(25%-125%)
Barium Carrier	Radium-228 in Drinking Water EPA 904.0 "As Received"			99.2	(25%-125%)

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: August 1, 2012

Company : UL Drinking Water Laboratory
Address : 110 South Hill Street

South Bend, Indiana 46617
Contact: Ms. Jessie Varab
Project: Drinking Water Analytical

Client Sample ID:	2647724A,B	Project:	ENHL00196
Sample ID:	308066002	Client ID:	ENHL001
Matrix:	Drinking Water (Potable)		
Collect Date:	22-MAY-12 14:00		
Receive Date:	18-JUL-12		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting												
Gross Alpha/Beta in Drinking Water EPA 900.0 "As Received"												
Alpha	U	ND	+/-1.37	2.49	1.00	pCi/L		CYH1	07/30/12	2005	1231032	1
Beta		2.69	+/-1.12	1.76	1.00	pCi/L						

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 900.0	

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: August 1, 2012

UL Drinking Water Laboratory
110 South Hill Street
South Bend, Indiana
Contact: **Ms. Jessie Varab**

Workorder: **308066**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 1231029										
QC1202701462 LCS										
Radium-228	8.77			7.81	pCi/L		89	(80%-120%)	KDF1	08/01/12 12:41
	Uncertainty			+/-1.03						
QC1202701463 LCSD										
Radium-228	8.77			7.66	pCi/L	1.91	87.4	(0%-20%)		08/01/12 12:42
	Uncertainty			+/-1.02						
QC1202701461 MB										
Radium-228			U	0.185	pCi/L					08/01/12 12:44
	Uncertainty			+/-0.347						
Batch 1231032										
QC1202701471 308076002 DUP										
Alpha	U	-0.00134	U	-0.0352	pCi/L	0.00		N/A	CYH1	07/30/12 20:08
	Uncertainty	+/-0.246		+/-0.426						
Beta	U	0.683	U	-0.0679	pCi/L	0.00		N/A		
	Uncertainty	+/-0.589		+/-0.503						
QC1202701474 LCS										
Alpha	60.2			55.9	pCi/L		92.9	(80%-120%)		07/30/12 16:27
	Uncertainty			+/-5.81						
Beta	250			247	pCi/L		98.8	(80%-120%)		
	Uncertainty			+/-8.82						
QC1202701470 MB										
Alpha			U	-0.00163	pCi/L					07/30/12 20:08
	Uncertainty			+/-0.185						
Beta			U	0.172	pCi/L					
	Uncertainty			+/-0.363						
QC1202701472 308076002 MS										
Alpha	241 U	-0.00134		180	pCi/L		74.7	(70%-130%)		07/30/12 16:27
	Uncertainty	+/-0.246		+/-24.8						
Beta	1000 U	0.683		914	pCi/L		91.4	(70%-130%)		
	Uncertainty	+/-0.589		+/-36.5						
QC1202701473 308076002 MSD										
Alpha	241 U	-0.00134		192	pCi/L	6.52	79.7	(0%-20%)		07/30/12 16:27
	Uncertainty	+/-0.246		+/-22.5						
Beta	1000 U	0.683		967	pCi/L	5.61	96.7	(0%-20%)		
	Uncertainty	+/-0.589		+/-35.4						
Rad Ra-226										
Batch 1230775										
QC1202700959 308076001 DUP										
Radium-226	U	0.173		0.654	pCi/L	116*		(0% - 100%)	KSD1	07/26/12 13:50
	Uncertainty	+/-0.493		+/-0.427						
QC1202700961 LCS										
Radium-226	82.3			78.8	pCi/L		95.8	(90%-110%)		07/26/12 13:50
	Uncertainty			+/-3.93						

QC Summary

Workorder: 308066

Parmname		NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rad Ra-226												
Batch 1230775												
QC1202700958 MB												
Radium-226					U	0.486	pCi/L				KSD1	07/26/12 13:50
		Uncertainty				+/-0.382						
QC1202700960 308076001 MS												
Radium-226		10.0	U	0.173		10.8	pCi/L		107	(80%-120%)		07/27/12 04:50
		Uncertainty		+/-0.493		+/-1.64						

Notes:
The Qualifiers in this report are defined as follows:

**	Analyte is a surrogate compound
<	Result is less than value reported
>	Result is greater than value reported
A	The TIC is a suspected aldol-condensation product
B	For General Chemistry and Organic analysis the target analyte was detected in the associated blank.
BD	Results are either below the MDC or tracer recovery is low
C	Analyte has been confirmed by GC/MS analysis
D	Results are reported from a diluted aliquot of the sample
F	Estimated Value
H	Analytical holding time was exceeded
J	Value is estimated
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD
M	Matrix Related Failure
N/A	RPD or %Recovery limits do not apply.
N1	See case narrative
ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.
UI	Gamma Spectroscopy--Uncertain identification
UJ	Gamma Spectroscopy--Uncertain identification
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	QC Samples were not spiked with this compound
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

QC Summary

Workorder: 308066

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

h   Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Alpha
Alpha Analytical Laboratories Inc.
e-mail: clientservices@alpha-labs.com

Laboratory & Corporate: 208 Mason Street, Ukiah, CA 95482
707-468-0401 Fax: 707-468-5267

Service Center & Micro Lab: 6398 Dougherty Rd, Ste 35, Dublin, CA 94568
925-828-6226 Fax: 925-828-6309

Chain of Custody Record

Reports and Invoices will be delivered by email in .pdf format.

Lab No. 1250923 Page 1 of 1

Report to:
Company: Todd Engineers
Attn: Dr. Bill Motzer
Address: 2490 Mariner Square Loop, Suite 215, Alameda, CA 94501
Phone/Fax: 510.747.6920 / 510.747.6921
Email Address: bmotzer@toddengineers.com

Invoice to (if different):
Company:
Attn:
Address:
Phone/Fax:
Email Address:

Project Info for Report:
Project ID: East Palo Alto, Gloria Way Well
Project No:
PO/Reference :

Samplers Signature: [signature]
Print: William E. Motzer

Signature below authorizes work under terms stated on reverse side.

Sample Identification	Sampled: Date	Sampled: Time	Container: 40ml VOA	Poly	Amber	Soil jar	Preservative: HCL	HNO3	H2SO4	None	Matrix: Raw Water	Soil	Total Number of Containers	DU - General Physical	Cr6 218.6 - **sub McCampbell**	General Mineral / Inorganics / Perchlorate	DHS: 508 515.1 524.2 531.1 547 548 549.2	**Sub to UL Lab:**	504.1, Bromide, Dioxin 2378, Uranium	Gross A & B, Rad 226 & 228, Tritium	Asbestos 100.2 - **sub TEM Lab**	525.2 Full List + 507, Iodide - **sub WECK**	Strontium 90 - **sub FGL**
Gloria Way Well	5/22/12	1330									x		1	x									
	↑	↑									x		1		x								
											x		3			x							
											x		13				x						
											x		7						x				
											x		5							x			
											x		2								x		
	↓	↓									x		3									x	
	5/22/12	1400									x		1										x

Analyses Requested

TAT: 10 days ● ; **RUSH:** 5 days ○ ; 48 hours ○ ; Other: ___ days ○
Lab Approval Required For Rush TATs

Sample Notes (lab use only)
Temperature: 2.0 3 deg. C
Shipment Method:
Custody Seals: Y / N

Sample Notes or CDPH Source Numbers:

Relinquished by:	Received by:	Date:	Time:
[signature]	[signature]	5/22/12	1400
[signature]	[signature]	5/22/12	16:30
[signature]	R. [signature]	5-22-12	17:20
R. [signature]	LAB R. [signature]	5-22-12	20135

CDPH Write On EDT Transmission? ○ Yes ● No
State System Number:
If "Y" please enter the Source Number(s) in the column above

CA Geotracker EDF Report? ○ Yes ● No
Global ID:
Sampling Company Log Code:
EDF to (Email Address):
Travel and Site Time:
Mileage:
Misc. Supplies:

Appendix G

Permit Requirements for Active Status and New Production Well Systems

REGIONAL WATER QUALITY CONTROL PLANT
2501 Embarcadero Way
Palo Alto, CA 94303

TELEPHONE: 650/329-2598

OPERATED BY THE CITY OF PALO ALTO FOR THE
EAST PALO ALTO SANITARY DISTRICT-LOS ALTOS-LOS ALTOS HILLS-MOUNTAIN VIEW-PALO ALTO-STANFORD

DISCHARGE APPLICATION FOR EXCEPTIONAL WASTEWATER

One-Time Batch Discharge_____ Series of Batches

A. PROJECT IDENTIFICATION

Business Name:

Address at Point of Discharge:

Contact Person:

Mailing Address:

Telephone:______________________ Emergency Telephone:

B. PERMITTEE'S CONSULTANT

Name:

Address:

Contact Person:

Telephone:_____________________________ Fax:

C. PROJECT DESCRIPTION

☐ Decontamination
☐ Excavation Dewatering
☐ Vault Dewatering
☐ Line Flushing
☐ Site Clean-up
☐ Tank Removal
☐ Elevator Shaft Dewatering
☐ Other:

D. TYPE OF CONTAMINANTS

☐ Fuel ☐ Solvents ☐ Heavy Metals ☐ Cyanide ☐ Others

E. DISCHARGE QUALITY

1. Please indicate the proposed quantity of wastewater and the desired dates of discharge:

   Quantity Discharged:________________________(gallons)

   Flow Rate:___________________________(gallons per minute)

   Anticipated date of discharge:

2. Provide a map identifying the exact discharge location(s) (clean out, manhole, etc.).
3. Describe treatment systems, if any, to be used to treat contaminated water. List the parameters to be treated:

F. CERTIFICATION SIGNATURE

I certify, under penalty of law, that the information contained in this report is true and correct to the best of my knowledge. I am personally qualified to make this certification or I have consulted with a professional who is qualified to make this certification.

Please check one of the following:

☐ a. I am a principal of at least the level of vice president (if the permittee is a corporation).

☐ b. I am a general partner or proprietor (if the permittee is a partnership or sole proprietorship respectively).

☐ c. I am a duly authorized representative of the individual designated in A or B above (if such representative is responsible for the overall operation of the facility from which the discharge originates.) I further certify that a DESIGNATION OF AUTHORIZED REPRESENTATIVE (DOAR) form has been sent to the Control Authority.

PRINT NAME OF OFFICIAL	DATE
SIGNATURE OF OFFICIAL	TITLE OF SIGNING OFFICIAL
PHONE OF SIGNING OFFICIAL	ADDRESS IF DIFFERENT THAN "A" ABOVE

<u>Attachments:</u>

1) Table 1 Local Limits
2) Table 2 List of Organics
3) Sampling Instructions
4) Hazardous Waste Certification
5) DOAR Statement

Local Maximum Allowable Discharge Limits and Analytical Detection Levels

Pollutants	Local Maximum Limits[1] (mg/l)[2]	Maximum Allowable Analytical Detection Levels (mg/l)
Arsenic = As	0.1	0.01
Barium = Ba	5.0	0.5
Beryllium = Be	0.75	0.075
Boron = B	1.0	0.1
Cadmium = Cd	0.1	0.01
Chromium, (Hexavalent)	1.0	0.1
Chromium, (total) = Cr	2.0	0.2
Cobalt = Co	1.0	0.1
Copper = Cu	0.25[3]	0.025
Cyanide = CN	0.5	0.05
Fluoride = F^-	65	6.5
Formaldehyde = Frm	5.0	0.5
Lead = Pb	0.5	0.05
Manganese = Mn	1.0	0.1
Mercury = Hg	0.01	0.001
Nickel = Ni	0.5	0.05
Phenols = Phe	1.0	0.1
Selenium = Se	1.0	0.1
Silver = Ag	0.25	0.025
Single Toxic Organic[4] (STO)	0.75	0.075
Total Toxic Organics[4] (TTO)	1.0	0.1
Zinc = Zn	2.0[5]	0.2
Conventional Pollutants	**Local Maximum Limit[1]**	**Maximum Allowable Analytical Detection Levels**
Oil/Grease	200 mg/l	20 mg/l
pH	Min 5.0, Max 11.0	N/A
Suspended Solids	3000[6] mg/l	300 mg/l
Total Dissolved Solids	5000[7] mg/l	500 mg/l

1 For discharges greater than 50,000 gallons per day (gpd), the local maximum limits specified in the table above shall be one-half the values listed with the exception of the conventional pollutants, STO, TTO, copper, fluoride, nickel, mercury and silver. For example, if the discharge is greater than 50,000 gpd the local maximum lead limit shall be 0.25 mg/l.

2 Milligrams per liter

3 The local maximum copper limit for cooling system discharges less than 2,000 gpd, Vehicle Services, Photoprocessing, Machine Shops and Metal Fabrication shall be 2.0 mg/l. See Section 16.09.116 of the Sewer Use Ordinance for details and for metal finisher requirements.

4 See attached list of specific TTO/STO compounds.

5 The local maximum zinc limit for vehicle service facilities shall be 4.0 mg/l.

6 Applies to composite samples; the discharge limit for instantaneous samples is 6000 mg/l.

[7] Applies to composite samples; the discharge limit for instantaneous samples is 10000 mg/l.

ATTACHMENT 2

TABLE 2

TOTAL TOXIC ORGANICS

(40 CFR, Section 413.02(I))

Acenaphthene
Acrolein
Acrylonitrile
Benzene
Benzidine
Carbon tetrachloride (tetrachloromethane)
Chlorobenzene
1,2,4-trichlorobenzene
Hexachlorobenzene
1,2-dichloroethane
1,1,1-trichloroethane
Hexachloroethane
1,1-dichloroethane
1,1,2-trichloroethane
1,1,2,2-tetrachloroethane
Chloroethane
Bis (2-chloroethyl) ether
2-chloroethyl vinyl ether (mixed)
2-chloronaphthalene
2,4,6-trichlorophenol
Parachlorometa cresol
Chloroform (trichloromethane)
2-chlorophenol
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
3,3-dichlorobenzidine
1,1-dichloroethylene
1,2-trans-dichloroethylene
2,4-dichlorophenol
1,2-dichloropropane
1,3-dichloropropylene (1,3-dichloropropene)
2,4-dimethylphenol
2,4-dinitrotoluene
2,6-dinitrotoluene
1,2-diphenylhydrazine
Ethylbenzene
Fluoranthene
4-chlorophenyl phenyl ether
4-bromophenyl phenyl ether
Bis (2-chloroisopropyl) ether
Bis (2-chloroethoxy) methane
Methylene chloride (dichloromethane)
Methyl chloride (chloromethane)
Methyl bromide (bromomethane)
Bromoform (tribromomethane)
Dichlorobromomethane
Chlorodibromomethane
Hexachlorobutadiene
Hexachlorocyclopentadiene
Isophorone
Naphthalene
Nitrobenzene
2-nitrophenol
4-nitrophenol
2,4-dinitrophenol
4,6-dinitro-o-cresol
N-nitrosodimethylamine
N-nitrosodiphenylamine
N-nitrosodi-n-propylamine
Pentachlorophenol
Phenol
Bis (2-ethylhexyl) phthalate
Butyl benzyl phthalate
Di-n-butyl phthalate
Di-n-octyl phthalate
Diethyl phthalate
Dimethyl phthalate
1,2-benzanthracene (benzo(a)anthracene)
Benzo(a)pyrene (3,4-benzopyrene)
3,4-Benzofluoranthene (benzo(b)fluoranthene)
11,12-benzofluoranthene (benzo(k)fluoranthene)
Chrysene
Acenaphthylene
Anthracene
1,12-benzoperylene (benzo(ghi)perylene)
Fluorene
Phenanthrene
1,2,5,6-dibenzanthracene (dibenzo(a,h)anthracene)
Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)
Pyrene
Tetrachloroethylene
Toluene
Trichloroethylene
Vinyl chloride (chloroethylene)
Aldrin
Dieldrin
Chlordane (technical mixture and metabolites)
4,4-DDT
4,4-DDE (p,p-DDX)
4,4-DDD (p,p-TDE)
Alpha-endosulfan
Beta-endosulfan
Endosulfan sulfate
Endrin
Endrin aldehyde
Heptachlor
Heptachlor epoxide
(BHC-hexachlorocyclohexane)
  Alpha-BHC
  Beta-BHC
  Gamma-BHC
  Delta-BHC
(PCB-polychlorinated biphenyls)
  PCB-1242 (Arochlor 1242)
  PCB-1254 (Arochlor 1254)
  PCB-1221 (Arochlor 1221)
  PCB-1232 (Arochlor 1232)
  PCB-1248 (Arochlor 1248)
  PCB-1260 (Arochlor 1260)
  PCB-1016 (Arochlor 1016)
Toxaphene
2,3,7,8-tetrachlorodibenzo-p-dioxin
  (TCDD)

ATTACHMENT 3

SAMPLING INSTRUCTIONS

I. Definitions

1. Sample: A sample is a known volume of wastewater representing the true characteristics of the effluent which is discharged from industrial wastewater processes and collected for a specific duration of time.

2. Types of Samples: The two most common types of samples are grab samples and 24-hour composite samples, both of which may be obtained either manually or automatically. The type of sample typically required for each parameter and waste stream type is detailed in Table 1.

   a. A grab sample is a given volume of discharge which is collected at a single point in time.

   b. A 24-hour composite sample is a mixture of individual grab samples which are collected at regular intervals. 24-hour composite samples consist of individual representative samples collected every 15 minutes. It is recommended that an automatic sampler be used, but if an automatic sampler is not available, manual grab samples may be taken every 15 minutes. A composite sample may then be prepared from the set of preserved grab samples. Equal volumes of the individual samples must be used unless flow monitoring allows for flow proportioning of the composite sample. Unless flow proportioning is being conducted, each grab sample must be at least 50 ml.

3. Manual Sampling: Manual sampling is the manual collection of a sample using an appropriate container (see Table 1).

4. Automatic Sampling: Automatic sampling is the collection of grab samples at regular intervals using a mechanical device.

II. Sample Collection and Sample Preservation

1. Metals

Collect self-monitoring samples for metals analysis at the point of discharge from the process stream downstream of any pretreatment system but prior to any dilution streams.

Immediately after collection, preserve by adding nitric acid until a pH <2 is attained. Please record the time and date of sample collection, pH if measured, and the name of the person(s) collecting/preserving the samples. Submit the composite sample as soon as collected to a laboratory approved by the California Department of Health Services for such analysis.

2. Cyanide

Collect self-monitoring samples for cyanide analysis at the point of discharge of the cyanide bearing waste stream downstream of any pretreatment system but prior to any dilution streams.

Each cyanide sample shall be collected as a grab sample and immediately preserved by adding sodium hydroxide until a pH >12 is attained. If chlorine destruction of cyanide has been used, check the sample for chlorine residual and dechlorinate the sample with 0.6 g. ascorbic acid per liter of sample before adjusting pH with sodium hydroxide. Cyanide samples shall be kept in the dark and refrigerated at 4 degrees centigrade. Please record the time and date of sample collection, pH, and the name of the person(s) collecting/preserving the samples. Submit the samples to a laboratory approved by the California Department of Health Services for such analysis.

3. Fluoride

Collect self-monitoring samples for fluoride analysis at the point of discharge of the fluoride bearing waste stream downstream of any pretreatment system but prior to any dilution stream.

Both grab and composite sample containers should be supplied to you by your analytical laboratory. Plastic containers, not glass, are appropriate for fluoride samples.

Immediately after collection, samples must be measured for pH. Please record the time and date of sample collection, pH, and the name of the person(s) collecting the samples. Submit the composite sample within one week of collection to a laboratory approved by the California Department of Health Services for such analysis.

All records must be retained and made available to City personnel upon demand. Results must be transcribed onto self-monitoring logs and submitted along with the original laboratory reports.

4. TTO

Collect self-monitoring samples for TTO analysis at the point of discharge from the process streams downstream of any pretreatment system but prior to any dilution streams.

TTO samples shall be collected as grab samples. For maximum reliability, it is suggested that at least two duplicates of each sample be taken. Only glass containers are appropriate for TTO samples and should be supplied to you by your analytical laboratory. Due to their volatile nature, a special sampling technique shall be used to collect samples for TTO analysis. A 40-ml glass sample bottle (or vial) should be filled in such a manner that no air bubbles pass through the sample as the bottle is being filled. The bottle or vial shall then be carefully sealed so that no air bubbles are entrapped in it. This hermetic seal must be maintained until the sample is analyzed.

Hold samples at 4 degrees C, hermetically sealed, and analyze within the acceptable holding time for the analysis. Preserve the replicate sample(s) for verification analysis if needed. A similar protocol may be followed for other types of volatile organics samples using other container types and sizes.

The method of analysis shall be capable of detecting at least 0.005 mg/l of each of the organic constituents in the discharge.

5. COD, NH_3 and SS

The COD, NH_3 and SS samples shall be 24-hour composite samples collected every 15 minutes from the designated sampling point. If an automatic sampler is used, the sampler must be equipped with ice to prevent the biological degradation of the sample during the sample collection period.

Immediately after collection, the COD and NH_3 samples must be measured for pH and preserved by adding sulfuric acid until a $pH<2$ is attained. The suspended solids sample must be kept refrigerated until delivery to the laboratory and does not need chemical preservation.

III. Sample Chain of Custody and Analysis

At a minimum, the following information shall be documented for each sample collected:

(1) date, time, exact location, and method of sampling. For composite samples, the setup date/time, start date/time, end date/time, and pickup time are required;
(2) volume of wastewater discharged through the sampling location during a composite sampling event or the volume of wastewater discharged on the day of sampling for grab sampling events;
(3) sampling container type;
(4) preservative used in each container;
(5) If cyanide samples are collected downstream of a cyanide destruction unit that employs chlorine then the chain of custody must indicate that free chlorine in the sample was tested for and if present neutralized prior to sample preservation;
(6) pollutants to be analyzed;
(7) indication if sampling container was sealed with a custody seal;
(8) indication if sampling container was refrigerated;
(9) individual who performed the sampling;
(10) analytical techniques or methods used for sample analysis;
(11) results of all analyses;
(12) dates the analysis was performed; and
(13) person(s) and company that performed the analysis.

The chain of custody form must be retained for a minimum of three years and be made available to City staff upon request. Samples shall be analyzed at the discharger's expense by a laboratory accredited by the California Department of Health Services for such analysis unless otherwise specified in the Discharge Permit.

Table 1
SUMMARY OF SAMPLE HANDLING REQUIREMENTS

DETERMINATIONS	CONTAINER	PRESERVATION	MAXIMUM STORAGE RECOMMENDED/REGULATORY *
Ammonia	P, G	Analyze as soon as possible or add H_2SO_4 to pH<2	7 days/28 days
COD	P, G	Analyze immediately or add H_2SO_4 to pH<2	7 days/28 days
Cyanide (total)	P, G	Add NaOH to pH>12 Refrigerate in dark	24 hours/14 days (24 hours if sulfide present)
Fluoride	P	None required	28 days/28 days
Metals	P, G	Add HNO_3 to pH<2	180 days/180 days
Suspended Solids	P, G	Refrigerate	2 days/7 days
TTO	G, TFE-lined cap	Refrigerate	7 days/7 days until extraction

G: glass
H_2SO_4: sulfuric acid
HNO_3: nitric acid
TFE: teflon
P: plastic
NaOH: sodium hydroxide

* Environmental Protection Agency, Rules and Regulations, Federal Register 49: No. 209, October 26, 1984. See this citation for possible differences regarding container and preservation requirements.

Table 2
SUMMARY OF SAMPLE COLLECTION REQUIREMENTS

	POLLUTANTS							
	METALS	TTO	CYANIDE	PHENOL	FORMAL-DEHYDE	FLUORIDE	COD, SS, AMMONIA	pH
BATCH PROCESS FLOW	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
CONTINUOUS PROCESS FLOW	Comp	Grab	Grab	Grab	Comp	Comp	Comp	Grab
COMBINED PROCESS AND SANITARY FLOW	Comp	Grab	Grab	Grab	Comp	Comp	Comp	Grab

ATTACHMENT 4

REGIONAL WATER QUALITY CONTROL PLANT

2501 Embarcadero Way, Palo Alto, California 94303, phone 650-329-2598
http://www.cityofpaloalto.org/depts/pwd/compliance/default.asp

Serving the Communities of the East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto and Stanford

HAZARDOUS WASTE CERTIFICATION ADDENDUM

1. DISCHARGE PERMIT APPLICATION SUBMITTAL DATE

Please enter the application submittal date: _____

2. BUSINESS IDENTIFICATION

Please complete the following:

Business Name:
Street address of facility discharging wastewater:

3. CERTIFICATION

Please check ONE of the three boxes below and sign

I certify, under penalty of law, that the wastes for which the discharge application is being filed does not and will not constitute a hazardous waste under Chapter 6.5 of the Health and Safety Code (Sections 25115 and 25117) and Title 22 of the California Administrative Code (Sections 66680 to, and including, 66746) at the point of discharge into the City sanitary sewer system. I am personally qualified to make this certification or I have consulted with a qualified professional who is qualified to make this certification.

☐ I am a principal executive officer of at least the level of vice-president (if the Permittee is a corporation).

☐ I am a general partner or proprietor (if the Permittee is a partnership or sole proprietorship respectively).

☐ I am the Designated Authorized Representative* on record or as documented in the attached Designation of Authorized Representative form.

Signature of Official — Telephone Number

Name and Title of Signing Official (Please print or type) — Date

**If the person signing Section 3 above is not (1) a principal executive officer of at least the level of Vice-President if the company is a corporation or (2) a general partner or proprietor if the company is a partnership or sole proprietorship, please complete and return the Designation of Authorized Representative (DOAR) form which is included with the application package.*

ATTACHMENT 5

REGIONAL WATER QUALITY CONTROL PLANT

2501 Embarcadero Way, Palo Alto, California 94303, phone 650-329-2598
http://www.cityofpaloalto.org/depts/pwd/compliance/default.asp

Serving the Communities of the East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Mountain View, Palo Alto and Stanford

DESIGNATION OF AUTHORIZED REPRESENTATIVE

An Industrial Waste Discharge Permit has been issued to this facility in accordance with the City of Palo Alto Sewer Use Ordinance No 3889, Section 16.09.020. As stated in this permit, various reports are periodically due as required by Federal and State regulations. These reports require the signature of a principal executive officer of at least the level of vice-president if the Permittee is a corporation OR a general partner or proprietor if the Permittee is a partnership or sole proprietorship. A duly authorized representative may be designated to sign if such representative is responsible for the overall environmental compliance of the facility from which the industrial waste discharge originates. If a representative is designated to sign, then the Permittee must submit to the Control Authority (jointly owned Palo Alto-Mountain View-Los Altos Public Operated Treatment Plant) a DESIGNATION OF AUTHORIZED REPRESENTATIVE (DOAR) statement.

A. BUSINESS IDENTIFICATION

Please complete the following:

Business Name:
Street Address of Facility Discharging Wastewater:

B. DESIGNATED REPRESENTATIVE

Please complete the section below with regard to the person directly responsible for environmental compliance at the Facility (person to whom correspondence will be directed):

Name: Title: Mailing Address:	Office Phone: Emergency Phone: Fax: E-mail:

C. EXECUTIVE OFFICER

Please complete the section below with regard to the executive officer (must be at least Vice-President, General Partner, or Proprietor):

Name: Title: Mailing Address:	Phone: Emergency Phone: Fax: E-mail:

D. STATEMENT OF FACT

Please check ONE of the two boxes below and sign

The above person is authorized as my representative to sign reports and certification statements submitted to the Control Authority as required by the Industrial Waste Discharge Permit. This authority shall remain in effect until the Control Authority is notified in writing of any changes.

☐ I am a principal executive officer of at least the level of vice-president (if the Permittee is a corporation).

☐ I am a general partner or proprietor (if the Permittee is a partnership or sole proprietorship respectively).

Signature of Official	Telephone Number
Name and Title of Signing Official (Please print or type)	Date

Please return the original DOAR to:	ENVIRONMENTAL COMPLIANCE DIVISION REGIONAL WATER QUALITY CONTROL PLANT 2501 Embarcadero Way Palo Alto, CA 94303

From: Daniel Craig [DCraig@toddengineers.com]
Sent: Tuesday, May 15, 2012 2:27 PM
To: Tom Yeager
Cc: Kelly White
Subject: FW: Some topics for the CDPH Meeting Regarding Gloria Way Well, East Palo Alto
Attachments: 4110024.City of East Palo Alto Gloria Well log.pdf; Gloria Bay Well.012.jpg; RES6.DOC

Hi Tom – in addition to our governance/management/ funding meeting next Tuesday EPA s trying to setup a meeting for CA DPH either 5/25 or the following week of 5/29 – 6/01 to discuss permitting requirements. Would you please respond to Bret's other email about your availability those days ?

DPH also sent this detailed list of requirements (see below) which pretty much cover what they are going to need. Especially see below "Since the well is already existing and meets the Well Standards (since it is provided with a sealed surface and an annular seal depth of more than 50 feet and thus is properly constructed), the Department considers the separation issues between the well and the residential sanitary sewers not an issue for the permitting process."

Kelly – FYI

Thank You * -Dan

Daniel J. Craig, PG, CHG
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From: Lozano, Jose (CDPH-DDWEM) [mailto:Jose.Lozano@cdph.ca.gov]
Sent: Tuesday, May 15, 2012 11:36 AM
To: Bret Swain
Cc: Daniel Craig; Lacy, Eric (CDPH-DDWEM); GNathan@amwater.com; McGovern.Cheryl@epamail.epa.gov
Subject: RE: Some topics for the Meeting Discussion Regarding Gloria Way Well, East Palo Alto

Bret:

Thank you very much for the informative e-mail that gives us a fairly good idea what the City intends to do with respect to the Gloria Way Well (aka Well 01; Primary Station Code (PSC) No. 4110024-001; Note that the well is currently classified an inactive well.) and what the Department, as the state regulator, will be requiring of the City, as part of the permitting process, to allow the improvement projects (together with the alternatives, which you discussed in your e-mail below) to proceed and later go online.

I) First, regarding the Gloria Way Well (aka Well 01). After talking to you on the phone, I reviewed the system files and noted the following:

1) Well 01 (See photo) can be considered to meet the Well Standards since it is provided with a sealed surface and an annular seal depth of more than 50 feet. The well drillers report for Well 01 (See enclosed PDF copy) indicates that the well has a 100-ft sanitary seal and is drilled in alluvial soils.
2) There is no record of a drinking water source assessment performed for Well 01;
3) According to a well data sheet received by our office on June 4, 1984, the well's turbine pump has a capacity of 300 gallons per minute (GPM). The well has not been operated for approximately 30 years. So, this pump capacity information is not current and needs to be updated through a new pump test.
4) Based on water quality monitoring data (obtained in 2005 and 2006) on file), Well 01 has manganese levels exceeding the secondary MCL. The well has iron levels ranging from 140 to 170 micrograms/liter (ug/L) and manganese levels from 180 to 182 ug/L. The secondary MCL for iron is 0.3 mg/L (300 ug/L) and that for manganese is 0.050 mg/L (50 ug/L).

Based on the above findings, the City will need to apply for an amended permit to change the status of Well 01 from inactive to active. As part of the amended permit application, we require the City to submit the following:

1) Completed permit application form;
2) A copy of the pump test used to determine the current source capacity of the well. Please note that the performance of the pump test must comply with the conditions specified in Section 64554 (f), Chapter 16, California Waterworks Standards, Title 22, California Code of Regulations (CCR).;
3) A completed drinking water source assessment for Well 01;
4) If the well is to be rehabilitated (and the well pump replaced), well design and as-built schematic diagram; and design drawings and specifications of the proposed replacement pump, slab construction and wellhead features.
5) Documentation of the California Environmental Quality Act (CEQA) clearance;
6) Title 22 water quality testing indicating that the well water meets the primary and secondary maximum contaminant levels; otherwise, (as most likely, in the case of manganese) , treatment will be required.

Since the well is already existing and meets the Well Standards (since it is provided with a sealed surface and an annular seal depth of more than 50 feet and thus is properly constructed), the Department considers the separation issues between the well and the residential sanitary sewers not an issue for the permitting process.

II) Regarding the treatment, which could involve blending (which is also considered a form of treatment) and treatment to address the 2nd MCLs OR both – the City would need to include in the above-mentioned amended permit application , the final treatment process for the source. In addition, the City would need to submit the following information:

1) Technical/engineering report for the treatment plant;
2) Plans and specifications for the treatment plant; and
3) Operations plan for the treatment plant.
4) If blending (involving Well 01 and SFPUC water) is part of the final treatment process, a blending operations plan, which would discuss, among other things, blending calculations, monitoring (for the concerned chemical(s) and flow), set points, alarm systems, and contingency plans.

The size of the lot (approximately, 50 feet by 80 feet) where Well 01 is located will be a major factor in deciding the size/type of treatment to be used.

III) Regarding the issue of storage, whether built into an above ground facility like parking overhead, or below ground storage, the City MUST comply with the requirements of Section 64585, Chapter 16, California Waterworks Standards (CWS), Title 22, CCR and Section 64582, CWS, T22, CCR (See excerpt below).

If the storage involves the addition of a new distribution reservoir, which has a capacity of 100,000 gallons or greater, in accordance with Section 64556, Chapter 16, CWs, T22, CCR, the City is required to apply for an amended permit application. In addition, the City must submit the following;

1) Plans and specification for the storage tank;
2) Documentation of the California Environmental Quality Act (CEQA) clearance;
3) Distribution data sheet (see enclosed form)

§64582. Disinfection of Reservoirs.

A newly-installed distribution reservoir or distribution reservoir that has been taken out of service for repair or inspection shall be disinfected and sampled for bacteriological quality in accordance with the American Water Works Association Standard C652-02, which is hereby incorporated by reference. If the results of the bacteriological sampling are positive for coliform bacteria, the reservoir shall be resampled for bacteriological quality and the test results shall be submitted to the Department for review and approval before the reservoir is placed into service.

Article 6. Distribution Reservoirs

§64585. Design and Construction.

(a) Each distribution reservoir shall meet the following:

(1) Any reservoir coatings or linings shall be installed in accordance with manufacturer's instructions;

(2) Vents and other openings shall be constructed and designed to prevent the entry of rainwater or runoff, and birds, insects, rodents, or other animals;

(3) At least one sampling tap shall be available to enable representative sampling of the water in the reservoir that will be entering the distribution system; the tap shall be protected against freezing, if necessary; and

(4) A reservoir shall not be designed, constructed, or used for any activity that creates a contamination hazard.

(b) The water supplier shall submit to the Department for review the design drawings and specifications for each proposed distribution reservoir prior to its construction. Each new distribution reservoir shall be:

(1) If it is a tank, constructed in accordance with American Water Works Association (AWWA) standards, which are hereby incorporated by reference, as follows: AWWA D100-05 (Welded Carbon Steel Tanks for Water Storage), D102-03 (Coating Steel Water-Storage Tanks), D103-97 (Factory-Coated Bolted Steel Tanks for Water Storage), D110-04 (Wire-and Strand-Wound, Circular, Prestressed Concrete Water Tanks), and D120-02 (Thermosetting Fiberglass-Reinforced Plastic Tanks);

(2) Constructed of an impervious material that prevents the movement of water into or out of the reservoir;

(3) Covered with

(A) A rigid structural roof made of impervious material that prevents the movement of water or other liquids into or out of the reservoir; or

(B) A floating cover designed, constructed, and maintained in conformance with the AWWA California-Nevada Section's "Reservoir Floating Cover Guidelines" (April 1999), AWWA Manual M25 (2000), and AWWA D130-02 (Flexible-Membrane Materials for Potable Water Applications), which are hereby incorporated by reference.

(4) Equipped with at least one separate inlet and outlet (internal or external), and designed to

minimize short-circuiting and stagnation of the water flow through the reservoir;

(5) Equipped with drainage facilities that allow the tank to be drained and all residual sediment removed, and an overflow device. The reservoir drainage facilities and overflow device shall not be connected directly to a sewer or storm drain and shall be free of cross-connections;

(6) Equipped with controls to maintain and monitor reservoir water levels;

(7) Equipped to prevent access by unauthorized persons;

(8) Designed to allow authorized access and adequate lighting of reservoir interior for inspections, cleaning or repair;

(9) Equipped with isolation valves, and designed and operated to allow continued distribution of water when the reservoir is removed from service. The isolation valves shall be located within 100 feet of the reservoir. For a reservoir used to meet the disinfectant contact time requirements of chapter 17 (Surface Water Treatment), bypass lines shall be blind-flanged closed during normal operations;

(10) Designed and constructed to prevent the entry of surface runoff, subsurface flow, or drainage into the reservoir;

(11) Designed to prevent corrosion of the interior walls of the reservoir;

(12) For a subsurface reservoir,

(A) Protected against flooding (both reservoir and vents);

(B) Equipped with underdrain facilities to divert any water in proximity to the reservoir away from the reservoir;

(C) Sited a minimum of 50 feet horizontally from a sanitary sewer and 100 feet horizontally from any other waste facilities and any force main;

(D) Constructed so as to have the reservoir bottom located above the highest anticipated groundwater level, based on a site investigation that includes actual measurements of the groundwater level during peak rainfall periods; extraction wells shall not be used to influence the highest anticipated groundwater level;

(E) Provided with a minimum of two groundwater level monitoring wells drilled to a depth at least 20 feet below the reservoir bottom and sited within 100 feet and on opposite sides (upgradient and downgradient) of the reservoir; and

(F) If the roof is to be buried and have a function (e.g., recreation, landscape, parking) in addition to covering the reservoir:

1. Designed and constructed pursuant to AWWA D110-04 (Wire- Strand-Wound, Circular, Prestressed Concrete Water Tanks), which is hereby incorporated by reference;

2. Equipped with an impervious connection, such as a pvc waterstop, between the wall and buried roof; and

3. Watertight, sloped for drainage and coated with a damp proofing material.

If the City decides to drill a new well instead of using Well 01, an amended permit application must be submitted for the new well. The City must comply with Section 64560, Chapter 16, CWS, T22, CCR for the permitting of the new well. In addition, the Department has other permitting requirements (e.g., CEQA clearance, source water assessment, etc.) for the new well, which will be provided upon the City's request.

The Department will provide further information regarding the above permitting requirements after the meeting. By the way, when (date and time) will the meeting take place?

I hope the above information addresses all the permitting and regulatory requirements needed for the City's improvement project(s). If I missed anything or if the City or its consultants have any questions, please contact me.

Jose ("JJ") P. Lozano IV, P.E.

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Santa Clara District
Drinking Water Field Operations Branch (DWFOB)
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From: Bret Swain [mailto:bswain@cityofepa.org]
Sent: Monday, May 14, 2012 5:25 PM
To: Lozano, Jose (CDPH-DDWEM); Lacy, Eric (CDPH-DDWEM)
Subject: Some topics for the Meeting Discussion Regarding Gloria Way Well, East Palo Alto

Jose,
As we discussed earlier, this is an initial feasibility study that will lead to a recommended project and eventual project design/implementation. The questions that have arisen thus far have related to the separation requirements between the Gloria Way Well and residential sanitary sewer (laterals in particular), the requirements for treatment and DPH's input, the requirements for storage/blending and DPH's input (particularly for potential storage built into a above ground facility like parking overhead, or below ground storage), and potentially other questions that may have arisen in the course of Kennedy Jenks review of the system. The US EPA had requested that we schedule a face to face meeting to look at some issues that DPH may have an impact on before we spend too much time and effort towards a conceptual design alternative that may not be allowable by DPH.

For the purposes of this study, in general we are looking a the following alternatives:

1. Rehabilitate/Restore Gloria Well to operation as a fully operational potable supply
   a. With treatment to address secondary MCLs
   b. With blending...
   c. With both

2. Rehabilitate/Restore Gloria Well to operation as a fully operational potable supply
   a. With treatment to address secondary MCLs
   b. With blending...
   c. With both
   d. Without treatment or blending

3. Identify other groundwater resource opportunities that could be utilized instead of Gloria Well if more feasible

4. A combination of Gloria Well and other groundwater resources to meet the City's long-term demands

-Bret Swain, PE

Appendix H

Water Rate Information for Cities of Palo Alto and San Bruno

The water and wastewater bill, at any particular property, will be affected by the rate increases, below, depending on the size of the meter connection and the amount of water consumed. For residential properties, the average water consumption between January and April of the prior year is used to determine the bi-monthly wastewater quantity charge. Customers meeting the definition of low income may receive a reduction in their bills in accordance with program guidelines as determined by City Council resolution. For more information about the low income program, call (650) 616-7086.

The increases are being proposed in order to offset a projected 54% increase in the cost of wholesale water from San Francisco, anticipated improvements to South San Francisco Sewer Treatment Plant, and projected increased capital costs associated with the replacement and rehabilitation of the City's water and wastewater utility infrastructure.

All references to "unit" where applicable to measurement of water represents one hundred (100) cubic feet or 748 gallons.

Proposed Water Rates

The proposed rate structure for water service consists of a monthly service charge based on the size of the water meter plus a quantity charge for all metered consumption of water. The proposed increases will be effective for all water bills mailed on or after July 1, 2012, as follows:

Monthly Service Charge	Meter Size	Current	Proposed July 1, 2012	Proposed July 1, 2013	Proposed July 1, 2014	Proposed July 1, 2015	Proposed July 1, 2016
Residential	3/4"	$14.22	$15.32	$16.60	$17.99	$19.49	$21.13
	1"	$19.43	$21.85	$24.68	$27.82	$31.31	$35.22
	1-1/2"	$32.46	$38.19	$44.87	$52.41	$60.87	$70.43
Multi-Family, Business, Commercial, and Industrial	2"	$49.43	$58.94	$70.04	$82.58	$96.71	$112.69
	3"	$73.93	$94.36	$118.18	$145.35	$176.19	$211.30
	4"	$136.71	$168.89	$206.42	$249.08	$297.34	$352.17
	6"	$267.00	$332.26	$408.35	$494.91	$592.92	$704.33
	8"	$475.48	$573.22	$687.17	$816.30	$961.91	$1,126.93
	10"	$762.13	$891.77	$1,042.88	$1,213.21	$1,404.30	$1,619.97

Quantity Charges for each Unit of Water Consumed per Billing Period (two months)		Current	Proposed July 1, 2012	Proposed July 1, 2013	Proposed July 1, 2014	Proposed July 1, 2015	Proposed July 1, 2016
Single-Family Residential	Tier 1: 0-10 units	(0-18) $4.79	$5.06	$5.56	$6.10	$6.70	$7.36
	Tier 2: 10-20 units	(0-18) $4.79	$6.07	$6.67	$7.32	$8.04	$3.83
	Tier 3: > 20 units	(>18) $7.26	$8.10	$8.90	$9.76	$10.72	$11.78
All Other Accounts: Each Unit		$5.22	$5.72	$6.28	$6.90	$7.58	$8.33

Water to supply for customers at the Crystal Springs Terrace Apartments is purchased from the North Coast County Water District. A differential cost reflecting the higher cost of water purchased from this source is applied to these accounts (projected to be $0.31 per hundred cubic feet of water consumed in 2012-13.)

Proposed Wastewater (Sewer) Rates

The proposed rate structure for wastewater service consists of a monthly service charge based on the size of the property's water meter, plus a quantity charge based on metered water use. For all residential accounts, the quantity charge is based on the average metered water use consumed through two billing periods during the winter months (January to April). The proposed rate structure and rate increases will be effective for all wastewater bills mailed on or after July 1, 2012, as follows:

Monthly Service Charge		Current	Proposed July 1, 2012	Proposed July 1, 2013	Proposed July 1, 2014	Proposed July 1, 2015	Proposed July 1, 2016
Single-Family Residential		$18.35	$20.02	$21.47	$23.04	$24.71	$26.55
All Other Accounts (Based on Water Meter Size)	3/4"	$18.35	$20.02	$21.47	$23.04	$24.71	$26.55
	1"	$18.35	$22.69	$27.20	$32.26	$37.89	$44.25
	1-1/2"	$18.35	$29.36	$41.51	$55.30	$70.84	$88.50
	2"	$18.35	$37.37	$58.68	$82.94	$110.37	$141.60
	3"	$18.35	$56.06	$98.76	$147.46	$202.62	$265.50
	4" and above	$18.35	$82.75	$156.02	$239.62	$334.41	$442.50

Quantity Charges Based on Property Classification		Current	Proposed July 1, 2012	Proposed July 1, 2013	Proposed July 1, 2014	Proposed July 1, 2015	Proposed July 1, 2016
All Residential (Single & Multi-Family)		$6.30	$6.88	$7.59	$8.37	$9.23	$10.18
Commercial	C-1	$6.44	$6.40	$7.05	$7.78	$8.58	$9.46
	C-2	$7.70	$6.88	$7.59	$8.37	$9.23	$10.18
	C-3	$8.88	$9.79	$10.80	$11.91	$13.14	$14.49
	C-4	$11.84	$12.70	$14.01	$15.45	$17.04	$18.80
Government	G	$6.31	$6.88	$7.59	$8.37	$9.23	$10.18
Industrial	I-1	$6.44	$6.88	$7.59	$8.37	$9.23	$10.18
	I-2	$5.63	$4.94	$5.45	$6.01	$6.63	$7.31
	COD per lb	$0.07	$0.38	$0.42	$0.46	$0.51	$0.56
	SS per lb	$0.25	$0.78	$0.86	$0.95	$1.05	$1.16

GENERAL RESIDENTIAL WATER SERVICE

UTILITY RATE SCHEDULE W-1

A. APPLICABILITY:

This schedule applies to all separately metered single family residential water services.

B. TERRITORY:

This schedule applies everywhere the City of Palo Alto provides water services.

C. RATES:

Monthly Service Charge:	Per Meter Per Month
For 5/8-inch meter	$ 13.74
For 3/4 inch meter	18.28
For 1 inch meter	27.35
For 1 1/2 inch meter	50.03
For 2-inch meter	77.25
For 3-inch meter	163.44
For 4-inch meter	290.46
For 6-inch meter	594.39
For 8-inch meter	1,093.39
For 10-inch meter	1,728.48

Commodity Rate: (To be added to Service Charge and applicable to all pressure zones.)

Per Hundred Cubic Feet (ccf) Per Month	All Pressure Zones
Tier 1 usage	$4.54
Tier 2 usage (All usage over 100% of Tier 1)	7.06

Temporary unmetered service to residential subdivision developers, per connection	$6.00

RESIDENTIAL MASTER-METERED AND GENERAL NON-RESIDENTIAL WATER SERVICE

UTILITY RATE SCHEDULE W-4

A. APPLICABILITY:

This schedule applies to non-residential water service in the City of Palo Alto and its distribution area. This schedule is also applicable to multi-family residential customers served through a master meter.

B. TERRITORY:

This schedule applies everywhere the City of Palo Alto provides water services.

C. RATES:

Monthly Service Charge		Per Meter Per Month
For	5/8-inch meter	$ 13.74
For	3/4-inch meter	18.28
For	1-inch meter	27.35
For	1 ½-inch meter	50.03
For	2-inch meter	77.25
For	3-inch meter	163.44
For	4-inch meter	290.46
For	6-inch meter	594.39
For	8-inch meter	1,093.39
For	10-inch meter	1,728.48

Commodity Rates: (to be added to Service Charge)

Per Hundred Cubic Feet (ccf) Per Month	All Pressure Zones
Per ccf	$ 5.75

D. SPECIAL NOTES:

1. Calculation of Cost Components

The actual bill amount is calculated based on the applicable rates in Section C above and adjusted for any applicable discounts, surcharges and/or taxes. On a customer's bill statement, the bill amount may be broken down into appropriate components as calculated under Section C.

2. Calculation of Usage Tiers

Tier 1 water usage shall be calculated and billed based upon a level of 0.2 ccf per day rounded to the nearest whole ccf, based on meter reading days of service. As an example, for a 30 day bill, the Tier 1 level would be 0 through 6 ccf. For further discussion of bill calculation and proration, refer to Rule and Regulation 11.

{End}

D. SPECIAL NOTES:

1. Calculation of Cost Components

The actual bill amount is calculated based on the applicable rates in Section C above and adjusted for any applicable discounts, surcharges and/or taxes. On a customer's bill statement, the bill amount may be broken down into appropriate components as calculated under Section C.

{End}

WATER SERVICE CONNECTION FEES

UTILITY RATE SCHEDULE W-5

A. TERRITORY:

Inside the incorporated limits of the City of Palo Alto and on land owned or leased by the City of Palo Alto.

B. FEES:

All fees must be paid prior to the scheduling of any construction. Depending on material availability and scheduling constraints, utility service will be installed between 30 and 40 days following receipt of full payment. Any work required to be done outside of regular work hours due to traffic, existing conditions or applicant's requirements shall be charged at 1.5 times the stated fee. The following fees are regularly updated, therefore all billings are only valid for 90 days from date of billing.

1. DISTRIBUTION SYSTEM EXTENSION CHARGE

   For City Standard 6" Main, charge per foot $111.00

2. SERVICE CONNECTION CHARGES:

   Category 1 - Domestic Water Service

Size	Amount
1-inch connection	$3,797.00
1-1/2 inch connection	4,535.00
2-inch connection	5,681.00
4-inch connection	8,381.00
6-inch connection	9,379.00

   Category 2 - Fire Service

Size	Amount
4-inch connection	$7,176.00
6-inch connection	7,941.00
8-inch connection	8,564.00

Category 3 – Additional Domestic or Irrigation Services

For service installations connecting to a pre-existing, larger service.

1-inch connection	$1,747.00
1-1/2 inch connection	2,095.00
2-inch connection	2,383.00
4-inch connection	5,043.00

Category 4 - Combination Domestic Water Service and Fire Service

For requests of combination domestic and fire water services, two service connection charges will apply: the charge for connection of a fire service and the charge for domestic service installation connection to a larger service.

Category 5 - Master Water Service

Approval by the Director of Utilities is required for a connection that serves domestic water service and fire protection through a detector meter. The charge for master water service will be based on the Engineering Manager's, Water-Gas-Wastewater, estimate of the total costs, including: materials, labor, metering not listed in Section B(2) or B(4), and other costs incidental to the installation.

For service connections of 4-inch through 8-inch sizes and meter sizes of 3-inch through 8-inch, the new owner must provide and install a concrete vault with meter reading lid covers to house meters and other required control equipment in accordance with the Water Utility's specifications.

An approved backflow prevention device with bypass assemblies must be provided by owner on all fire services.

3. METER CHARGES:

5/8 Inch x 3/4 Inch	$222.00
1 Inch	276.00
1 ½ Inch	492.00
2 Inch disk	601.00

2	Inch turbine (irrigation only)	724.00
3	Inch compound	1,882.00
3	Inch turbine (irrigation only)	1,163.00
4	Inch	2,429.00
4	Inch turbine (irrigation only)	1,487.00
6	Inch	4,138.00
AMR Encoder Receiver Transmitter		108.00

4. ADDITIONAL METERS ON CONNECTION:

With new connection	$321.00
On existing connection	783.00

5. RELOCATION OF FACILITIES:

Approved relocation of service, hydrants, or other facilities will be done at the cost of the person requesting the re-location. Deposit of estimated cost is required before relocation work begins. After the City completes the work, a final billing based on actual costs will be sent to the person requesting the relocation of facilities.

6. CAPACITY FEES:

Domestic:

5/8	Inch x 3/4 Inch	$5,000.00
1	Inch	9,400.00
1 ½	Inch	18,850.00
2	Inch	By estimate at $125/FU
3	Inch	By estimate at $125/FU
4	Inch	By estimate at $125/FU
6	Inch	By estimate at $125/FU

Note: FU is fixture unit (1 FU=15gpd)

Fire Service Capacity Fees:

2	Inch	$750.00
4	Inch	$9,000.00

6	Inch	$22,530.00
8	Inch	$43,080.00
10	Inch	$69,510.00

If a customer is upgrading the capacity of an existing service, then the capacity charge will be the difference between the new service size and the existing service size.

C. OTHER CONDITIONS

1. SERVICE CHARGES:

(A) Additional Service connections are available with payment of additional service connection charge as shown in Section B.

(B) Replacement of service connection made necessary because of ordinary wear and deterioration will be made without charge. Replacement due to inadequacy because of additional demand or load will be charged as a new service connection.

2. INSTALLATION UNDER UNUSUAL CONDITIONS:

(A) Any condition which, in the opinion of the Engineering Manager, Water-Gas-Wastewater will result in a cost higher than the charges set forth in Section B will be classified as unusual. The charge for an unusual installation will be based on Engineering Manager, Water-Gas-Wastewater's estimate of the total costs of all materials, labor, and other costs incidental to the installation.

(B) In the event water service to a premises is requested and insufficient capacity exists to provide such service, the applicant shall bear the total cost for enlarging the distribution system to accommodate serving the applicant. The Engineering Manager, Water-Gas-Wastewater may require the applicant to make arrangements for the design and construction of said expansion in accordance with City standards and specifications. Alternatively, the Engineering Manager, Water-Gas-Wastewater may elect for City forces or contractors to design and install respectively such facilities at the applicants' expense.

3. EXCEPTIONS:

(A) Water Service Areas 3 & 4, connections served directly from supply main: The distribution system charges (Section B) will be based on a maximum frontage of 660 feet. This exception applies to single applications for service and does not apply to subdivisions or tracts.

(B) The subdivision developer will furnish and install the water system at his or her expense and in accordance with City's specifications.

D. OTHER SERVICES:

1. MANIFOLD:

   (A) 2 Inch $612.00

2. ABANDONMENT:

   (A) Small service less than 2 Inch $952.00
   (B) Large service more than 2 Inch 1,383.00

3. METER INSTALLATION:

   Charges for meter installations by third parties, i.e. contractors, homeowners, etc.

   5/8 Inch to 2 Inch $76.00
   3 Inch to 6 Inch 228.00

4. FIRE HYDRANT:

   (A) Install New Hydrant without Lateral $2,830.00
   (B) Install New Hydrant with Lateral 9,785.00
   (C) Relocation behind curb (up to 5 feet) 4,261.00

   Relocations more than 5 feet will require a New Lateral and the existing Lateral will be disconnected and abandoned at the main.

5. OTHER FEES: Per Hour

   The following fees will apply to utility work performed by outside contractors:
   (A) Engineering Fee $132.00
   (B) Utility Inspection Fee 102.00

{End}

2012-2013 RATES

RESIDENTIAL: For each dwelling or living unit, a charge of five hundred twenty dollars ($520.00) per year.

COMMERCIAL AND INDUSTRIAL: For each commercial or industrial user, a charge in accordance with the annual use of water by each establishment times the applicable rate as follows:

7.5417 per hundred cubic feet for Restaurants.
4.1729 per hundred cubic feet for Educational Facilities.
3.9193 per hundred cubic feet for Offices and Churches.
4.3299 per hundred cubic feet for Motels.
4.3310 per hundred cubic feet for Commercial.
4.8289 per hundred cubic feet for Medical.
4.6430 per hundred cubic feet for Industrial.
4.3299 per hundred cubic feet for Recreational.

No individual commercial or industrial establishment should be charged less than five hundred twenty dollars ($520.00) per year.

Appendix I

California Department of Public Health Safe Drinking Water State Revolving Fund Information

California Department of Public Health Safe Drinking Water State Revolving Fund Information

Project Eligibility

All eligible projects must facilitate compliance with national or State primary drinking water regulations or further the health protection objectives of the SDWA. Eligible projects are listed below:

1. Compliance with primary drinking water standards and related public health objectives.
2. Projects to provide treatment to meet drinking water standards and optimize water quality.
3. Consolidation of water systems - improve the safety of public water supplies by enabling systems to achieve and/or maintain compliance with the SDWA to consolidate with another water system that is in compliance with the SDWA.
4. Projects to replace aging infrastructure to enhance long term reliability of drinking water infrastructure.
5. Water, Energy Conservation and Security - SDWSRF can fund components to enhance the benefits of the needed project by including meters to encourage water conservation, energy conservation and reliability (e.g. auxiliary power and green power), and security (e.g. SCADA).
6. Land Acquisition - Acquisition of land is only eligible if it is integral to a project that is needed to meet or maintain compliance or further the public health protection of the SDWA.
7. Planning and Design of a Drinking Water Project - Projects to assist a water system with the costs of planning, design and other related costs to get a drinking water project ready for construction. State SDWSRF regulations allow planning funding (loan and/or principal forgiveness) of up to $500,000.

Project Priority Ranking Criteria

1. In establishing the PPL, CDPH ranks projects in order of the degree of health risk associated with the problem that the proposed project is intended to solve. Projects solving the most serious health risk and SDWA compliance problems receive the highest ranking. In general, CDPH considers categories A through G to be high priority, categories H through K to be medium priority and categories L through O to be low priority. Focusing on solving public health risk problems, CDPH has been inviting all projects in categories A to G on the Project Priority List (PPL) for funding consideration for several years and will continue to do so.

SRF Category	Problem Description
A	Water systems with deficiencies that have resulted in documented waterborne disease outbreak illnesses that are attributable to the water systems, or water systems under a court order to correct SDWA violations and/or water outage problems.
B	Water systems that have repeatedly violated the total coliform MCL (TCR) due to active sources contaminated with coliform bacteria (fecal, E. coli, or total coliform).

SRF Category	Problem Description
C	Water systems that have a surface water supply; a groundwater under the direct influence of surface water (GWUDI) source, that is not filtered, or untreated; or non-GWUDI well sources that are contaminated with fecal coliform or E. coli.
D	Water systems that have surface water or GWUDI sources with filtration treatment deficiencies that violate federal or state regulations concerning surface water treatment requirements; non-GWUDI wells that are contaminated with fecal coliform or E. coli and are inadequately treated; or uncovered distribution reservoirs.
E	Water systems with water outages, significant water quantity problems caused by source water capacity, or water delivery capability that is insufficient to supply current demand.
F	Water systems that distribute water containing nitrates/nitrites in excess of the MCL; distribute water containing perchlorate in excess of the MCL; or are in violation of the Total Coliform Rule for reasons other than source contamination.
G	Water systems that distribute water containing chemical or radiological contamination exceeding a State or Federal primary drinking water standard (other than nitrate/nitrite or perchlorate).
H	Water systems with reservoirs with non-rigid (floating) covers that are in active use; or water systems that do not provide meters for the water delivered to customers.
I	Water systems that comply with surface water treatment requirements, but are not in conformance with the California Cryptosporidium Action Plan.
J	Water systems that are in violation of portions of the Water Works Standards those could result in the entry of wastewater into the water supply or distribution system
K	Water systems that operate disinfection facilities lacking needed reliability features, chlorine residual analyzers and alarms or have other disinfection deficiencies that violate the Water Works Standards. .
L	Water systems that distribute water in excess of the iron or manganese secondary standard and for which a compliance order has been issued; distribute water in excess of CDPH published chemical Notification Level; distribute water which has exceeded a primary drinking water standard in one or more samples, but has not violated the standard (for a running average standard); or need treatment for a standby groundwater source that is contaminated in excess of a primary MCL.
M	Water systems that do not meet the Water Works Standards (other than those components already covered by the above listed categories), or do not meet the TMF criteria but do not have a project in any of the above categories.
N	Water systems that distribute water exceeding secondary standards.
O	All water system deficiencies that are eligible and are not covered in any of the above categories.

2. Bonus Ranking Points

Bonus points are used in ranking projects within a category. The addition of bonus points will not move a project from one category to another. To the extent feasible, when a group of systems is invited to complete the application for SDWSRF funding, all the systems within that category seeking funding that year are invited.

a. Affordability

CDPH factors in affordability by comparing the MHI of the community served by the proposed project to the statewide MHI level. Communities that are below the statewide average MHI level receive additional ranking consideration. Additional affordability ranking points will be granted as follows:

MHI of Service Area	Ranking Points
Greater than statewide MHI	0
90%-100% of statewide MHI	5
80%-89% of statewide MHI*	10
70%-79% of statewide MHI	15
60%-69% of statewide MHI	20
Less than 60% of statewide MHI**	25

* <80% of statewide MHI is Disadvantaged
** <60% of statewide MHI is Severely Disadvantaged

Funding Limits

1. Non-disadvantaged Communities:

a. Construction Funding

Construction funding comprises the majority of the project financing made available by the SDWSRF. Construction funding is provided to projects that are ready to proceed to construction within one year. Generally, the following terms and conditions apply:

(1) Maximum length of a loan is 20 years or the useful life of the project, whichever is less;
(2) Interest rate is 50 percent of the average interest rate paid by the State on general obligation bonds issued in the prior calendar year;
(3) Maximum amount of funding for each project during any one fiscal year is $20,000,000*;
(4) Maximum funding for any system is $30,000,000 per fiscal year* (*except as provided in CCR Section 63012).

2. Disadvantaged Communities

The terms and conditions for SRF financing of non-disadvantaged community projects are applicable to disadvantaged community projects as well. However, as provided for by state and federal statutes, disadvantaged communities (see discussion under Section VII) may be eligible for additional financial assistance in the form of lower interest rates, extended repayment periods, or forgiveness of principal (subsidy/grant). The additional allowable terms and conditions include:

(1) A disadvantaged community project, if necessary, may receive a construction loan of up to 30 years as long as this does not exceed the expected useful life of the project;
(2) The applicable interest rate for loans to disadvantaged communities is zero percent;
(3) Financial subsidy may be awarded to a disadvantaged community owned by a public entity or not-for-profit entity.